Department of Biology

Academic Program Review

Self-study document
February 2017
The study of biology is fundamental to any university, and biology has been a part of the curriculum at the University of New Mexico since the late 19th century. Early programs focused on organismal level biology of plants and animals. However, courses in ecology were taught from early in the 20th century when this discipline was just beginning to become important in the United States. As the focus on organismal biology waned in the late 1970s, the department built an internationally recognized program in ecology and evolution. Programs in cell and molecular biology were added more slowly, mostly due to lack of funds and space. However, we have excellent individual programs that are gaining recognition in some areas of integrative and cell/molecular biology at present. Recent additions of programs and faculty have continued to build in these areas.

The biology department grew slowly during the university’s first half century, having only two or three faculty until the late 1940s, and less than 10 faculty until the early 1960s. Enrollment grew rapidly starting in the late 1950s, but growth in faculty numbers did not occur until the late 1960s. By 1977, there were 27 biology faculty members, and by 1984 there were 30. Numbers of tenure-track faculty reached the mid-30s by 1990 and since that time, despite more than doubling the number of biology majors, tenure-track faculty numbers have remained flat. The number of lecturers has increased from two in 2000 to more than eight full-time equivalents, with their function largely to accommodate the substantial increase in demand for non-majors courses, entry-level majors courses, and preparative courses for health science careers.
A brief description of the organizational structure and governance of the unit, including a diagram of the organizational structure.

The Chair of the Department, Dr. William Pockman, serves as the administrative director of the unit, and he reports directly to the Dean of the cognate college, Arts & Sciences (A&S). The Chair oversees all aspects of Biology's function including budgeting, faculty matters (including recruitment, retention, review and evaluation), facilitating research, and overseeing the teaching mission. The Chair is aided by administrative support. Three Associate Chairs are appointed by the Chair and oversee specific sub-activities within the Department: currently, Dr. Kelly Miller oversees curriculum matters and scheduling; Dr. Lee Taylor oversees space assignment and graduate studies, and Dr. Howard Snell is tasked with faculty evaluation, promotion and retention issues. This leadership team meets regularly to discuss and address significant issues that arise, and to oversee the activities of numerous sub-committees that also function to administer important department issues, including space assignment, graduate admissions, APR development, undergraduate policy, and many others. Subsequently, most major departmental decisions are made following consultation with and (depending upon the issue) vote from the Biology faculty following presentations from the active committee. A list of department committees and administrative duties is provided in Appendix 0-1.

Departmental activities also essentially depend upon a staff supported by the Instructional and General (I&G, State Line) budget. Staff duties include department administration, accounting, human resources, facility operations, animal facility maintenance, management of the Molecular Biology Facility, grant preparation, web activities, and graduate program coordination (see organization chart, Figure 0-1). In the past few years, some additional state-line activities within the department have been taken over by the College of Arts & Sciences, including undergraduate advising and computer maintenance. These takeovers were performed for budgetary consolidation and to streamline operations between departmental and college advising functions.

![Figure 0-1 Department of Biology staff organizational chart.](image)

The Department also overlaps significantly with the Museum of Southwestern Biology (MSB). MSB has its own Director (Dr Joseph Cook) who for MSB activities reports to the A&S Dean, and who is also a tenured faculty member within Biology. The MSB comprises nine divisions that are overseen by seven tenured Biology Department faculty members who serve as curators (including Dr Cook, who curates two divisions). These faculty curators manage and develop their museum divisions and supervise collections managers and other staff. Eight
of the nine divisions within the MSB have dedicated 1.0 FTE, I&G-funded Collections Managers and, during the Fall and Spring semesters, 0.5 FTE Graduate Assistants that are funded from the Biology Department assistantship allocation from the College of A&S. The MSB also has a full-time Administrative Assistant who reports to the Director. Thus, the MSB occupies a complex administrative position within the Department of Biology, with some activities reporting separately to the College, but most financial (staffing) and faculty activities also channeled through Biology. The Department has a formal administrative agreement with the MSB (Appendix 0-2).

0D. Information regarding specialized/external program accreditations associated with the unit including a summary of findings from the last review, if applicable. If not applicable, indicate that the unit does not have any specialized/external program accreditations.
The Department of Biology does not have any specialized program accreditations.

0E. A brief description of the previous Academic Program Review for the unit. The description should note when the last review was conducted. The description should also provide a summary of the findings from the review team’s final report, the resulting action plan to address the recommendations, and a summary of actions taken as a result of the previous academic program review.
The prior Biology Academic Program Review was carried out in 2008. The following points were the main items of emphasis from that review:

- Achieve critical mass in Cell/Molecular Biology (CMB) faculty by making competitive offers, undertake coordinated hires ahead of retirement of distinguished Ecology, Evolution, Organismal and Behavior (EEOB) faculty, hire outstanding minority candidates, strive to integrate, increase interdisciplinary approaches and favor international emphasis

We have made progress in this regard: we hired two new cell/molecular biology faculty members, and although one of those left after three years, we recently hired a replacement. It is still a challenging venture to hire cell/molecular biology faculty because in many cases our candidates are also being recruited to medical schools for which startup and salary costs are far higher than we are able to offer. We also hired two Associate-level faculty with expertise broadly in ecology to replace senior retirees, and we hired an ecologist at the junior level, and a quantitative ecologist to replace a senior faculty member (Dr. Bruce Milne) who obtained an endowed chair in Sustainability. We also have been fortunate in making a number of spousal hires that have enhanced our faculty ranks. Despite these enrichments to our faculty, in recent years we have suffered from retirements and faculty who left the university to take up positions elsewhere. Thus our overall faculty numbers have not significantly increased since the last review. See Criterion 5 for further details on faculty.

- Improve career trajectories for Lecturers, reduce faculty salary inequities, value the work of MSB curators more

For the lecturers, Biology lecturers developed a proposal for creating career trajectories for lecturers which paralleled the three ranks normally assigned for research faculty, and created criteria and mechanisms for review and promotion. Moreover, it includes hard-wired salary increases following promotion that track the increases for promotion of tenure track faculty. Lecturers can also receive a one-semester sabbatical. This proposal was unanimously supported by the Biology Department. The proposal ultimately resulted in the creation of the new lecturer streams, criteria for how promotions would be evaluated, and this process was formalized in a revised Faculty Handbook.

For faculty salary inequities, we have made some progress despite extremely tight budgetary constraints. In 2012, the Provost released funds to address salary compaction and inequities, wherein around ten Biology faculty received significant raises. The Dean of A&S has also provided funds to partially address continuing inequities, and inequities caused by new faculty hires. Because the funds made available for these salary adjustments have been limited, inequities persist compared to both other departments in the College and compared to peer institutions (see Criterion 6), and ongoing budgetary constraints in the state make it difficult for faculty to obtain pay raises unless through promotion, administrative appointments, or retention. These
problems are only compounded by unresolved salary compaction among faculty ranks.

For the MSB curators, there is fundamental agreement that curators should receive recognition for their curatorial work. Currently, an evaluation of curatorial activities is not required to form part of a Faculty Curator’s annual review, nor is it necessarily a required consideration for promotion and tenure decisions, even though those evaluations should contribute to promotion and tenure decisions, according to College of Arts and Sciences directives. Resources to specifically recognize these activities (such as course releases, and Summer compensation for building and managing the infrastructure, plus supervision of staff throughout the year) have not been a university priority, although faculty curators do now receive some Summer compensation.

- **For undergraduates, improve outcomes assessment and career tracking, develop emphasis areas**
  We have made some progress in improving outcomes assessment and career tracking, although limited resources have hampered our progress. As described in more detail in Criterion 4, a recent alumni survey provided encouraging data that many of our graduates obtain or retain careers directly related to their Biology degrees, or use expertise learned during their degrees for their current employment.

  Regarding emphasis areas, we recently created an undergraduate concentration in ecology, evolutionary and organismal biology (Concentration in EEOB), in which several students per year participate. Currently, eight students are registered for this concentration. This concentration functions alongside the ongoing Concentration in Conservation Biology that serves 20-40 students per year, with about ten per year ultimately completing the latter concentration.

- **For graduate students, increase and improve recruiting efforts (especially for minorities) and salaries, work with other UNM units to develop a CMB core, consider rearranging Bio 500 to make it more relevant, consider adopting a Professional Masters program, consider making Research Day more of a grad recruitment opportunity**

To increase minority graduate student applications, for several years we promoted our program at the annual meeting of the Society for the Advancement of Chicanos and Native Americans in the Sciences (SACNAS), and provided application fee waivers to students who visited the booth. However, this did not have a discernible effect upon the proportion of minority applicants to our graduate program, and we have discontinued this activity. We are currently discussing ways to enhance minority graduate student enrolment.

For general recruiting, we now have an annual open house to which our top candidates are invited to view our facilities and meet with faculty, students and staff. We have not observed a significant increase in applications from minority candidates, although the number of minority graduate students has increased. This graduate open house functions separately from our annual Research Day; they cannot be combined because it is necessary to make Research Day later in the semester to ensure that undergraduates have sufficient time to generate data to present. While we have yet to develop a CMB core for graduate students, several of our CMB students attend the core offered in the Health Sciences Center Biomedical Sciences Graduate Program, for which courses are acceptable for biology graduate credit. Once again, due to resource limitations, we have not been able to significantly increase graduate student stipends. Our base rates for teaching assistantships are higher than the minimum level mandated by the University, but these rates have not increased for several years. Biol 500 has been expanded slightly so that all incoming graduate students take a Research Ethics class as part of their orientation. Thus, all of the graduate students in our program are versed in research ethics topics: this is a positive outcome in its own right, and further it meets requirements set by federal funding agencies that graduate trainees should have ethics training for any federal support that they receive.

- **Regarding staffing, hire an IT person to help with recruiting and to update webpage, an additional student advisor is needed, somehow improve outcomes assessment and student tracking, more support staff for 300-400 courses is needed**

Since the last review we have updated the webpage (and a second update is ongoing), and all graduate applications are now online through Graduate Studies. We have not enhanced our IT capabilities: IT support is now coordinated through College employees, although one College IT employee is permanently housed in Biology. We also have not obtained the resources to enhance 300/400-level support staff.
Other goals should be to improve outreach efforts, work with the administration to improve return of overhead funds and service provided by pre-award grant offices, accept the reality of Rio Rancho campus and use it to our advantage, do a better job with outside fundraising, be skeptical about the business model for running UNM, and continue to seek upgrades of facilities.

Our outreach efforts have improved through an ongoing and increasing interaction with the University Foundation for fundraising, and the past few months we received a $50,000 donation to the department which is expected to double in the next year. We are working toward utilizing recent upgrades in UNM’s ability to track and contact alumni in the interest of building a network of donors to support our programs.

We have worked long and hard with pre-award services but there has actually been a decrease in the quality and support from that office in the last year, and the current interaction with the Office of the Vice Provost for Research could be described as frigid. The return of overhead funds generated by our research has also decreased with the implementation of a new model of research administration, nicknamed “Top Slice”, wherein the OVPR keeps a flat amount (the Top Slice) required to fund their operations, and returns the remainder to the Colleges for distribution to the units that generated it. Under this model, the OVPR no longer participates in start-up funding for new faculty, increasing the amount of each start-up that falls to Biology from 21% to 40%. Recently the amount of the Top Slice has been increased to provide funds needed to implement a Research Strategic Plan that is presently under development. Regarding Rio Rancho (a new UNM campus to serve individuals from across town), the administration de-emphasized this campus for a period of time, but new plans are afoot to provide several pre-health classes at that campus to support Nursing and Medical Technology programs. In the future this may mean that Biology in the future will have to develop some presence over there, although the details of these plans are not yet fully apparent.

We have made progress in facility upgrades in a number of areas, including completion of a new wing of the Biology building that added approximately 50,000 square feet to our footprint, and a state of the art new greenhouse on the roof of the building. We also are recipient of a COBRE award from NIH that supports facility development, and this grant has enabled us to maintain relevance in molecular biology and cell biology equipment and expertise (see Criterion 7 on Facilities).
Criterion 1. Program Goals

The unit should have stated learning goals for each program and demonstrate how the goals align with the vision and mission of the unit and of the university. (Differentiate by program where appropriate.)

1A. Provide a brief overview of the vision and mission of the unit and how each program fits into the vision and mission of the unit.

The department has a threefold mission: (1) to train undergraduate and graduate students, (2) to conduct high-quality, nationally and internationally recognized research, and (3) to serve the community, the University and our disciplines.

Our more specific goals across the unit are:

1) Maintain our nationally and internationally recognized programs in ecology and evolutionary biology, comparative immunology, and cell and molecular biology.
2) Have the flexibility in space and resources to allow modest expansion of the faculty to facilitate coalescence and strengthening of particular research groups representing areas of departmental strength and visibility. Part of our strategy is to enhance areas that are distinctive from, and not mere repetitions of, research emphases in other regional universities.
3) Partner with the Museum of Southwestern Biology by working with our faculty who are museum curators so it can continue to maintain a high level of international recognition for its programs in systematics, phylogenetics and conservation biology.
4) Work closely with the UNM administration to ensure that equitable distributions of overhead funds generated by our activities continue to flow back to the department. Without such funds, our ability to offer competitive start-up packages, to provide transitional funding, and to favor new innovations would be severely impacted.
5) Attract top-notch graduate students and to work with the UNM administration to provide them competitive stipends, health benefits, and more options for research assistantships.
6) Continue to work to improve the overall quality of our undergraduate curriculum, particularly at the upper level, by providing more meaningful lab experiences featuring more state-of-the-art equipment and techniques.
7) Involve a substantial number of undergraduates in research in faculty labs or working on faculty-directed projects.
8) Continue to increase faculty diversity.
9) Increase the number of minority students who choose careers in science.
10) Provide an undergraduate education that emphasizes the processes and skills of science in addition to providing content knowledge. To accompany this, we also encourage UNM to increase admissions standards as a way to increase the university’s national ranking.
11) Provide effective advising that allows students to progress through the curriculum smoothly, and to enhance our overall retention and graduation rates.
12) Improve faculty salaries to be competitive with our peers.
13) Improve both the amount and quality of teaching and research space to meet the needs of our growing student population and our many well-funded research programs.
14) Develop partnerships with the community that increase science literacy and improve K-12 education.
15) Devise ways to interface effectively with the many components of UNM (engineering, pharmacy, medicine, to name some) that want to partner with the Biology Department to develop academic or research programs. This must be done in a way to favor innovation without risking loss of focus or identity of the department.
16) Continue to work to improve career development and future prospects for our lecturers, research faculty and post-doctoral associates.
17) Acquire more staff to assist in important activities like outcome assessment, and to do all we can to encourage staff career development and high staff morale.
18) Finally, to continue to function as one large, strong, highly interactive department without barriers, rather than to split into multiple, smaller independent units that would soon be competing for university resources and lose overall cohesion. For this, we ideally need to increase our faculty size to 50-60 faculty.
It is further recognized that many students enter this curriculum with specific career goals, and therefore the special missions of the department include:

1. Preparation of biology majors for successful entry into graduate education programs in biology and related disciplines.
2. Preparation of students for successful application to medical school, veterinary school, and dental school.
3. Preparation of students for employment in positions in industry or governmental agencies (biotechnology, conservation policy), as laboratory research technicians and field biology workers and, in part, as teachers in secondary schools.

The B.S. is a traditional degree and the one sought by most of our majors. A number of years ago, a group of faculty thought that we were missing a chance to serve a population of students who had more interdisciplinary interests. These students, it was argued, would be well served by a less intense biology degree so that they would have time to pursue substantial work in another discipline. Therefore, the B.A. program was created. This degree requires four hours less biology, less math and less rigorous training in physics. While many faculty still believe that the B.A. program serves the original purpose, those who do undergraduate advising have another opinion. Students who are unable to complete the more rigorous parts of the B.S. degree, often at the last minute, opt for the B.A. Alternatively, some students seeking preparation for graduate programs in Physical or Occupational Therapy find the B.A. a useful option. Advisors virtually never see students use the B.A. to pursue an interdisciplinary program.

Our graduate program is based on breadth and diversity rather than on specialization and concentration. We have tried consciously to maintain a faculty whose research interests span much of the breadth of modern biology. This enables us to recruit graduate students with diverse backgrounds, and to encourage them to pursue a wide variety of individualistic, interdisciplinary research and training programs.

**Ph.D. Degree:** The majority of our doctoral students still aspire to obtain jobs in academia that require some combination of teaching and research; these range from primarily teaching positions at community colleges and small private colleges, to research and teaching positions at major state and private universities, to curatorial positions at museums. Increasingly, however, our students are seeking and obtaining positions in industry (e.g., biomedical, environmental consulting, risk assessment, bioremediation, genetic engineering), government agencies (e.g., forensics, environmental health, and environmental management with Albuquerque Police Department, New Mexico Departments of Health and Environment, and U.S. Environmental Protection Agency, Bureau of Indian Affairs, Fish and Wildlife Service, Forest Service, and Bureau of Land Management), and non-government organizations (e.g., The Nature Conservancy, World Wildlife Fund, Audubon Society).

**Master's Degree:** Most students in the Master’s degree program aspire to obtain additional training to prepare themselves for further graduate study, either in professional areas, such as medicine, dentistry and law, or in the natural, social and engineering sciences. Some M.S. students seek employment in secondary education, with government agencies, or in the private sector.

**1B. Describe the relationship of the unit's vision and mission to UNM's vision and mission.**

The University of New Mexico is the state’s flagship research university. With more than 27,000 students on the Main Campus alone, it is also the state’s largest university. The university has 12 colleges and schools, including a School of Medicine and a School of Law. It also has five branch campuses. With 47 doctoral programs, UNM is classified as a Carnegie Research University with Very High Research Activity. Unlike almost any other university in that category, UNM is an institution with High Hispanic Enrollment and 34.5% of Main Campus students are Hispanic. UNM is defined as a Hispanic Serving Institution by the Hispanic Association of Colleges and Universities. UNM is an urban university with a large number of non-traditional students. The average age of UNM students is 27 years. This aligns well with the university’s mission of education, scholarship and service.
described below.

The study of biology is fundamental to any university, and biology has been a part of the curriculum at the University of New Mexico since the late 19th century. Early programs focused on organismal level biology of plants and animals. However, courses in ecology were taught from early in the 20th century when this discipline was just beginning to become important in the United States. As the focus on organismal biology waned, the department built, starting the late 1970s, an internationally recognized program in ecology and evolution, which was closely followed by international programs in integrative biology and cell/molecular biology. Recent additions of programs and faculty have continued to build in these areas.

The current UNM Mission statement is threefold:

- “UNM will provide students the values, habits of mind, knowledge and skills that they need to be enlightened citizens, to contribute to the state and national economies, and to lead satisfying lives.”
- “Faculty, staff, and students create, apply, and disseminate new knowledge and creative works; they provide services that enhance New Mexicans' quality of life and promote economic development; and they advance our understanding of the world, its peoples, and cultures.
- Building on its educational, research, and creative resources, the University provides services directly to the City and State, including health care, social services, policy studies, commercialization of inventions, and cultural events.

By providing high-quality education for NM citizens, training graduate students through our graduate programs, supporting high-quality research that is of critical importance to society, improving K-12 education, and through our efforts to increase the diversity of faculty, staff and students, create distinguished programs and improve UNM’s competitiveness in obtaining grants and contracts, we feel Biology's goals align nicely with UNM's.

Extension of 1B: In order for the university to better showcase your unit, please explain the importance of its contribution to the wellbeing of the university including the impact of the unit's degree/certificate programs on relevant disciplines/fields, locally, regionally, nationally, and/or internationally?

We train biologists, including students headed to medicine, environmental biology, bioinformatics, and a variety of related careers; we train students in related fields including many pre-health students; and we train many graduate students who go on to academia or research careers in the private sector, or local government/environmental positions. We are the top-earning department on campus when it comes to F&A, and these funds are used to support many academic levels including the OVPR functions, plus functions in the college that do not necessarily benefit Biology but that help out other departments. For example, start-up costs in chemistry are extremely high, and usually have to be supported by the college at a higher level than the college normally would support. That flexibility in funding by the college comes from the large amounts of overhead that are generated by entities such as Biology, Physics and Earth & Planetary Sciences.

1C. List the overall learning goals for each undergraduate and/or graduate program within the unit. In accordance with the Higher Learning Commission’s Criteria for Accreditation, student learning goals and outcomes should be articulated and differentiated for each undergraduate and graduate degree/certificate program.

We were tasked with coming up with new learning goals for each program within our unit two years ago.

Broad Program Learning Goals for B.A. and B.S.

A. To understand a wide range of basic principles in modern Biology
B. To comprehend the scientific method and its application to problems in Biology
C. To learn how to interpret and present biological data in written and oral formats
Broad Program Learning Goals for M.S. Biology
1) Knowledge of fundamental facts and theories across biology.
2) Familiarity with ongoing areas of research in biology.
3) An appreciation of the need for an ethical framework in biology.

Broad Program Learning Goals for Ph.D. Biology
1) A deep understanding of biological theories, questions and approaches
2) Capacity to build upon existing knowledge to create new knowledge and insight into biology through original, ethical research

1D. Explain the manner in which learning goals are communicated to students and provide specific examples.

The goals for each of our programs are included on the College of Arts and Sciences assessment web page (http://artsunm.edu/assessment/program-assessment.html). Our B.A. and B.S. majors are all required to take four core courses, Cell/Molecular Biology (BIOL 201), Genetics (BIOL 202), Ecology and Evolution (BIOL 203), and Plant and Animal Form and Function (BIOL 204) before moving on to the upper level courses. Each course has its own specific learning goals, and these are provided on the syllabus for each course.

The graduate learning goals are posted on our Graduate Program pages (http://biology.unm.edu/graduate/UNM-Biology-Graduate-SLOs-Oct-10-2016.pdf). In addition, they are mentioned and provided to the new graduate students during the one day orientation at the beginning of the Fall semester.

1E. Describe the unit's primary constituents and stakeholders.

We consider our primary constituents to be:
1) the undergraduate students who either:
   a. major in Biology; or
   b. take biology courses as pre-requisites for other science majors (e.g., Biochemistry); or
   c. take non-majors Biology to meet their UNM general core curriculum requirements (BIOL 110, BIOL 112); or
   d. take specific Biology courses as required courses for health-related majors on campus (e.g. EMS, Physical Therapy, Nursing), including Anatomy and Physiology I and II (BIOL 237 and 238), and the associated labs (BIOL 247 and 248), and Introductory Biology for the Health Sciences (BIOL 123), and its lab (BIOL 124), and Medical Microbiology (BIOL 239).
2) the M.S. and Ph.D. students we train.

The annual number of graduating students in Biology over the past five years has been 200-250 B.A. or B.S degrees, and 10-30 M.S. and Ph.D. degrees. For pre-health students, enrollment in the Spring 2017 semester alone for BIOL 110/112 (Biology for non-majors) is 198 students, 558 students in BIOL 123 (Biology for health science), 350 students in BIOL 124L (laboratory for BIOL 123), 278 students in BIOL 237 (Anatomy & Physiology I), 276 students in BIOL 238 (Anatomy & Physiology II), and 154 students each in 247L and 248L (laboratories associated with BIOL 237 and 238 respectively). These numbers have been relatively consistent, every semester, for the past 5 years, and indicate that our instructional duties are high for a faculty of our size.

In addition, our research activities serve a significant number of important constituents both on the UNM campus and externally. The newly created Center for Stable Isotopes, whose Associate Director (Dr. Seth Newsome) is a faculty member in Biology, analyzes stable isotope samples for researchers and labs around the world. Research staff and faculty from across the UNM campus also use our Molecular Biology facilities, and other facilities offered through the Center for Evolutionary and Theoretical Immunology (CETI), the UNM Sevilleta Field Station offers state-of-the-art laboratory facilities, accommodations and conference facilities, as well as access to over 100,000 acres of desert, riparian, and low-elevation savanna and woodland environments that
represent many of the dominant ecosystems across the Southwestern US. The new LTER project is also expected to broaden ecological research at the Sevilleta National Wildlife Refuge. The Museum of Southwestern Biology is a world-class research museum that houses specimens heavily in demand from researchers all over the world. Three collections are among the largest worldwide (Mammals-3rd; Frozen Tissues-1st, Parasitology), while all other divisions are among the largest in the Southwest (Texas to California).

We consider the primary stakeholders of our unit to be future employers of our undergraduate and graduate students, and more broadly the scientific community who benefit from our service to the community. Importantly, many of our faculty do research that informs policy making at both the state and federal level, including Dr. Tom Turner’s work on conservation genetics of fish in NM watersheds, Dr. Matt Hurteau’s research on best management practices to promote carbon sequestration in western U.S. forests, and others. In addition, many of our faculty serve on editorial boards and grant review and funding agency committees that directly impact research and policy across the country.

Finally, the public is also an important stakeholder in the department. Local, national and international news media often ask the faculty and research staff for comment and analysis on scientific topics that are of interest to the general public.

The Museum of Southwestern Biology is a major contributor at UNM to public service and outreach efforts, especially activities related to thoughtful (science-based) management of natural resources. We are heavily involved with municipal (Albuquerque and Bernalillo County Open Space Initiatives), state (NM State Lands Office, NM Game and Fish, Rare Plant Society, regional BioBlitz’s, etc.) and federal (USDA Forest Service, US Fish and Wildlife Service, Bureau of Reclamation, National Park Service, etc.) agencies through funded projects ranging from New Mexico to Alaska. Many of our outreach efforts are related to developing effective management plans for state and federal resource agencies. International organizations also rely on our specimens, data and expertise to help them design and implement public health initiatives. MSB has built a strong tradition in the public health arena in efforts related to identifying zoonotic pathogens (e.g., hantavirus) and understanding the ecology of zoonotic diseases and wildlife diseases in the western US, but also in a number of international settings.

Due to the vast spatial and temporal biodiversity data managed by the museum, the MSB is now a key component of national and international efforts in bioinformatics, both environmental and genomic. This activity is recorded in the number of hits (and downloads) from our databases, number of loans and number of publications based on these materials and data. MSB faculty and staff have been heavily engaged with faculty in other departments and in other colleges—perhaps more so than other units on campus. We have established long-term collaborative efforts with the School of Medicine and with the Arts and Ecology Program (College of Fine Arts), and Anthropology, Geography, History, and other disciplines. We have MOUs in place that are active and productive including one with New Mexico Museum of Natural History and Science (e.g., new exhibits, videos and student interns through the new graduate museum studies program) and NM State Lands Office (e.g., biotic inventories of sensitive species on state lands slated for development). Our staff serves on national boards including the Board of Directors of American Society of Mammalogists, Flora of North America, Society of Ichthyologists and Herpetologists, Entomological Society of America, and the Natural Science Collections Alliance, the primary advocacy group of administrators and curators who oversee research-oriented museums of natural history. This alliance is closely tied to American Institute for Biological Sciences in Washington, DC. MSB staff also serve on Steering Committees for several national initiatives, including VertNet, CollectionsWeb (NSF RCN), Aim-Up! (NSF RCN UBE), and the National Integrated Biocollections Alliance, a Research Coordinating Network focused on translating the vast digital resources of natural history museums into a catalyst for greater research productivity and educational transformation in the US. A number of metrics demonstrate outreach including annual averages of >250,000 web hits, 169 loans comprising thousands of specimens, 470 professional visitors to the collections, and 143 publications by scientists not affiliated with UNM.

1F. Provide examples of how satisfaction of the program goals serves constituents.

All of our program goals are intended to enable us to be more effective in our jobs, including research, teaching, curation, and service.

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1G. Provide examples of outreach or community activities (local, regional, national, and/or international) offered by the unit. These could include activities such as colloquia, conferences, speaker series, performances, community service projects, etc. Provide an assessment of these activities in relation to the unit’s educational objectives.

Biology hosts a weekly departmental seminar, most often from another university or government agency, to expose our students and faculty to new ideas and promote dialogue both within our department and the broader community. This seminar series is widely distributed, both within UNM and to interested parties in the greater Albuquerque/Santa Fe area.

We are in the process of redoing our webpage to more effectively highlight the accomplishments of the department. The result will include an embedded list of our current class offerings, a comprehensive bibliography of the research products of the department, and more accessible information on the requirements of our various degree programs.

We host “Research Day” each year in the Spring, to highlight the research of our undergraduates, graduate students, and students in other departments affiliated with Biology. We typically have approximately 60 posters, and 20-30 students each year are able to give oral presentations. On this day, we also host a speaker of international stature to speak to the whole department.

The Bosque Environmental Monitoring Program (BEMP) is a remarkable program that, since 1999, has engaged K-12 and college students in citizen science. Most importantly, their research informs multi-million dollar natural resource management decisions (Eichhorst et al. 2012). BEMP has an office in our department, and every Spring and Fall semester they teach a class for UNM undergraduate and graduate students to help coordinate the research across K-12 schools in the Albuquerque area. BEMP’s mission of science, education, and stewardship through long-term, hands-on student research annually involves 10,000 people, including >3,000 K-12 students that participate in monthly field research that monitors ecological responses to climate, fire, drought, and human impacts. BEMP’s goals are to deliver field-based science consistent with national science education reform efforts and to provide natural resource managers with accurate and timely analysis of ecological data. BEMP staff and UNM students are in the field with students and then in their classrooms as students analyze results. Most BEMP funding derives from contracts with natural resource agencies to provide deliverables of stream related research. Most BEMP students are from underrepresented groups, including 55% Hispanic and 11% Native American. Many of BEMP’s educational materials are bilingual (Spanish/English). Since 2014, BEMP (in partnership with Luquillo LTER) hosts a formal student webinar in Spanish for students to share their research. BEMP’s internal assessment shows that 70% of BEMP students who worked for the program as either high school or college interns are now either in a STEM career or discipline in college. BEMP staff and funding concentrate on engaging students with repeated, multiple contact-hour field experiences and follow up classroom and lab work. Hundreds of BEMP participants converge annually for a series of BEMP student symposia, which is held at UNM every other year. BEMP educational materials also support Common Core non-fiction reading goals (Shaw 2010, Shaw 2013). We are very fortunate that UNM undergraduate and graduate biology students play an integral part in BEMP through both quality control support and mentoring. UNM BIOL 408/508 students also contribute to K-12 classrooms by writing Data Nuggets, which consolidate long-term datasets into accessible, understandable nuggets for younger students.

The faculty of the Department of Biology also have a strong commitment to research training as part of their teaching activities. Accordingly, most faculty at any given time have several undergraduates working in their research groups, totaling approximately 200 undergraduates per year. In parallel, several faculty have taken the initiative to obtain grants for training programs:

Dr Cook has been PI on two NSF-funded programs UnO (Undergraduate Opportunities; NSF, 2007-2013). The Undergraduate Opportunities (UnO) Program supported 46 undergraduate students at the University of New Mexico by immersing them directly into evolutionary and ecological research projects across the Biology Department (25 faculty mentors, three staff mentors, five post doc mentors, and 31 graduate student mentors). In six years, UnO established a >94% retention rate, with 45 scholars graduated. Of these, 20 entered graduate programs to date (2 PhD’s awarded), 5 entered medical or vet school, and an additional 7 have professional
positions in biology. Several UnO scholars won prestigious national awards, including the Barry Goldwater Scholarship, Harry and Mabel Leonard Research Fellowship, James Drew Pfeiffer Memorial Scholarship, Maurice Hughes Scholarship for Excellence in Research, NSF STEM scholarship, and others.

AIM-UP! was an NSF-funded Research Coordination Network (2010-2016) that explored the use of natural history collections in undergraduate education. AIM-UP! refined existing efforts and developing new integrated approaches to collections-based training in large-scale questions using the expertise of educators, curators, collection managers, database managers, and scientists from > 45 institutions whose work spans disciplines and relates topics covering a spectrum of time and space.

The Initiative to Maximize Student Development (IMSD) program, funded by NIGMS to Dr Werner-Wasburne (2005-present), is an undergraduate/graduate training program for under-represented students. The program supports students for two years, and provides research training and professional development activities. Graduate students are supported, to enhance retention whilst in a PhD program. The IMSD program has been exceptionally successful: since 2004, they record 48 PhDs, 38 MDs, 2 MD/PhDs, 50 students in PhD programs, and 5 in medical school.

The Minority Access to Research Careers (MARC) program funded by NIH/NIGMS to Dr. Marshall (with an expectation of continued funding to Dr. Takacs-Vesbach as the new P.I.) supports ten pre-PhD students who conduct laboratory research with a faculty mentor. MARC students take a "Research Ethics" course during their first year in the program, and all MARC students present a poster or talk at the annual Department of Biology Research Day. During their second year, each student visits a laboratory at another university or research institute. MARC and IMSD programs at UNM work closely together and have created a system that moves students into the programs that best address their needs.

The FlyBase Diversity Action Plan is an award from NIH/NHGRI to the PI of the FlyBase genetic and genomic database program at Harvard Medical School, with funds sub-awarded to Drs. Cripps and Werner-Washburne at the University of New Mexico. This programs supports an undergraduate/graduate-level class entitled Frontiers in Genomics, that brings nationally-recognized genome researchers to UNM in the Fall semesters to teach. The program also supports five graduated students for two years each as they prepare for entry into PhD programs.

The NSF Research Experience for Undergraduates (REU) is awarded to Dr. Collins, and supports under-represented undergraduates for an eight-week summer internship at the Sevilleta National Wildlife Refuge.

The Postbaccalaureate Research and Education Program (PREP) is awarded to Dr Cripps by NIH/NIGMS, and supports full-time postbaccalaureate Scholars and they gain research experience and apply to Ph.D. programs in the biomedical sciences.

A listing of recent other outreach activities of note include:

Dr Adema has developed a PCR-based detection and sequence characterization of a locally transmitted nematode parasite, and collaborates with a local veterinarian to support diagnosis of infected dogs and obtain samples in the process.

Dr. Cook has mentored numerous high school students who have trained in the MSB, and been involved in field work, database entry, curation, and presentation of their findings.

Dr. Cripps has trained a high school student in genetics and molecular biology research, who has attended the Intel International Science Fair in each of the last two years.
Dr. Hurteau is a member of the Ecological Society of America’s Rapid Response Team and has conducted Capitol Hill visits to discuss climate change and wildfire with law makers.

Dr. Litvak has given 3 climate change talks to general audiences in the past year in Albuquerque, La Vida Llena (~50 people), Albuquerque Museum of Natural Science (~40 people), and St. Pius AP Environmental Science classes (~50 students).

Dr. Salinas has hosted over 200 school students from rural areas of New Mexico and Colorado to visit her laboratory. Students got to see the PI's aquarium facilities and observe live African lungfish breathing out of the water.

Dr. Toolson has presented talks on toxins to groups at Stanford University and to a group of nature lovers at the Western Heritage Museum in Hobbs, NM.

Dr. Witt starred in a 2016 PBS Nature episode, Super Hummingbirds, that was viewed by over three million people, and he has given several major public talks on his research that was featured in the documentary.
Criterion 2. Teaching and Learning: Curriculum
The unit should demonstrate the relevance and impact of the curriculum associated with each program. (Differentiate for each undergraduate and graduate degree/certificate program and concentration offered by the unit.)

2A. Provide a detailed description of curricula for each program within the unit. Include a description of the general education component, required and program-specific components for both the undergraduate and graduate programs. Provide a brief justification for any bachelors degree programs within the unit that require over 120 credit hours for completion.

Curriculum for B.S and B.A.
All Biology majors, regardless of whether they are seeking a B.S. or B.A., are required to take a four-course introductory sequence that includes Cell Biology, Genetics, Ecology and Evolution, and Plant and Animal Form and Function (BIOL 201–204)—designed to cover the breadth of biology. The first two courses include lectures and discussion/problem sessions. The discussion/problem sessions focus on homework directly related to the lectures and a few demonstrations/labs. BIOL 203 and 204 have full labs. The BIOL 204 lab, in particular, focuses on using inquiry so that students develop skills in formulating hypotheses, designing experiments, and using the primary literature. We just redesigned the lab in BIOL 203 to focus on developing quantitative skills relative to the lecture material in Ecology and Evolution, rather than a survey of Biodiversity. We surveyed the students two years ago about the core, and the most common complaint was that the lab in 203 did not mesh well with the lecture. The second most common complaint was that it took too long to move through the intro sequence to get to their upper level courses. Since the 203 lab redesign, we have noticed remarkable improvement in student’s skills to do simple statistics, use Excel and to formulate hypotheses. In general, the students are better prepared not only for 204, but for our upper division courses as well. The goals of our core curriculum include broad content knowledge and skills in the practice of science. Students who take this curriculum are required to take two semesters of general chemistry before BIOL 201. Students are required to start their calculus sequence before or during BIOL 203. The specific requirements for B.S. and B.A. degrees are given in Appendix 1-1. We dropped the requirement to get a minor in a field outside of Biology in 2015 in order to provide greater opportunities for students to take more upper-level biology courses.

Upper-Division Curriculum for Undergraduates
The B.S. majors take one organismal biology course (300 level course) and at least four 400-level courses as part of their major. Four-hundred-level courses are arranged in five categories (Cell and Molecular Biology, Physiology, Organismal Biology, Ecology and Evolution, and Interdisciplinary Science) and students must take a course from three different categories. Overall, many faculty feel that the upper-division curriculum needs an evaluation. Although new courses have to be approved, most new faculty add one or two new courses such that we have a very diverse array of offerings that can be offered only infrequently. There has been no evaluation in more than three decades of how the upper-division curriculum fits together and how many courses are really needed. This is a curricular item that needs serious attention. One particular concern is that more of our students may benefit from upper division lab and field courses. Assessment of the upper-division curriculum also is difficult as the courses are so diverse. B.S. majors need to take additional major elective courses so that the total numbers is biology is at least 37. B.A. majors do not have to take an organismal course, and only need to complete two 300/400 level biology courses, plus additional courses to that the total number of hours in biology is at least 32.

Concentration in Biotechnology
Students who participate in the Biotechnology A.S. degree and Biotechnology Certificate at CNM may receive a Bachelor of Science degree in Biology at UNM with a concentration in Biotechnology. The concentration in Biotechnology provides students with specific laboratory skills required for employment in biological and health professions, and makes graduates more competitive and successful candidates for admission into graduate programs around the country. The concentration is based on existing CNM Biotechnology course work and the curriculum is designed to meet competencies common to biotechnology programs around the nation and to be
responsive to industry needs. Departmental advisement is required for students who wish to complete the concentration in Biotechnology. Requirements are provided in Appendix 2-1.

**Concentration in Conservation Biology**
The growing emphasis on Conservation in the biological sciences supports this concentration. Students may receive either the Bachelor of Science or Bachelor of Arts degree in Biology with a concentration in Conservation Biology. The concentration provides students with a strong background in biology as well as the complementary interdisciplinary skills critical to understanding and addressing contemporary conservation questions. Departmental advisement is required for students who wish to complete the concentration in Conservation Biology. Requirements are provided in Appendix 2-2.

**Concentration in Ecology, Evolution, and Organismal Biology**
Climate change and other pressing environmental problems have led to the increased importance of a solid understanding of Ecology, Evolution, and Organismal Biology (EEOB). The concentration provides a depth of understanding at multiple hierarchies of biological organization and exposes students to the techniques, methodologies and approaches used by these sub-disciplines. Students develop expertise with the biology of a group of organisms, familiarity with methodologies used in study, expertise with the systematics of classification, and significant hands-on experience in the field or research laboratory. The concentration, available to students pursuing either the Bachelor of Science or Bachelor of Arts in Biology, is designed to provide a comprehensive background for students planning to pursue graduate school or seek a career in a governmental agency. Requirements are provided in Appendix 2-3.

**UNM Core Curriculum**
All UNM students must take approximately 37 credit hours across seven study areas in the basic core curriculum. The goal is to give all students at UNM “a grounding in the broad knowledge and intellectual values obtained in a liberal arts education and to assure that graduates have a shared academic experience.” The seven areas of study include: writing and communication, social and behavioral sciences, mathematical reasoning, scientific methods in the physical and natural sciences, the humanities, the fine arts, and languages. The curriculum worksheet for the Core Curriculum is provided in Appendix 2-4.

**Graduate Student Training:** Students are required to complete a specified number of hours of coursework, depending on the degree. The details are listed in our graduate handbook (Appendix 2-5). Required coursework includes both lecture courses and problems courses and must be completed with more than one faculty member. The department has experimented with various requirements for coursework across disciplines. At the time of the last review, students were required to take at least one course in three of nine categories. The review team recommended a different approach so that students would take some coursework across the major divisions in the department (Ecology and Evolution or Cell and Molecular Biology). At that time, three categories of courses were created and students were required to take coursework in at least two. That system failed. We were able to offer coursework in either of the two major areas, but we could seldom offer courses in the third, more interdisciplinary category. At present, there is no distribution requirement for graduate courses. Rather, students with interests in Ecology and Evolution are strongly encouraged to take our two graduate core courses in this area (BIOL 516, Basic Graduate Ecology, and BIOL 517, Basic Graduate Evolution). No similar core courses exist for students interested in Cell and Molecular Biology. Rather, they take courses germane to their special interests in cell or molecular biology, and many instead take core courses offered by the Health Sciences Center, that can meet biology course requirements. Courses available to graduate students fall into three categories: (1) courses that were originally developed at the 400-level (senior undergraduate), but are available for graduate credit if some extra work is done; (2) courses originally developed at the 500-level (graduate student only) that may or may not allow advanced undergraduates to enroll; and (3) special topics courses that usually focus on reading the literature; some of these also allow undergraduate enrollment. While faculty in ecology and evolution have been able to routinely offer formal courses that were developed specifically for graduate students, faculty in cell and molecular biology rarely have been able to do so. This is because so many undergraduates wish to
take upper-division courses in cell and molecular biology, and because fewer graduate students specialize in cell and molecular biology. The ecology and evolution faculty proposed graduate core courses in ecology and evolution so that students in these areas would have a common intellectual framework to foster discussion and collaboration. Thus, Basic Graduate Ecology and Basic Graduate Evolution were created. Due to the smaller number of graduate students in cell and molecular biology, there has been no opportunity to develop similar core courses for the graduate students in these areas.

Extension of 2A: Which skills that are outlined in the new NM HED Core structure would the unit’s undergraduate curriculum align with and target? Explain what innovative practices could be implemented to ensure students are able to better achieve these skills?

1. Written and spoken communication. Based upon activities in our core sequence laboratory sections student have to write reports and give oral presentation in the core sequence classes (BIOL 201-204).

2. Quantitative skills. In particular in BIOL 203 and 204 the students are required to collect, graph, manipulate and analyze data using Excel and other programs. They then write up the reports in the format of a scientific paper. Our undergraduate core also requires that the student pass MATHS 180 or 182.

3. Critical thinking: we emphasize in our core classes the need to think broadly about data and its implications. We ask structured and analytical questions of our students that require critical thinking to perform well. This occurs in all core classes (BIOL 201-204).

2B. Describe the contributions of the unit to other internal units within UNM, such as offering general education core courses for undergraduate students, common courses for selected graduate programs, courses that fulfill pre-requisites of other programs, cross-listed courses.

General education core courses:
We offer a non-majors Biology for UNM students to meet their general core curriculum requirements (BIOL 110, BIOL 112L, BIOL123, BIOL 124L).

Pre-requisites of other programs
In addition, we teach several courses that are required courses for health related majors on campus (e.g. EMS, Physical Therapy, Nursing). While some of the students in these courses are Biology majors, most are from other majors. These courses include Anatomy and Physiology I and II (BIOL 237 and 238), and the associated labs (BIOL 247 and 248), Introductory Biology for the Health Sciences (BIOL 123), and its lab (BIOL 124), and Medical Microbiology (BIOL 239). Enrollment in the Spring 2017 semester alone for BIOL 110/112 is 198 students, 558 students in BIOL 123, 350 students in BIOL 124, 278 students in BIOL 237, 276 students in BIOL 238, 154 students each in 247 and 248. These numbers have been relatively consistent, every semester, for the past 5 years.

Biochemistry majors are required to take BIOL 201 and 202. There are over 400 Biochemistry majors now, and many of them end up taking 2-3 of our upper division courses, which is putting an added strain on our department.

Cross-linked courses
Dr. Cook co-teaches BIOL 402/502 Art and Natural History, a 3-credit hour class in the Honors Program, as part of the Art and Ecology Program.
Geography cross-lists BIOL 480/580 (Global Change Biology) taught by Dr. Litvak as both an undergraduate and graduate level course.
Dr. Watson (Adjunct Professor) teaches BIOL 419/519 (The Evolution of Religiosity and Human Coalitional Psychology) that has been cross-listed as Religious Studies 447 and Peace Studies 340.
2C. Describe the modes of delivery used for teaching courses.

Courses are taught using a variety of modes of delivery. The most common is the in-person lecture format. Our faculty use various technology aids to improve learning outcomes, including iClickers and the Learn course website system. Although we don't have specialized flipped classrooms in which to teach, a number of faculty incorporate active learning modules into their lecture courses. We teach a small number of online courses; these tend to be successful, in part due to UNM's technical support staff for developing and implementing online courses. In recent years we have stopped offering laboratory-based classes online, as these were generally considered to be diluted in quality relative to in-person laboratory classes. We have also substantially reduced our ITV offerings (courses that had live video feeds to satellite campuses), as this mode of learning never had strong enrollment at other UNM campuses.

Class sizes are generally medium (15-36) or large (>36), with some very large classes. Small classes are discouraged by the college, despite the obvious advantages to students. In 2007, the minimum class sizes were 13 undergraduate, 10 for 400/500 level courses (open to both undergraduates and graduates), and 6 for graduate courses. Approximately two years ago the undergraduate minimum was increased to 15 students.
Criterion 3. Teaching and Learning: Continuous Improvement

The unit should demonstrate that it assesses student learning and uses assessment to make program improvements. In this section, the unit should reference and provide evidence of the program’s assessment plan(s) and annual program assessment records/reports. (Differentiate for each undergraduate and graduate degree/certificate program and concentration offered by the unit.)

3A. Describe the assessment process and evaluation of student learning outcomes for each program by addressing the questions below.

Our department is currently engaged in learning assessment in collaboration with, and as requested by, the Office of Assessment at UNM. At the undergraduate majors level (BS and BA degrees), we assess student learning outcomes in the four core classes that all majors are required to take: BIOL 201-204. In a three year rolling process, we assess BIOL 201, then BIOL 202 the following year, then BIOL 203 and 204 the third year. Also at the undergraduate level, we assess General Education classes (BIOL 110, 112L, 123, 124L), and report the outcomes of the assessment every three years. Undergraduate assessments consist of questions inserted into the final examinations that are intended to test the students’ understanding of key learning goals. Undergraduate Assessment plans are presented in Appendices 3-1 to 3-3.

At the graduate level, we have developed assessment plans for the MS (Plan I and Plan II) and PhD degrees (Appendices 3-4 to 3-6), and we are commencing evaluation for these programs. The assessment activities consist of three components: an annual online survey of graduate students; and graded evaluations by the students’ thesis committee members at the times of oral examination and thesis defense.

Assessment reports are submitted to the Assessment Office, which are then distributed back to the College of Arts & Sciences. The reports are reviewed by an A&S committee, which provides feedback to the units. There is general expectation that this feedback is communicated to the program and discussed as a faculty to potentially develop modifications of the teaching strategies to ensure improved teaching outcomes.

- **What skills, knowledge, and values are expected of all students at the completion of the program (refer to learning goals outlined in Criterion 1)?**

  These goals have not changed significantly since we outlined them in Criterion 1.

- **What are the student learning outcomes for the program?**

  The student learning outcomes for each program are described in detail in the cognate assessment plans, as described in Appendices 3-1 to 3-6. They are listed briefly here:

  **BA:**
  A.1. Students will demonstrate an understanding of key principles in various biological subdisciplines that span molecular to ecosystem levels of organization
  B.1. Students will able to design, test, and evaluate scientific hypotheses
  C.1. Students will be able to summarize and interpret key findings of research papers
  C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and oral presentations

  **BS:**
  A.1. Students will demonstrate an understanding of key principles in various biological subdisciplines that span molecular to ecosystem levels of organization
  B.1. Students will able to design, test, and evaluate scientific hypotheses
  C.1. Students will be able to summarize and interpret key findings of research papers
  C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and oral presentations

* Please note that the SLOs are the same for the B.A. and B.S. degrees. While this is not an ideal arrangement (since they are different degree programs), this is because we assess these classes at the completion of the 200-level core courses (BIOL 201-204), which are required courses for both the B.S. and B.A.
MSI:
A.1. Graduates will demonstrate knowledge of theories, questions and approaches across major areas of biology by discussing questions posed by committee members during the thesis defense at a level expected of a professional biologist or academic colleague.
A.2. Demonstrate understandings of the conceptual framework, major advances and important methodological approaches within their chosen discipline by discussing questions posed by committee members during the thesis defense at a level expected of a professional biologist or academic colleague.
B.1. Demonstrate the capacity to design and carry out research to address knowledge gaps.
B.2. Graduates will demonstrate understandings of ethical issues that intersect with scientific research by passing the evaluation at the required graduate ethics training and carrying out research that follows IRB/OACC and/or other relevant guidelines.
B.3. Exhibit scientific oral and written communication that is clear, logical, and effective.
B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.

MSII:
A.1. Graduates will demonstrate knowledge of theories, questions and approaches across major areas of biology by discussing questions posed by committee members during the oral exam at a level expected of a professional biologist or academic colleague.
A.2. Ability to connect current outstanding questions in biology to appropriate methods of inquiry and analysis.
B.1. Ability to list and explain the importance of cutting-edge research topics in a chosen subdiscipline of biology.
C.1. Graduates will demonstrate understandings of ethical issues that intersect with scientific research by passing the evaluation at the required graduate ethics training.

PhD:
A.1. Graduates will explain, compare and critique theories, questions and approaches across major areas of biology by answering questions posed by committee members during the dissertation defense at a level expected of a PhD-level biologist or academic colleague.
A.2. Graduates will demonstrate an ability to defend or revise the conceptual framework and important methodological approaches within their chosen discipline by carrying out original research that passes the bar of peer-review and by answering questions posed by committee members during the dissertation defense at a level expected of a PhD-level biologist or academic colleague.
B.1. Demonstrate the capacity to independently design and carry out novel research to address important knowledge gaps.
B.2. Capacity to evaluate and respond appropriately to ethical issues that intersect with scientific research by passing the evaluation at the required ethics training and carrying out research that follows IRB/OACC and/or other relevant guidelines.
B.3. Demonstrate scientific oral and written communication that is clear, logical, and compelling.
B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.

- **How have the student learning outcomes been changed or improved?**
  For the undergraduate program, we have developed individualized SLOs for each core class in our introductory sequence, Biol 201-204. The individual SLOs feed into the overarching SLOs for the undergraduate majors. For the graduate program, the SLOs are being used for the first time and will be reviewed and potentially modified each year, in response to our findings from each year of evaluation.

- **How are the student learning outcomes clearly defined and measurable?**
  In the undergraduate programs, the SLOs are directly measurable through the questions being standardized and through the responses being evaluated using a defined rubric. For the graduate program, many of the criteria
being measured are represented in numerical data, including number of papers published, number of meetings attended, and so on.

- **How are the student learning outcomes communicated to faculty and students?**
The SLOs are described in detail on our departmental website, alongside a description of the assessment process. The outcomes of assessment, and any changes made, will also be provided on the website once we have moved forward with those activities.

- **What current direct and indirect assessment methods are used to evaluate the extent to which students are meeting the student learning outcomes?**
Our assessment activities predominantly use direct methods. At the undergraduate level these activities include questions embedded into exams for the core classes, that test the students’ understanding of core concepts. Similarly, assessment in undergraduate laboratory classes is achieved through evaluation of the student laboratory reports. At the graduate level, direct assessment comprises evaluation of student performance in required activities (oral presentations and examinations) by members of the graduate committee, who provide a numerical evaluation of student attainment. In addition, all graduate students are expected to create a profile in Google Scholar that enables us to assess publications and their potential impact. We have also developed some indirect assessment activities, including graduate student exit surveys and an exit survey that is under development for undergraduate students completing the core sequence.

We have also recently commenced two indirect measures of assessment: a self-survey given at the end of BIOL 204, where we ask students to evaluate their progress with respect to intended outcomes; and a second survey that we provide to all graduating seniors, that asks them to report on where they are going next.

- **How have the program’s assessment methods been changed or improved?**
Since we are still early in our assessment cycle, there have been limited opportunities for improvement in the assessment methods of the department, although it is worth noting that assessment methodology in our unit has improved significantly as a result of committee evaluation of assessment plans.

### 3B. Synthesize the impact of the program’s annual assessment activities by addressing the questions below.

- **How have the results of the program’s assessment activities been used to support quality teaching and learning?**
Even though our assessment activities are still at an early stage, several aspects of the ongoing assessment have improved our curriculum and our instructional activities. For example, the creation of defined SLOs for each core class has resulted in a tighter curriculum to which we more closely adhere. This is an important improvement since each faculty member is expected to contribute to the core once every two years, thus the specific curriculum for any given semester can vary somewhat. Having a defined set of SLOs for each class has brought some greater uniformity to the core curriculum. In addition, we are in the process of carrying out course re-designs for our core classes. While these re-designs did not arise specifically from results of assessment activities, they arose from the gestalt of faculty that teach in the core courses identifying ways in which instruction could be improved. For Biol 203, for example, we have increased the level of critical thinking required of the students, and the laboratory exercises now involve significantly increased use of graphing and numeracy assignments. In Biol 202 and 204, individual faculty have enhanced the lecture delivery to include more group work and active learning, that are anticipated to improve student understanding and retention of the material.

- **How have the results of the program’s assessment activities been used for program improvement?**
The assessment reports for both undergraduate and graduate programs are currently being considered by the faculty and we expect to have specific proposed improvements by the end of the semester.
• Overall, how is the program engaged in a coherent process of continuous curricular and program improvement?

We have made significant improvements to our assessment methods over the last several years and are positioned to apply our assessment findings to curriculum improvement.

• How does the program monitor the effects of changes?

Although we have yet to reach this goal, our plans are that once alterations are made to the program to improve instruction, will continue to monitor our assessment materials to determine if the changes that we make have a positive impact upon student learning outcomes.

Extension of 3B. Explain how you have demonstrated progress in your assessment practices over the last two years.

Our assessment practices have improved by initiating the assessment process in undergraduate classes, and creating an assessment process for graduates (that we are beginning to roll out). We also demonstrate progress in assessment practices through review and feedback by the College of Arts and Sciences Assessment Review Committee.
Criterion 4. Students (Undergraduate and Graduate)
The unit should have appropriate structures in place to recruit, retain, and graduate students. (Differentiate by program where appropriate.)

4A. Provide information regarding student recruitment and admissions (including transfer articulation). and

4B. Provide an analysis of enrollment trends, persistence, and graduation trends.

At the undergraduate level, most student recruitment is carried out by UNM Recruitment Services or the Athletics Department. The department Chair interacts with these entities when individual students request information about the Biology degree and the Biology facilities. Upon arrival on campus, students have broad access to biology advisors, and we increase the visibility of the Department of Biology through participating in Welcome Back days (where campus units set up stalls on campus in the first week of the Fall semester); and our own Biorama event, which is a broad advising and recruitment activity that takes place 1-2 times per year within the Department of Biology.

In regard to undergraduate transfers, transfer credits are automated if the transfer class has already been assessed by Biology faculty for equivalence with our existing courses. For courses for which a transfer equivalency has not been articulated, the chief advisor housed in Biology sends the transfer course syllabus out to a small number of faculty with matching teaching expertise to determine if the course matches an existing Biology course. If not, then the transfer student is granted the credit hours but not the course equivalency.

A current effort by the State of New Mexico is to ensure that as many equivalent courses across the State’s institutions of higher education have identical course numbering. This approach appears to ignore the existing transfer equivalencies that we have stored, and has both advantages and disadvantages: on the one hand, it may further facilitate course and student transfer between institutions; on the other hand, it will require a state-wide agreement as to the syllabus for courses that will have the same numbering. For example, BIOL 201 (Cell/Molecular Biology) is the first course in our undergraduate major core sequence and is a pre-requisite for all subsequent major core courses. It will of course be important that all institutions teaching BIOL 201 (or an equivalent course) cover material that will be built upon for subsequent classes, otherwise transfer students might not be prepared for the core sequence here on main campus. Of greater concern, we have undertaken significant efforts over the last few years to achieve course re-design in several of our core classes, to the extent that the laboratory class accompanying BIOL 203 thoroughly trains the students in quantitative data manipulation and analysis. There is a concern that other institutions might not provide the level of detail and rigor that we feel is appropriate for this course. In addition, the laboratory accompanying BIOL 204 requires the students to design experiments, collect data, and analyze the data, using skills that have been developed through the 201-203 sequence. However, the local Central New Mexico Community College (CNM), that also teaches BIOL 204 and 204L uses the laboratory times as a recitation rather than for experimentation. This is a concern because we feel that the students significantly benefit from the experiential training that 204L provides. We have taken efforts to ameliorate these concerns for students by separating BIOL 203 and 204 from their laboratory components (now BIOL 203L and 204L); thus, students transferring in with Biol 204 from CNM could separately take the laboratory component, although student with Biol204L from other institutions are not currently required to take BIOL 204L here. At this writing, the department’s Undergraduate Policy Committee has voted in favor of raising lecture and laboratories of Biology 203L and 204L to the 300-level, which are not offered at community colleges. Based on that recommendation, the statewide course numbering committee assigned 203L and 204L different numbers from these courses at other institutions.

Figure 4-1. Five-year undergraduate major enrollment trends.

Regarding undergraduate enrollment, we continue to have a high number of undergraduate majors, although this number has seen a slight decrease over the past five years (Figure 4-1). The reasons for this are unclear, but a number of scenarios, each of which is not mutually exclusive, come to mind. (1) There is a net loss of population in New Mexico, probably caused by
improving economies in neighbouring states, and individuals moving out of New Mexico. This will decrease the number of high school graduates from which to pull. (2) Despite the relatively poor state economy, the job market has picked up slightly, and high school graduates may elect to obtain a job rather than use their Lottery Scholarship to go to school (the Lottery Scholarship supports tuition for individuals who want to go straight from high school to university, making it an attractive option in poor economic times). (3) At UNM, there has been significant emphasis over the last five years on increasing our low graduation rate, and this may be the only positive contributing factor to the lower enrolment. (4) Students may be electing to avoid Biology as a major. Some anecdotal evidence for this comes from conversations with students, a number of whom have elected to take Biochemistry as a major once they complete BIOL 201 and 202, because they do not hear positive comments about Bio 203 and 204 from peers. It is hoped that our course re-design will address this problem, if it exists to a significant extent.

The graduate program.
For graduate students, UNM Biology does not have a formal program to attract interest in the graduate program. Individual faculty may advertise their labs on listserves, at professional meetings, or through contacts with colleagues. However, in 2014 the department instituted a formal recruiting weekend in which 15-25 top candidates are brought to campus. Airfares are generally paid for by individual faculty while the department contributes food and local transportation. The candidates spend Friday on campus, meeting with faculty and students and getting tours of the facilities. Saturday is an optional field trip (typically attended by ¾ of the recruits, plus faculty and current graduate students) focusing on natural history and ecological experiments at the Sevilleta National Wildlife Refuge. While we do not have specific measures of the impact of adding this recruitment weekend, anecdotal evidence suggests that it has left a positive impression on many prospective students, and has been the critical ‘tipping point’ leading to a prospect choosing UNM in particular instances.

The 2008 Academic Program Review expressed concern that graduate application numbers had dropped, from peaks in the 140’s during 1997-1999 to lows in the 60’s-80’s during 2004-2007. Measures were suggested to reverse the decline. At least one of these was implemented: the recruiting weekend (described above). It appears that the application trend has somewhat improved, with numbers of applications in the 80’s and 90’s in recent years (Fig. 4-2). Causes for the low number of applications during 2004-2009 are unclear but probably have more to do with national trends than with UNM-specific factors as other Biology graduate programs (e.g. CU Boulder) also experienced a dip during this time (see 2008 APR report).

Admission.
Following evaluation of graduate applications, we offer admission to approximately 37% of graduate applicants, based on data from 2011-2015.

Enrollment.
Over the past decade, the graduate program has enrolled a fairly constant ~20 new students per year. The fraction of these that lead to MS degrees seems to be rising (Figure 4-3). Regarding demographics, numbers of female graduate students have increased over time, and now the percentage of our students who are female is 64%. Likewise, the percentage of minority students has increased over time; the figure is currently 24% (22%, 1%, and 1% of graduate students are Hispanic, Native American, or two or more races, respectively). The remainder of the graduate student body
identifies as Caucasian (67%), Asian (2%), and non-resident Alien (6%)

Graduation.  The number of undergraduate B.A. plus B.S. degrees awarded over time is shown in Figure 4-3. At the undergraduate level, there has been a relatively steady number of degrees awarded (the low value for 2011 is due to only part of the year being included). In 2016 there was a slight drop in the number of degrees awarded, which might reflect an overall slightly downward trend in enrolment (see Figure 4-1).

![Figure 4-3. Graduation trends for B.A. plus B.S. degrees.](image)

We also analyzed the proportion of undergraduate students that were under-represented minorities (URM; American Indian, African American/Black, Hispanic, and Native Pacific Islanders). Interestingly, the proportion of our majors that are URM matches closely the student dynamics at UNM and in the state, being majority-URM (Figure 4-4). However, the proportion of B.A. plus B.S. graduates that are URM is less than 50%. This indicates that URMs are graduating at a relatively lower rate than non-URMs, although it appears as though in recent years the proportion of graduates that are URMs has been increasing.

At the graduate level, the number of degrees awarded is shown in Figure 4-5. The mean time to completion (± SD) for MS degrees is 3.0 (± 1.8) years; for Ph.D. degrees it is 6.1 (± 2.8) years (data for 2010-2016 graduates).

**Extension of 4B.**  Data indicate there is low enrollment for low-income and Hispanic students in your majors. Explain what innovative practices could be implemented to increase the representation of these students as majors.

We are not sure that we fully agree with this analysis. From Studentflows, with entry year 2013, we show 56% Hispanic, 3.6% American Indian, and 2.6% Black/African American. Moreover In Figure 4-4 (discussed above, data obtained from Office of Institutional Analytics) the demographics of our majors matches closely the demographics of the overall student population and the population of the state as a whole.

**4C. Provide a description of program advisement for students.**

At the undergraduate level, program advisement is carried out in two ways. We have three staff advisors, who are employees of the College of Arts & Sciences but situated in Biology, and who meet with students to oversee their course and degree requirements. These advisors are not exclusively Biology advisors, as they also advise majors from the Departments of Chemistry & Chemical Biology and of Latin-American Studies. In addition, one Principal Lecturer, Dr Bruce Hofkin, provides pre-veterinary advising. For students with pre-health interests (Nursing, Pharmacy, EMT, etc), there are dedicated advisors at the UNM Health Sciences Center (0.5 miles North of Biology); and for pre-medical advisement there is now an advisor stationed on our Main Campus.
Students have several interactions with advisors during their careers. Upon arriving at UNM, all students (both new students and transfer students) are required to participate in New Student Orientation, and they also participate in a new student learning workshop in their first semester. In addition, to these multi-student interactions, advisors meet with most students one-on-one during their first semester, an encouraged (but not required) activity. When a student meets the minimum requirements to declare as a Biology major (having completed 26 hours, the writing & speaking core, the Maths core, the language core, CHEM 121 & 123L, and BIOL 201L), they attend a mandatory Biology departmental orientation where they interact one-on-one with an advisor. Once a student has reached 75 credit hours, they also must attend a graduation planning workshop, where they work with an advisor to assess and plan their remaining requirements for their major.

One burgeoning concern with advising is that, since it was taken over by the College, there has been a higher turnover of our advisors. This may stem from the extensive training that they receive, which positions the advisors well for higher paying jobs in some of the professional programs such as nursing. Creating more stability in the advisors that service Biology majors is an important goal.

At the graduate level, students receive advisement from three major directions. Naturally, their first line of support is the faculty mentor, who is expected to guide and mentor the graduate student through their careers. In addition, each graduate student has a faculty committee consisting of their advisor plus two additional faculty members (and PhD students have an additional faculty committee member from outside the department as they approach graduation). The function of the graduate committee is to meet at least annually with the student, to oversee progress on their research project, to collaborate with the student to develop a suitable course curriculum (and ensure completion), and to ultimately determine the appropriateness
of the student's work for fulfillment of the graduation requirements. Thirdly, the Department employs a full-time Graduate Coordinator, Ms Cheryl Martin, who oversees and coordinates all aspects of graduate student application, admissions, TA assignments, contracts, and graduation paperwork. The Graduate Coordinator is assisted by a student employee for non-confidential activities.

The Department has also developed a Graduate Student Handbook in which all of the graduation requirements are described (Appendix 2-5). Faculty and the Graduate Coordinator assist the student in unraveling the complexities of the Handbook. A new version of the Handbook is currently being developed collaboratively by faculty and graduate students.

4D. Describe any student support services that are provided by the unit.
Since advising has been taken over by the College of Arts & Sciences, many of these activities are handled by college employees. In addition, the Department of Biology has activities that provide support for students. For student complaints and academic appeals the students are advised to meet with their instructor, then the Associate Chair, and then the Chair to resolve specific issues, after which the student can petition with the Dean's office. Departmental faculty also support student organizations including the Biology Undergraduate Society, SACNAS Lobos (associated with the Society for the Advancement of Native Americans and Chicanos in the Sciences), and Lobo SEEDS, which is a student organization focused more specifically upon students with ecology interests.

Although not directly associated with Biology, the Center for Academic Program Support (CAPS) pays upper-level students to act as tutors for undergraduates taking individual classes. The classes for which tutors are supplied varies a little each year, nevertheless the CAPS-supported students work closely with faculty teaching the classes to provide academic support for students who wish to receive it.

At the graduate level, a number of support services are provided. Within Biology, there is the Biology Graduate Student Association (BGS), which is particularly active. The BGSA has elected officers that oversee association activities, that include: application, evaluation and awarding of scholarships funds, scheduling graduate student social and professional activities, and others. Moreover, all department committees have a graduate student representative that participates in the committee functions, with the exception of faculty evaluation committees. Notably, all faculty search committees have a graduate student representative who coordinates interactions of faculty candidates with the graduate students, assists with evaluation of applicants and interviewees, and participates in the final voting to rank faculty candidates.

Outside of Biology, UNM also has developed several resources that support the development of our graduate students, including the Graduate Student Funding Initiative (GSFI), and the Graduate Resource Center (GRC). The GSFI provides training for graduate students to develop their proposal writing skills, including help with formulating the application, support for writing the application, and training in developing a proposal budget. The GRC complements these workshops by providing training for graduate students in presentation skills (written and oral), communication skills, and academic skills such as developing a bibliography, reviewing the literature, and enhancing reading skills.

4E. Describe any student success and retention initiatives in which the unit participates.
Undergraduate program.
The Department participates broadly in university initiatives aimed at supporting and graduating students. These include: the Graduation Project, which contacts students who have left the university but who are in sight of graduation to encourage them to return; the Graduate Success Initiative, which supports tuition for a subset of students that are close to graduation.

In addition, the Department with support from the College of A&S, has increased its portfolio of Summer classes so that students can graduate faster. These include BIOL 203L and 204L, plus a small number of upper-level classes that students may need to graduate in a timely manner. These courses are popular with our students, and seem to be having the desired effects.

One of our professors, Dr. Werner-Washburne, has developed a Pathway Scholars mentoring program in the Department of Biology. This program is open to everyone, but targets Native Americans, who have a 22% 6-year graduation rate at UNM, and low retention rates. In the past five years, there were 90 Pathway Scholars,
and eight have entered undergraduate research programs, four have entered postbaccalaureate programs, and overall there has been an 89% retention/graduation rate (84% for Native Americans). The program is based on a 1-credit mentoring group that meets once a week. The group helps them find tutors (often from the IMSD program) who can meet with them regularly, assists with financial aid issues, and works with the students to give them the tools they need to succeed cross-culturally, in academia and life.

**Graduate program.**
At the graduate level, the department has a policy of not admitting Ph.D. students unless financial support can be guaranteed. We guarantee five years of support that may be in the form of teaching assistantships (T.A.), research assistantships (R.A.) or fellowships. Occasionally, Ph.D. students are admitted who have guaranteed outside support from another agency, such as a national laboratory, or who are already research staff at UNM. M.S. students may be admitted with or without guaranteed support. If support is guaranteed, it is for two years. Students without guaranteed support—usually because they have exceeded the time limit for completion of their dissertations or theses—may ask to be in the T.A. pool, where students may be offered T.A. support, on a semester-by-semester basis, if T.A. slots are available after all students on guaranteed support have been accommodated. In recent semesters, most students who wish to have T.A. support have been accommodated. In fact, we often hire a few T.A.s from outside the department.

**T.A. Support.** Currently, the stipend for Ph.D. students is $17,592.20 for the academic year for 0.5 FTE. The T.A. contract also includes tuition, fees and the supplemental student health insurance.

**R.A. support** is driven by faculty grants or student fellowships. Based on our data from the past three semesters (Fall 2015 through Fall 2016), the percentage of graduate students on RA support fluctuated between 24-30%, with the remainder receiving TA or GA support. Our limited ability to offer graduate research fellowships has been a continuing source of concern. This is particularly a problem because many students teach every semester, limiting their ability to conduct research and write manuscripts.

**Summer support.** While a few summer T.A. positions are always available, graduate students need time free from teaching to conduct their research. Many faculty provide summer R.A. support from grants. In addition, programmatic grants such as the Sevilleta LTER have provided several summer fellowships for students working in particular subject areas or sites.

**Graduate student research support.** To support their research activities, graduate students can apply for several internal sources of funds. These include research support from the BGSA (mentioned above), and a host of Biology Scholarships that are awarded in the Spring semester. Many of these scholarships support graduate student supplies or travel, and although the size of these awards is usually fairly modest (up to $2,000), some larger scholarships provide RA support for an entire semester.

The Department has also been very supportive historically of graduate students applying for fellowship awards, and our students have historically been successful at obtaining funding from agencies including NSF, the American Heart Association, and others.

**Extension of 4E.** Data seems to indicate that many Biology majors also declare Chemistry as a second major or minor. What steps have you taken to improve and/or develop collaborative efforts with the Chemistry Department to ensure the success of these students? (Relevant data can be accessed on the attached Excel data spreadsheet – Biology and Chemistry double majors and minors)

Since advisement in the College of Arts and Sciences is a C2D2 model (Centrally Coordinated/De-centrally delivered), departments coordinate efforts for degree completion more efficiently than the decentralized models of the past. Because STEM advisors are cross trained and meet for staff meetings on a weekly basis, they discuss student trends in major and minor selection on a regular basis. The Chemistry minor is very popular with our Biology majors because 13 of the 20 hours required for the minor are satisfied by the Biology major’s
supportive coursework. Biology advisors regularly explain the overlap in requirements and provide opportunities to add these components throughout their academic career. Recently the Biology department deleted the requirement of a minor for the Bachelor of Science but many students still opt to finish with the Chemistry minor added. Advisors regularly discuss strategies with BA students to earn a second major vs. a minor. This is one way in which students that may be struggling to earn enough upper division coursework can make these hours more intentional and relevant to their educational interest.

**Extension of 4E.** What collaborations have you participated in with the Biochemistry program in HSC in order to ensure students successful completion of this major? Is there an organizational/curricular structure of Biology and/or Biochemistry that exists or could be developed to better serve Biochemistry majors in their transition?

All Biochemistry majors come through the first two courses of our core curriculum, BIOL 201 and 202. Moreover, many Biochemistry majors take upper-level cell/molecular/physiology classes in Biology to satisfy some of their upper-level class requirements. Currently, since Biology upper-level classes require 201-204, Biochemistry majors are technically not eligible for upper-level Biology classes. We address this issue in general through instructors admitting Biochemistry students into classes through pre-requisite online over-rides, on a case-by-case basis. Perhaps this could be streamlined through changing the pre-requisites on these courses to “BIOL 201-204 or Biochemistry major”.

In parallel, Biochemistry faculty allow our student into their upper-level courses in return for us allowing Biochemistry students into our.

If a student chooses to transition from Biology to Biochemistry, this is facilitated by the advisors for both majors belong to the same discipline cluster within A&S. This allows for smoother transitions for students who do change their majors. All advisors within discipline clusters have an additional layer of cross training to support their students and each other. One example of this is the ability for advisors in one cluster to assist students in another cluster if, for example, an advisor leaves. Presently Chemistry is being supported by the Biology advisors while the college hires and trains the replacement.

We should note that many biochemistry students also receive research training in Biology, through formal or informal arrangements with individual faculty members.

### A. B.A. and B.S. graduates

<table>
<thead>
<tr>
<th>Destination</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go to another professional school such as nursing, pharmacy, PA, etc</td>
<td>5.0%</td>
</tr>
<tr>
<td>Go to graduate school</td>
<td>10.0%</td>
</tr>
<tr>
<td>Go to medical school</td>
<td>15.0%</td>
</tr>
<tr>
<td>Obtain or continue a job related to biology</td>
<td>20.0%</td>
</tr>
<tr>
<td>Obtain or continue a job unrelated to biology</td>
<td>25.0%</td>
</tr>
<tr>
<td>Obtain or continue a job unrelated to biology but using skills acquired in the Biology program</td>
<td>10.0%</td>
</tr>
<tr>
<td>Remain unemployed</td>
<td>0.0%</td>
</tr>
</tbody>
</table>
B. M.S. graduates.

C. Ph.D. graduates

Figure 4-4. Career trajectories of our students immediately following graduation (top – undergraduates; middle - MS graduates; bottom – Ph.D. graduates).

4F. Provide a summary of the success of graduates of the program by addressing the following questions:

- Where graduates are typically placed in the workforce?

To understand the career trajectories of our students following graduation, we recently contacted alumni and surveyed them with regard to their careers following graduation.

When asked what they did immediately after completing their degrees at UNM Biology, almost 75% of the undergraduates continued their training or had a job related to biology, and 60% of the remainder used skills gained during their degree. This seems to be a positive impact of our program upon the undergraduates. At the graduate level, perhaps unsurprisingly, an even greater number continued in biology-related employment or training (see Figure 4-4).

When asked about their current careers, approximately 60% of undergraduates are in biology or health related employment. For graduates, while 80% of our Ph.D. graduates are in biology-related employment, the outcomes for M.S. students is more varied, and reflects the different career motivations of many M.S. students (see Figure 4-5).
Reflecting the large number of undergraduates that we train in the research laboratory, 33% of our undergraduates authored or co-authored at least 1 peer-reviewed scientific article based on work they did at UNM [N = 331 survey respondents who obtained a BA or BS].

- **Are placements consistent with the program’s learning goals?**

A number of points stand out from these results. One observation is the rather encouraging fact that many of our graduates continue in biology or a related field following graduation. It would be interesting to see how these numbers compare to other majors, and to biology majors from other institutions. Nevertheless given that our overall goals are to provide our students with an overall appreciation of the breadth of biology and the methods used to study it, this seems a positive result.

It is also interesting to note that a large number of our graduates enter health-related professions. In a survey of Biol 204 students from approximately ten years ago, almost 50% of students indicated an interest in attending medical school. While that number of students do not ultimately enter an MD program, it seems likely that a number enter related fields, and that is what we observe here. These numbers support, albeit indirectly, observations from undergraduate class sizes that enrollment in pre-health related classes (such as physiology, pharmacology, immunology, infectious organisms, and a number of cell/molecular classes) are generally the highest amongst 400-level classes.

- **What methods are used to measure the success of graduates?**

At the undergraduate level, we do not formally measure the success of graduates. Moreover, while the Biology Department has not routinely collected data on our former graduate students, units associated with the Department have done so for subsets of graduates. These indicate a high level of success. For example, Biology Ph.D. graduates from 2000-2015 associated with the Museum of Southwest Biology are currently tenure-track or tenured professors (33% of 46 graduates), researchers in federal or state agencies (20%), researchers or collections managers in other organizations (institutes, museums, etc.) (17%), postdoctoral fellows (17%), or lecturers (4%), with the remaining 9% of these graduates either not in science or in an unknown profession.

### A. B.A. and B.S. graduates

![Bar chart showing employment statistics for B.A. and B.S. graduates](chart.png)
B. M.S. graduates.

C. Ph.D. graduates.

Figure 4-5. Currently employment of Biology graduates (top – undergraduates; middle - MS graduates; bottom – Ph.D. graduates).

- What are the results of these measures?
Not applicable.

Extension of 4F. Given that many pre-med students are biology majors, what steps have you taken to formally track, serve, and advise the students who are not accepted into medical school? What steps have you taken to improve and/or develop collaborative efforts with the medical school in advising and transitioning these students into the health field? What steps have you taken to track the success of the pre-med students who are admitted into medical school?
In the past A&S advisement has sponsored a Pre-Med advisor that was available to all UNM students. This advisor worked with UNM’s Medical School as well as professional organizations to better educate students on what makes a competitive pre-med applicant. One example of their activity is series of workshops that was developed for pre-med hopefuls, and that was created and delivered in collaboration with UNM Medical School student support staff.

Unfortunately, because of a change in advising structure, A&S needed to redirect that salary line to major advising. On the other hand, University College houses a Pre-Health advisor, and as a college we have been able to collaborate with him and continue to offer support (although not as comprehensive) for our students that are interested in pre-health professions. We do not track these populations but would rely on University College’s position to take the lead in that endeavor.
**Criterion 5. Faculty**

The faculty associated with the unit’s programs should have appropriate qualifications and credentials. They should be of sufficient number to cover the curricular areas of each program and other research and service activities. (Differentiate by program where appropriate.)

5A. Describe the composition of the faculty and their credentials. Provide an overall summary of the percent of time devoted to the program for each faculty member and roles and responsibilities within each program.

5B. Provide information regarding professional development activities for faculty within the unit.

5C. Provide a summary and examples of research/creative work of faculty members within the unit.

5D. Provide an abbreviated vitae (2 pages or less) or summary of experience for each faculty member (if a program has this information posted on-line, then provide links to the information).

This is provided in Appendix 5-1.

**FACULTY**

Brief CV’s for all faculty are in Appendix 5-1.

**Faculty Demographics:** As of January 2017, our faculty includes two Distinguished Professors, 17 Professors, nine-and-a-half Associate Professors, six Assistant Professors, and eight non-tenure-track Lecturers (various ranks). These numbers are nearly identical to what they were in January 2007 (Table 5-1). Three additional tenure-track faculty members are on long-term leave.

During the period from 1993 to 2007, over which numbers of undergraduate majors more than doubled, numbers of tenure-track faculty were virtually unchanged. Since 2007, the number of undergraduate majors has increased, and the number of faculty has dropped by one member. Turnover in the faculty has been 37% over the last 10 years, with 16 faculty currently in the department who were not present for the last program review.

The proportion of faculty members in each rank has remained generally steady over the past 10 years, except that there are somewhat fewer Assistant Professors and more Associate Professors now (Table 5-1), reflecting a slow pace of hiring over the last six years. By mid-2018, we are likely to have only two faculty members remaining at the rank of Assistant Professor. The number of full-time lecturers has remained steady at eight (versus 8.5 in 2007). These lecturers teach all of the non-majors courses, ~25–50% of the sections of Biol 201 and 202, several sections of Biol 203 and 204, as well as a small portion of the upper division coursework.

The department has failed to achieve gender equity among the faculty ranks, making no progress over the past ten years. Female faculty comprise 30% of the overall faculty, and only 23% of tenure-track faculty (Table 5-1), proportions that are virtually unchanged since 2007, at which time the number of female faculty had passed 20% for the first time in the history of the department.

The fact that no progress has been made on gender balance does not entirely signify that the department has been unfriendly to families. For example, contributing to our gender inequity are two recent spousal hires in which the department hired men who were the married to existing or incoming faculty members at other UNM units. These cases actually help to illustrate how spousal hires contribute to gender equity in faculty ranks in general, if not at the department level.

The number of minority faculty in the department has always been low (Table 5-1). From 2007-2017, the percentage of minority faculty members has dropped from 18% to 9%. This is in sharp contrast to the high percentage of minorities in the undergraduate student body. Regarding women and minorities among the faculty ranks of our department, existing faculty routinely express a desire to diversify. However, it is also clear that no specific, targeted measures have been undertaken by the department to try to remedy these imbalances.

The faculty currently includes approximately 24 adjunct faculty (who typically are unpaid and do not work on campus) and 31 research faculty (many of who work on campus and are paid from grant funds). Typically, adjunct and research faculty are nominated by one or more tenure-track faculty, their CVs are reviewed, and the tenure-track faculty vote on their appointment. Names of research and adjunct faculty are on the department website where they are organized by rank.

**Faculty Areas of Expertise:** Faculty expertise spans a broad range of topics in modern biology, as evidenced
by the CVs compiled in Appendix 5-1. Although it is increasingly difficult to categorize the faculty according to the boundaries of conventional Biology sub-disciplines, we note that ~67% of the research-active tenure track faculty conduct at least some work that would fall in the general realm of ecology; ~55% work on some aspect of genetics or genomics; ~25% work on some aspect of molecular or cellular biology; 21% are curators at the Museum of Southwestern Biology; 21% study vertebrate animals; 18% work on some aspect of microbiology. Most faculty do research that spans more than one of these areas.

Table 5-1. Numbers of female, male, and minority Biology Department faculty by rank in January 2007 compared to January 2017. Does not include research faculty, emeritus faculty, adjunct faculty, or the three faculty members who are on long-term leave. The half position reflects a joint appointment with another department.

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<tbody>
<tr>
<td>Distinguished Prof.</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>3</td>
<td>0</td>
<td>2</td>
<td>0</td>
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<td>18</td>
<td>3</td>
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<td>6</td>
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<td>7</td>
<td>0</td>
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<tr>
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<td>9.5</td>
<td>2</td>
<td>4</td>
<td>1</td>
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<tr>
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<td>4</td>
<td>35.5</td>
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<td>3</td>
<td>34.5</td>
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<td>8</td>
<td>44</td>
<td>12.5</td>
<td>30</td>
<td>4</td>
<td>42.5</td>
</tr>
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</table>

Teaching Assignment Patterns: The standard teaching load for tenure-track faculty is one lecture course each semester and one additional assignment. The additional assignment is often a small readings course or lab group. Occasionally, this teaching load is modified by allowing a doubling-up in one semester to free the other semester for research, reducing to accommodate large administrative assignments, or reducing to buy out from grants. Lecturers teach two, usually large classes per semester, and some coordinate highly subscribed lab courses in place of one or both classes. Lecturers frequently take on additional assignments for which they receive additional compensation.

Although the teaching load is meant to be equal, the experience can be quite different for faculty in different sub-disciplines. These differences arise from discrepancies in undergraduate interests, faculty interests, and differences in opportunities to buy time with grants (NSF almost never funds release time, while NIH is willing to do so). At the lower-division level within the core curriculum, Biol. 201 (Cell Biology) and Biol. 202 (Genetics) have been taught about half the time by tenure-track faculty and half the time by lecturers. Biol. 203 (Ecology and Evolution) and Biol. 204 (Plant and Animal Form and Function) tend to be taught by tenure-track faculty. At the upper-division level, virtually all ecology, evolution, organismal and behavior classes are taught by tenure-track faculty. Upper-division classes are nearly always well subscribed, indicating substantial demand. The most popular courses are those related to health science professions or the biology of sex (a long tradition in our department), and these typically having 50-100+ registered students.

Publications: Faculty in Biology are expected to publish regularly. Since 1996, the general trend is an increase in number of publications per year (Fig. 5-1) despite that the faculty size has changed little. Each year, these publications include several in very prestigious journals. Complete lists of annual publications were previously compiled in the department’s annual reports, but these have been recently discontinued. As of 2016, faculty are required to maintain public Google Scholar accounts. Twenty-seven tenured/tenure-track faculty have public Google Scholar accounts that are up-to-date (listed in Appendix 5-2).

Every year, our faculty publish high-impact articles and they receive prestigious awards, federal grants, and international attention (usually positive). Many examples are illustrated in the CV’s in Appendix 5-1. Our most recognized faculty members on an international level include Scott Collins, a Distinguished Professor who has been a leader in the field of ecology, and Sam Loker, a Distinguished Professor who has been a leader in the fields of parasitology and immunology. In the Museum of Southwestern Biology, Joe Cook is a widely
recognized leader in the natural history museum and mammalogy communities. Our senior ecologist hire of 2012, Jennifer Rudgers, is widely viewed as a rising star in ecology, and she recently led an important effort to re-fund our department's long-term ecological research site, the Sevilleta, through a major NSF grant. There is a general feeling in the department that there are several assistant and associate professors who do outstanding research and are likely to rise to international research prominence over the course of their careers. This is important, because our department continues to feel the absence of three distinguished professors that have retired within the last three years (Randy Thornhill, James Brown, and Eric Charnov). Those three individuals were profoundly influential in international research communities and they became tightly intertwined with our department's reputation.

Figure 5.1. Annual numbers of peer-reviewed publications authored by Biology Department faculty. The method of counting from 1996-2006 is unknown (green points). From 2007-2013 (purple points), publications include research articles, reviews, syntheses, book chapters, and scholarly books, as reported in the department annual report documents. From 2014-2016 (red points), publications include those listed in Google Scholar profiles for only the 26.5 faculty members who maintain public profiles; abstracts and book reviews were excluded. Overall, the annual output of publications has more than doubled over the last two decades, and continues to increase despite an overall decline in faculty numbers and the recent retirements of three prolific Distinguished Professors.

Review of Faculty: In addition to the university-level procedures for tenure and promotion review, Biology faculty members are reviewed each year. Faculty members are required to submit a data report annually. These data are reviewed by the Salary Committee and the chair. The format of the annual report was overhauled in 2016 and now consists of a highly streamlined Excel Workbook. However, the process of refining the annual review remains unfinished because feedback to faculty on the annual report was limited to a numeric score, provided without context, for each of research, teaching, and service duties. In the management field, it is well established that performance evaluation should include specific, qualitative feedback and context; whereas, anonymously-judged numeric scores can be counter-productive and demoralizing.

Typically, annual salary adjustments are meager or nonexistent; they can include a cost-of-living adjustment, a small merit raise, an equity adjustment, or a retention adjustment (see Faculty Salaries, below).
Untenured faculty and new lecturers are assigned two mentors from among the tenured faculty or senior lecturer ranks. The mentors are expected to discuss the expectations for tenure and/or promotion, observe teaching at least once per semester, answer questions about departmental issues, and present the mentee's record at a meeting of the tenured faculty each spring. These faculty likely receive mentoring from their mentors (although this is not specifically tracked), and ultimately receive an annual review letter from the chair.

**Governance:** The faculty are led by a chair and three associate chairs (recently increased from two associate chairs, in recognition of the sizable workload). Most faculty business is discussed at faculty meetings held every one to four weeks. While there is a regularly scheduled time for faculty meetings, meetings are not held unless there is business to discuss. Faculty meetings are always held to discuss tenure and promotion decisions and faculty hires. Votes on all major decisions are conducted by anonymous ballot within a 24-hour voting period. Anonymous-ballot voting helps faculty whose family and other responsibilities prevent them from staying until the end of long meetings, preserves independence of junior faculty, and prevents conflict. One disadvantage of this system is that the chair is required to wait to act on the outcome of a vote for any contentious matter, and this prevents further progress on that matter in a single meeting. The faculty sometimes circumvent this issue by creatively designing the ballot to make multiple decisions in a single vote.

**Faculty Hires:** The chair and faculty discuss priority areas for hiring during dedicated faculty meetings or retreats. The last retreat was a day-long event on February 21, 2015; the previous retreat of the Biology faculty had occurred in 2004. Historically, the department had been marked by a disciplinary division between faculty members who identified with molecular and cellular biology, and those who identified with ecology, evolution, behavior, and/or organismal biology. The importance of this dichotomy has been considerably diminished because of blurring of disciplinary boundaries in recent years. For example, at the retreat, faculty from both sides of this divide agreed on priorities for hiring that would potentially provide mutual benefit (e.g. bioinformatics). Nonetheless, the divide still exists. There is a long-held perception on the molecular and cellular biology side of the department that their small community of ~8-10 faculty members barely reaches critical mass to be competitive in biomedical research, graduate training, and the NIH funding environment.

In practice, following the recommendations emanating from faculty discussions and retreats is hampered by several factors. First, faculty turnover is not always predictable and can shift priorities. We have experienced substantial turnover in faculty over the last two decades. Of the 2007 faculty, 20.5 were not present in 1996 (the 0.5 FTE represents a faculty member with a joint appointment); of the 2017 faculty, 15.5 were not present in 2007. Second, since faculty lines do not automatically stay in the department, replacement of faculty takes time and areas of expertise, once vacated by retirements, frequently go unplaced. Often, by the time a line comes available, additional retirements or separations have occurred and hiring priorities are muddied. Third, the department has avoided reductions in size only because of special hiring opportunities including faculty hires that were subsidized by the NIH-funded CETI program (Center for Evolutionary and Theoretical Immunology), spousal hires, special hires in which soft money research positions were converted to tenure-track lines. These have been valuable hires of quality faculty; our numbers would be limited without them, though it is not clear to what extent considering that these hires may cause the Dean to adjust hiring plans for the College. However, it is clear that these hires are the result of special opportunities rather than the outcome of a department-wide planning processes; in this way, they undercut the ability of the faculty to strategically target important or emerging subdisciplines. It is possible that, as a consequence of the department taking the initiative to make special hires and using grant funds to leverage, expedite and support hires and to create new programs, we may have avoided the significant losses in faculty size that have plagued other UNM science departments. Other departments within the College have been ravaged by retirements and recruitment by other universities. Efforts have been made to retain some of our faculty who have been offered jobs elsewhere, but these efforts have had mixed success (see Faculty Retention Efforts, below).

Some shifts in faculty areas of emphasis have occurred over the past decade, changing the priorities for hiring. Listed here are five of the shifts that have occurred or are anticipated:

1. As has been noted for over a decade, the former strength of our department in behavioral ecology would be affected by retirements of faculty members such as Ligon, Kodric-Brown, Charnov, and Thornhill; the
department has not hired to fill this gap, and we currently have essentially no program in behavior.

2. Departures and retirements of faculty studying genetics and genome evolution (e.g. Nelson, Werner-Washburne, Katju, Berghorsson, Wagner) have left a noticeable gap in molecular genetics, evolutionary genetics and comparative genomics, even while those subdisciplines are experiencing a boom elsewhere.

3. Faculty discussions have consistently identified bioinformatics and water-resources as emerging, interdisciplinary areas of biology in which we would like to pursue strategic hires, but these have not been pursued to date, for various reasons including the weak UNM budget.

4. Curators who are phasing to retirement in the Museum of Southwestern Biology portend a looming crisis of inactivity in certain museum divisions if timely replacement of those curators does not occur. The MSB urgently needs critical mass of active curators considering that two curators have phased into dean-level administration duties, and another is near retirement and not pursuing a collections-based program at present. Although the MSB continues to be highly productive, among its nine divisions at least four lack active faculty-curators who are pursuing specimen-based research agendas and collections-infrastructure improvement that is focused on the long term.

5. The CETI (Center for Evolutionary and Theoretical Immunology) program has had positive impacts that have reverberated through our department via subsidized faculty hires, infrastructure development, seed grants to faculty, and maintenance of a vibrant intellectual atmosphere. However, this program, which is funded via NIH's COBRE mechanism, will be changing as the final phase of COBRE funding finishes over the next few years. Over the same time frame, Sam Loker will retire and the continuation, transformation, or replacement of CETI's role in our department will be an important question facing our faculty.

6. New areas of emphasis and excellence are emerging as a result of faculty hires and collaboration. These include microbial ecology, comparative immunology, and landscape-level ecology. The coalescence of faculty to develop these program areas is encouraging for future research emphases in the department, and it will be useful to determine if there are ways that these programs can be further enhanced without subtracting resources from other areas, perhaps through grant funding.

Faculty Curators: Seven tenured faculty members are currently serving as curators of collections at the Museum of Southwestern Biology (MSB). These duties occur over 12-months and without any formal reduction in work-load relative to non-curator faculty members in the Department of Biology. Over the past two years, the Dean has begun providing an additional $2,000 of summer salary to each curator in recognition of this uncompensated work. However, there are concerns that this measure is not sufficient to address the problem, and it may be inconsistent with the MSB's administrative agreement with the Department of Biology. Furthermore, evaluation of curatorial job performance, which is often substantial and also reflects highly uneven effort levels among the curators, is made difficult by the fact that it is essentially uncompensated work.

Roles for Retiring Faculty: Usually, retired faculty are granted emeritus status after a request to the department. They may have office space in Castetter Hall or the adjacent Marron Hall. Retired faculty generally do not retain lab space, but often continue writing, doing research, and mentoring on behalf of our department, and their contributions are highly valued. Some recently retired faculty are being hired to teach courses or assist mentoring programs, as needed. Retired faculty serve on graduate committees, but may not be the sole chair of these committees. At present, recently retired faculty members Randy Thornhill and Maggie Werner-Washburne continue to contribute impactful teaching and mentoring.

Faculty Involvement in Interdisciplinary or Cross-Unit Academic Programs: Faculty have been involved in a number of large, interdisciplinary training programs. Current programs include IMSD, MARC, and PREP/FlyBase programs, each of which includes mentors and mentees in multiple departments on Main Campus and the Health Sciences Center. Attempts in recent years to revive former programs funded by IGERT/NRT (NSF) or PIBBS (NIH) have not been successful. The Sustainability Studies program at UNM (led by Bruce Milne) is by definition interdisciplinary. Dr. Helen Wearing has a 50:50 appointment with Biology and Mathematics and Statistics; that appointment has generally been viewed as a success, although there were concerns that it may have caused Dr. Wearing to bear an additional burden of bureaucratic issues, committee
work, and evaluation. Dr Chris Johnston was a recent hire that was funded by the Arts & Sciences B.A./M.D. Program, that enrolls high school graduates into a specifically designed undergraduate degree program that automatically channels them directly into the UNM Medical School M.D. Program. Dr Johnston teach a section of the BIOL 201 core class to all of the B.A./M.D. students (plus other students from outside the program), and participates in administration of the program. Separately, Dr. Johnston has also developed a course in collaboration with a faculty member from the Department of Chemistry and Chemical Biology entitled Pharmacology of Antibiotics and Anti-Cancer Agents, that includes a Summer field trip to Germany to visit pharmaceutical companies.

**Faculty Teaching Workloads** (see also Teaching Assignment Patterns, above): The number of student credit hours taught per year has increased. We taught 14% more student credit hours in 2007 than in 1996–1997, and the increase has continued at a similar rate 2017, despite a slight decline in faculty numbers. Those student credit hours are divided between majors and non-majors courses. The number of students in our non-majors courses continues to increase. Most of the student credit hours in upper-division courses are taught to our majors, whereas lower-division courses include many that are targeted at non-majors. Lecturers teach primarily in the large, non-majors courses, whereas tenure-track faculty members teach primarily in upper-division courses as well as the core curriculum for majors (200-level series). The College of Arts and Sciences has supported teaching extra sections of the non-majors biology courses to improve student access to courses that are part of the university core curriculum and to increase access to courses that are prerequisites for health sciences programs, especially nursing.

**Support for Faculty Development:** Faculty support starts at the hiring stage. The last two faculty hires started at salaries of $65,000 and $75,000, respectively. This is increased slightly from the average starting salary of $56,000 for assistant professors starting one decade ago. Start-up packages have typically been ~$300,000, over the past decade, though our most recent hire was granted ~$425,000. Currently, start-up packages are funded from the College of Arts and Sciences and the Biology Department, using overhead (F&A) funds. The Office of the Vice President for Research formerly supported start-up funds routinely, but now only supports start-up funds for inter-disciplinary hires and by advance negotiation. This has caused concern about the department's ability to mount sufficient startup funds to compete for top job candidates.

Typically, beginning faculty are given a teaching release by the department for the first semester. Most also receive one research semester from the College of Arts and Sciences between the mid-probationary review and the tenure review. New faculty are assigned two mentors from the tenured faculty or, for lecturers, from the senior lecturer ranks.

The department provides additional support for faculty or infrastructure from its overhead (F&A) accounts. These funds are disbursed or directly spent at the discretion of the Chair. Some funds are allocated to faculty for travel to meetings, publication costs, or research support. Other funds are spent on research infrastructure that the Chair believes to be in the best interest of the department.

**Faculty Salaries:** Faculty salaries in the Biology Department (described in Fig. 5-2) are substantially below the average for major research universities, which puts us at a competitive disadvantage. They are also substantially below the levels of other science departments at UNM, despite higher grant-funding levels and sustained, impressive research output by the Biology Department. In recruiting faculty, we routinely emphasize that the unique features of New Mexico and its modest cost of living are able to compensate for low earnings, but this does not fix the underlying problem. Exacerbating the low salary problem are the chronically small annual raise increments. In 2014, the median raise among department faculty was 3.25%; but in each of 2015 and 2016, the median raise among faculty was 0.00%. This three-year annual average increment of ~1% is insufficient to keep up with increases in the cost of living and increases in salary deductions due to rising costs of healthcare, meaning that most faculty have received a net loss of take-home pay over the last three years. It is difficult to maintain competitiveness in the national arena under these circumstances, and this negatively impacts hiring, retention, and morale throughout the ranks.
Our department suffers striking problems with salary compaction and inversion. We have highly successful faculty members who have been productive for the department over five–ten years, but whose salaries are only one–three percent higher than our starting assistant professor salary level; additionally, there is a faculty member earning a salary identical to three faculty members that were hired later (complete salary compaction). Furthermore, there are three outstanding assistant professors who are paid substantially less (>5%) than the most recently hired assistant professor (salary inversion). There is no question that these problems and inequities create morale issues for faculty members, beyond the simple economic problems associated with being underpaid among their peers on a national level and across UNM Main Campus. Efforts to improve inequities were rolled out by the Provost in 2012. While this addressed some egregious problems, it was not as comprehensive as we would have liked. Fixing inequities should be a continuing activity, but equitable salary adjustments have not been a continuing focus of the upper administration.

Faculty Retention Efforts: The department occasionally makes efforts to retain faculty who are under consideration for faculty positions at other universities. Such efforts are managed by the Dean of the College, and the Biology faculty and Chair provide only opinion and guidance. The policy of the College of Arts and Sciences in this matter, while it has historically varied among Deans, is currently considered to be restrictive or even regressive by some faculty, as it can have the effect of diminishing salary increases for our faculty. A written job offer is generally required to receive any retention measure. On occasion, the department has been able to take steps for retention at the interview stage. Furthermore, the Dean directly polls the department faculty with regards to pursuing retention, which risks equating personnel decisions with popularity contests and could be seen as undercutting the authority of the Chair to make appropriate strategic decisions for the department. Third, salary increases related to retention have in the past targeted only the faculty member in question, which causes salary inequity, salary compaction, and poor morale (but see comments elsewhere in this document concerning recent salary adjustments in the Department of Earth & Planetary Sciences); by comparison, other institutions employ policies that lift peer salaries in the cases of retention raises.

Over the past decade, we have succeeded in some retention efforts, although the requirement to obtain a formal job offer, combined with the weak academic job market, has limited the number of retention efforts required. On the other hand, we have failed at retention efforts for two young female faculty in recent years, each of whom accepted faculty positions elsewhere; and we recently failed to retain an important senior faculty member who departed for NSF. In addition to a higher salary or the offer of a spousal position where relevant, our efforts in this area also have included making provisions for staff assistance, working out special time-sharing
arrangements with other academic units or institutions, and provisions of more material resources. Unfortunately, there are seldom funds from the college to deal with the potential inequities created for faculty who are less mobile due to family or other reasons. The annual salary increment given to the department, on the few occasions that it has existed over the last several years, is insufficient to address this problem.

**Maintaining Faculty Size:** The department is facing a crisis of faculty size that if left unresolved could challenge our role as one of the top performing units on campus in teaching (~1,500 majors, >20,000 CR/yr, courses required by programs across campus) and research ($21.9M in F&A from 2005-2012, $10M more than any other department in A&S, 60% of the School of Engineering). In recent years, faculty hiring has been offset by retirements and departures, maintaining faculty size as our number of majors has increased. In the next 2-3 years, the retirement of 5-8 faculty is likely to occur in a budget environment that will severely limit or completely block hiring junior faculty to replace these senior faculty members. Moreover, the success of our Assistant and Associate Professors increases the risk of losing additional faculty to other universities. In the Department of Earth and Planetary Sciences (EPS), the retention of a talented Assistant Professor recently caused the College of Arts and Sciences to apply substantial salary increases ($136K) to faculty at all ranks to fix a broken salary structure. The same problems exist in Biology, but four hires in the last five years with a similar effect on the salary structure have not triggered the same solution. Comprehensive salary adjustments, such as those already taken in EPS, are badly needed in Biology to maintain morale, reduce the risk of departures of early and mid-career faculty to other universities, and perhaps delay the retirement of senior faculty.

### Table 5-2. Summary of STEM salary adjustments in A&S from June 2015 to March 2017.

<table>
<thead>
<tr>
<th>Department</th>
<th>Faculty†</th>
<th>Total increase§</th>
<th>avg % Increase‖</th>
<th>$ increase per faculty member‖</th>
<th>Credit hours Spring 2017¶</th>
<th>Total F&amp;A 2005-2012¶</th>
<th>Credit hours Spring 2017¶</th>
<th>Total F&amp;A 2005-2012¶</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>32</td>
<td>$70,385</td>
<td>2.38%</td>
<td>$2,199</td>
<td>12,352</td>
<td>21.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chem</td>
<td>19</td>
<td>$33,715</td>
<td>1.60%</td>
<td>$1,774</td>
<td>9,716</td>
<td>5.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E &amp; PS</td>
<td>16</td>
<td><strong>$136,034</strong></td>
<td><strong>8.02%</strong></td>
<td><strong>$8,502</strong></td>
<td>2,213</td>
<td>7.2 (4.8)*</td>
<td>2,213</td>
<td>7.2 (4.8)*</td>
</tr>
<tr>
<td>Physics/Astro</td>
<td>25</td>
<td>$48,140</td>
<td>1.96%</td>
<td>$1,925</td>
<td>5,620</td>
<td>12.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CBE (SOE)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1,631</td>
<td>6.4†</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Civil (SOE)</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,586</td>
<td>4.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*with (and without) Meteoritics
- average current salaries in Chemical and Biological Engineering and Civil Engineering are shown in Table 2. Salary changes are unknown.
1. if increase were allocated proportionately across all faculty in department (they were not)
2. includes all hours for all sections during Spring 2017.
3. millions of dollars, this period chosen only because data were readily available
4. includes only faculty who were employed in June 2015 and March 2017 (retirements and new hires are excluded, as are research faculty and lecturers).
5. includes standard salary increases for promotions during FY15 and FY16.
6. Estimated from yearly combined F&A generation of Center for Biomedical Engineering and Department of Chemical and Nuclear Engineering during 2010-2012 applied to 2005-2012.
**Criterion 6. Resources and Planning**

The unit has sufficient resources and institutional support to carry out its mission and achieve its goals.

6A. Describe how the unit engages in resource allocation and planning. If the program or unit has an advisory board, describe the membership and charge and how the board’s recommendation are incorporated into decision making.

We do not have an advisory board that makes resource allocation and planning services. Decisions on how to spend materials and supplies money is made largely by the chair, DA and head of Accounting on a year-to-year basis. If there are new or critical issues, e.g. a cut in the budget, it is brought to the faculty as a whole to aid in the decision making process.

6B. Provide information regarding the unit’s budget including support received from the institution as well as external funding sources.

The department has four main sources of funding, state funding (the I & G budget) that is allocated to the department by the College of Arts and Sciences, course fees that are collected from students, overhead funds generated by grants, and gifts that are managed by the UNM Foundation. The faculty, staff and students in the department also hold grants funded by a variety of agencies. These funds, of course, are for research projects, not for the general operation of the department. This section provides an overview of our financial situation. Details for FY15/16 can be found in a report provided by our accounting staff (Appendix 6-1).

**I & G Budget:** The state-funded budget includes two parts—Salaries and Materials & Supplies. Starting in fiscal year 2004–2005, a 1% tax was imposed on all transactions in the I & G budget. This tax funds implementation and operation of a new data base system—Banner. Over the past 5 years, the department’s I & G budget increased to $6.2 million in FY15, then dropped dramatically in FY16, due to 3 faculty retirements, 2 faculty leaving UNM to go to NSF, and the transfer of a portion of one faculty members salary to A&S (when he became Associate Dean of Research for the College). Salary dollars freed up from retirements or leave are reclaimed by the College of Arts and Sciences. Our Materials and supplies budget increased from FY13 to FY15, where it has stayed consistent for several years. Initially, new online courses resulted in an increase of funds generated for the Biology unit. We used this surplus to meet Materials and supplies demands not covered by A&S. A change in accounting several years ago essentially wiped out the financial benefit to the department of offering online classes. At that time, we negotiated a ramp up of Materials and supplies budget to meet our needs.

![Figure 6-1. Institutional and General (I&G) expenditures in Biology. Left, salaries; right, supplies.](image)

The allocation of I&G funds to materials and supplies is overseen by the chair of the department. The department currently gets $142,477 for materials and supplies. This covers everything from phone lines, leases for copiers, to all office supplies, computers, non-capital equipment, computer software, postage, seminar series, and miscellaneous equipment and building repairs. This is not sufficient to cover the needs of the department. We routinely use Biology Foundation funds or F&A to help make up the difference.

Large fixed costs incurred each year include the lease for departmental copiers ($4,741 in FY15/16), and telecommunications ($ 51,358). The large telecommunications bill arises because, despite an increase in the size and complexity of our department, the university has not increased our budget for telephone lines for many
years. The department pays for increased phone lines from the I & G budget. Because of these costs that are necessary to operate the department, our Materials and Supplies budget is often not sufficient to meet our needs, and/or have any left over to allocate for supplies for our courses.

**Course Fees:** As the state budget for teaching materials had become inadequate, the department began charging fees for all courses in 2005. Some course fees for the more expensive labs had always been a part of the budget; however, because all courses had costs that could not be covered by the state budget, the department applied for and gained approval to charge course fees. Course fees range from $5-$75. We charge $5 for most lecture classes, $10 per discussion class, $30-75 for lab classes, and $75 for field trip and anatomy and physiology labs. Charging course fees has turned around the department’s teaching budget. These fees generated $136,000 in FY 2005/06, and $215,000 in FY2015/16. These funds are monitored carefully and are spent only on teaching, which allows us to purchase supplies for classes and to engage in a program of upgrading teaching equipment. For example, in the past few years, with these funds, the department purchased new Syndavers (synthetic cadavers) for the anatomy and physiology labs, microscopes for upper-division courses, and new instruments to measure gas exchange for the labs in one of our core courses. We still face challenges in providing lab supplies, which increase in cost each year, but we are in a better circumstance than we were a decade ago.

![Figure 6-2. Indirect cost generation and return in Biology.](image)

**Overhead Funds:** The Biology department generated just over $3 million in F&A funds for UNM in 2005, and this number has decreased to $2.2 million dollars in 2015, presumably due to the downturn in federal funding (Figure 6-2). Until two years, ago, 35% of F&A funds generated in Biology were returned by the OVPR to the College of Arts and Sciences and 40% of the College’s share of F&A was returned to Biology (Biology returns 25% of its share to the PI of each award providing a source of discretionary funds for faculty). Under that system, start-up packages for new hires were shared according to the same formula. Two years ago, the then-VPR implemented a new system, nicknamed “Top Slice”. Under Top Slice, the OVPR retains a fixed portion of F&A generated and returns the remainder to the units that generate it and the OVPR no longer participates in funding new faculty start-up. The 60:40 distribution of F&A returned to the College remains unchanged. Under top slice, F&A returns to the College have fallen below 35% and the costs of new faculty start-up have effectively doubled for the College and Biology (Biology’s share increased from 21% of startup to 40%). About 45% of the F&A returned to Biology is distributed to centers (with individually negotiated F&A distribution agreements) within the unit and to individual PI’s, based on the individual grants that generated the F&A. The remainder is reserved to
fund start-up obligations for new faculty. As a result of the increased share of start-up borne by the department, our expenditures of returned F&A in other areas have been severely curtailed. Although as of this writing Biology hiring is frozen by limitations in funds for faculty salary, we are concerned that the reduced F&A returns and increased start-up costs to the department under the Top Slice model will limit our ability to provide start-up funds needed to hire faculty. The allocation of F&A has ranged from approximately $300,000 to 450,000 over the past 5 years (Figure 6-2). In FY 16, the department’s overhead allocation was $317,414. $46,000 of this allocation was used for start-up expenses by our new faculty, $223,555 was disbursed to the museum, CETI, Natural Heritage, and individual PI’s, and approximately $3,000 was used to supplement Materials and Supplies. The rest was banked for future start-up needs.

**Foundation Accounts:** The department, through its own development efforts, has accumulated some accounts managed by the UNM Foundation. These support scholarships for undergraduate and graduate students, the Museum of Southwestern Biology, research, and discretionary activities. Table 6-1 summarizes the current UNM Foundation accounts. To the extent possible, we have, in recent years not used the annual spending account of the major departmental endowment, as a way to continue to grow the endowment principal.

![Figure 6-3. Ten-year trend in grant expenditures in Biology.](image)

![Figure 6-4. Recent trends in grants submitted and funded in Biology.](image)

**Grant Funding:** In 1996, the department had $4,927,390 in grant expenditures. By FY07, the department’s funding increased to $13,358,472 in grant expenditures on 219 grant indices. We have had some ebb and flow in these expenditures as new grants come online, but in FY16, the department still had $11,358,462 in grant expenditures on 228 grant indices (Figure 6-3). Based on UNM’s accounting system, the number of grant indices is a measure of the number of active grants. This is a slight overestimation as a few grants have more than one index. The peaks in FY05 and FY12 represents the initiation of the large NIH grant that funds the CETI program. We are somewhat concerned that grant dollars have declined over the past 5 years. This may be due to an increase in recent retirements in our department, but other explanations are the recent decrease is due to the normal funding cycles for some large programmatic grants, increasing difficulty of obtaining federal funds, or reductions in submissions of proposals by our faculty perhaps due to difficulties with pre-award services at UNM. We also are concerned about the changing climate for funding from federal agencies. A comparison of number of proposals and awards over the three years, shows a dip in both the submission of proposals and those (Figure 6-4). We would like to work with the college and university development staff to improve our connections with and funding from private foundations.
Table 6-1. Summary of Biology Department Accounts in the UNM Foundation.

<table>
<thead>
<tr>
<th>Type of Accounts</th>
<th>Number of Accounts</th>
<th>Purpose</th>
<th>Funds Available to Spend</th>
<th>Endowment Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-endowed Biology Foundation Accounts:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Museum of Southwestern Biology</td>
<td>$24,867</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Plant Ecology Scholarship</td>
<td>$60,826</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>NM Heritage Program Chair's Discretionary Fund</td>
<td>$153,262</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>$20,221</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Endowed Biology Accounts</td>
<td></td>
<td></td>
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Our funded awards range in amount from a few hundred dollars to millions of dollars. Typically, the largest amount of funding comes from the National Science Foundation (NSF). This is primarily because of the large grants to the LTER and LTER Network Office, but there are also numerous single investigator grants. Funding from NIH also is substantial and increasing over time, in part due to the large COBRE grant that funds the Center for Evolutionary and Theoretical Immunology (CETI). Details of funding sources are presented in the financial report (Appendix 6-1). While most of the grant dollars come from awards to tenure-track faculty, substantial grant activity also comes from the work of other department members, especially the research faculty. In FY 2015/16, ~50% of the new awards were to members of the department who were not tenure-track faculty. On average, 30 tenure-track faculty hold grants each year.

Current and Projected Costs: The bulk of our annual I & G budget is for salaries and the salary funds cannot be moved to other budget categories. We expect salaries to continue to increase and worry about the slow rate at which the state budget increases. Salaries need to rise to be competitive with our peers and to retain our faculty. A recent concern has been an increase in the UNM administrative budget, resulting in fewer funds trickling down to the faculty level. The department would benefit from both an increase in the number of staff lines and an increase in the rate of pay for staff. Essential duties are still supported by overhead funds. The number of guaranteed T.A. lines has shown essentially no increase in the last five years. The time has also come
for a substantial (at least 20%) increase in TA stipends to remain competitive. We also expect materials and supplies costs to continue to rise, likely at higher than the rate of inflation. In recent years, this budget actually has declined, and we use course fees to cover the shortfall. Grant revenues are difficult to predict. Given the current funding climate and the state of the federal budget, in the near future it is more likely that these funds will decrease rather than increase. This creates two problems for the department. First, faculty are likely to experience gaps in funding and ask for support from the departmental overhead funds. Second, fewer grant dollars means a smaller overhead budget. Yet we expect the demands on the overhead budget to be even greater, as travel costs for faculty, gaps in funding, and requirements for start-up funds all increase. We are very concerned about our overhead budget. This budget has kept the department afloat during many lean times at UNM. However, this budget has recently decreased as discussed above. This is of great concern for several reasons:

1. The permanent, institution-wide decrease in the redistribution of overhead funds has been very detrimental at the departmental level. We used to depend on our overhead funds to support travel to professional meetings or for collecting trips, to enable purchase of equipment items or supplies needed by faculty in transitional funding situations, or to provide supplemental support for the research activities of graduate students. Overhead funds were among our most discretionary funds, and insofar as they are devoted to research activities, and given that we have created the overhead streams in the first place by virtue of getting grants funded, these are very important to us.

2. A reduction in the level of funds returned to the units that generate them in the first place is a huge negative incentive for PIs. Even though the PI share received now is small, it is something, and can be used by the PI to initiate totally new projects or to make scientific trips that would not be possible otherwise. If there is no return or a diminished return, we feel it will eventually cause the number of proposals submitted to decline.

3. The OVPRED office retains more research overhead funds, and this has significantly impacted their ability to provide start-up funds related to future hires as discussed above.

4. Many of our large, multi-investigator projects rely heavily on cost-shares to help pay for the support personnel needed to administer the program in question. In some cases, virtually 100% of the overhead generated has been returned to the projects via cost shares. Cost shares are now much more difficult to obtain to the OVPR and often fall to the college and the department who only have access to a limited share of the F&A generated by our grants. This has reduced the efficient operation of some of our most valued programs, and the likelihood of getting new large grants funded.

5. More philosophically, if overhead funds generated from research are not plowed directly back into research, but instead are siphoned off by other UNM financial units, then this sends a very strong negative message to the faculty that research is not sufficiently valued, or that the research infrastructure (compliance, proposal handling, accounting) is not being sufficiently supported. All of these things create difficulties for submission or support of research endeavors, create negative incentives for continuing to submit proposals, and cast doubt on the potential of UNM to excel in research.

**The Relationship Between the Budget and the Department’s Mission and Goals:** The department has little control over the I & G budget, yet this budget is necessary to perform our primary missions of research, teaching and service. Annual increases in salary, as provided by the state, are small enough that only small merit awards can be given. Larger increases in salary come from counteroffers to those faculty who can seek jobs elsewhere and from adjustments based on administrative responsibilities. This is typical of the entire university. Our needs for additional staff lines are very difficult to address and extra T.A. lines are not allocated in a way that allows us to plan for new graduate students. The department does control its course fee budget. Course fees were created to address directly the need for teaching equipment and supplies. The course fees budget is used entirely for those purposes. The overhead budget is used most directly to support our goals related to the research mission.
Here, where the department does have control, funds are allocated directly to faculty research needs.

In recent years, the state budget has been in a state of crisis, and faculty resignations and retirements have not been replaced leading to a slow decrease in the number of faculty. Based on the current state budget and the anticipated retirement of up to six faculty in the next 2-3 years, this trend is likely to continue. The net effect will be to return our faculty numbers to levels not seen since the mid-1990’s, even as our number of majors has more than doubled since that time. In Fall 2016, with encouragement from the College of Arts and Sciences, Biology submitted a Request for Differential Tuition. Differential tuition is additional tuition charged on every credit hour taken by students in a particular program, in this case Biology majors, to generate revenue to support the program. Recognizing that we are unlikely to see increases in state funds needed to hire faculty, increase the availability of upper-division courses, hire additional TAs for upper division courses and to provide other benefits to our students, Differential Tuition provides a means to support our program during these difficult times. Biology faculty supported Differential Tuition even as they expressed concerns that it might lead to a decrease in our number of majors, or a relative decrease in funds from the College (because Differential Tuition represents a source of revenue not available to other departments in the College). The Regents will render a decision about Differential Tuition by the end of Spring semester, 2017.

6C. Describe the composition of the staff assigned to the unit (including titles and FTE) and their responsibilities.

Currently, the department has 115 staff members, 34 of whom are paid in full, or in part, by state I & G funds. Of those paid by I&G funds, 31 are 1.0 FTE. The remainder of the staff are paid through grants, overhead funds and foundation funds. These staff include core, departmental staff that run the Main Office, keep track of department finances, advise students and manage our buildings. State-funded staff lines have always been a limiting resource for the department.

6D. Describe the library resources that support the unit’s academic and research initiatives.

The academic and research initiatives of biology department faculty, staff, and students are supported by the library resources and services provided through the UNM College of University Libraries and Learning Sciences. The UNM University Libraries (UL) is a member of the Association of Research Libraries and includes four separate facilities on the University of New Mexico’s Main Campus in Albuquerque: Zimmerman Library (education, social sciences, and humanities); Centennial Science and Engineering Library (CSEL), which houses the majority of materials that support biology research; Parish Memorial Library (business and economics); and the Fine Arts and Design Library. Additional resources and services are available through the UNM Health Sciences Library & Informatics Center and UNM School of Law Library.

The UL has an annual collections budget of $5.6 million, supplemented in recent years by an additional $1 million annually from endowment funds and municipal bonds. Of the UL’s annual budget, more than $2.4 million is specifically allocated to support STEM content. Together, these funds are used to build and maintain the UL’s collection of more than 3.3 million physical and digital volumes, including 67,000 scholarly journal titles, plus an additional 5.6 million digital volumes accessible through collaborative memberships (i.e. HathiTrust, Center for Research Libraries).

The UL’s collection also includes more than 380 online literature and reference databases, which provide targeted search and navigation to aid in scholarly resource discovery. Significant library subscription databases that support biology research include Web of Science Core Collection, Biosis Citation Index, Zoological Record, Environment Complete, Wildlife & Ecology Studies Worldwide, Science Reference Center, and JSTOR Global Plants. Extensive electronic scholarly journal packages with significant biology subject content are accessible through a number of publisher platforms, including Elsevier’s ScienceDirect, BioOne, JSTOR, and Wiley, among others.

The UL’s catalog is built on the Worldcat library system, which provides bibliographic access to UNM-owned content in addition to millions of books, journal articles, and other information sources in libraries worldwide. The Worldcat catalog enables integrated Interlibrary Loan (ILL) service, expanding accessibility through streamlined reciprocal borrowing of materials not held by UNM. ILL requests for electronic journal articles and book chapters are typically filled within 24 hours, while requests for physical books are frequently delivered.
in five business days. This ILL borrowing service is free to all UNM students, faculty, and staff. The UL additionally encourages and honors biology department member requests to purchase specific information materials (books, journals, databases, software, multimedia) as a means to best serve specific information needs and build upon the department’s subject expertise.

There are numerous special collections and services available through the UL, including the Map and Geographic Information Center (MAGIC) at CSEL. The MAGIC collections include more than 300,000 maps and cartographic images. The UL is also home to the Digital Initiatives and Scholarly Communication (DISC) Center, located in Zimmerman Library, and the Research and Data Services (RDS) Program, located in CSEL. DISC develops online cultural heritage, scholarly, and educational resources. Of significance to the biology department, DISC maintains Lobovault, UNM’s institutional repository that archives faculty publications, data, and other resources; the UNM Open Journals Portal; and the Searchable Ornithological Archive (SORA), the world’s first and largest open access database providing full text access to ornithological publications. RDS provides a wide variety of services in support of digital projects and data management, including data management planning advisement for grant funding compliance and more broadly through advisement on general planning, management, preservation, discovery, and use of research data at all levels. Through this program, biology department faculty, students, and research programs have access to authoritative data consultation services provided by a faculty Director of Research Data Services and a Data Curation Librarian.

To effectively communicate and meet the diverse information needs of the biology department, the UL engages a faculty life sciences liaison librarian (rank of assistant professor) dedicated to providing services tailored to the needs of the biology department’s faculty, staff, and students. These services most notably include collection development, one-on-one reference and research consultations, data consultation services in coordination with RDS, practical workshops, course-integrated information literacy instruction, and outreach regarding library resources and services. Beginning in 2015, through a collaboration with the UNM STEM Gateway’s Essential Academic Skills Enhancement (EASE) program, nearly every undergraduate biology major will take a Library Research and Advanced Library Research instruction session taught by a faculty librarian and integrated into core required biology laboratory courses. This standardized approach to information literacy instruction represents an objective to build a foundation within biology undergraduates for information literacy and information seeking skills in the sciences. In 2016, CSEL science librarians taught 57 library instruction sessions that reached over 730 students in biology courses.

Moving beyond traditional library services, in 2017, CSEL opened an innovative learning and collaboration space, providing biology and other STEM departments with access to web conferencing, presentation practice, and virtual reality technologies, in addition to six analysis workstations with an advanced range of software (e.g. ArcGIS, QGIS, SPSS, NVIVO, Adobe Creative Cloud Suite, IPython/Jupyter Notebook, and others). This space is aimed at furthering academic and research initiatives in new ways, supporting collaborative research, research communication, and enabling higher level computing and data analysis.
Criterion 7. Facilities
The facilities associated with the unit are adequate to support student learning as well as scholarly and research activities.

7A. Describe the facilities associated with the unit and associated programs including, but not limited to, classrooms, program space (offices, conference rooms, etc.), laboratories, equipment, access to technology, etc.

Space for our research and teaching missions has historically been in short supply. However, the footprint of the department has expanded substantially over the past 15 years with (1) the 2003-4 expansion into the CERIA Building, which now houses the Museum of Southwestern Biology and the NSF Long Term Ecological Research (LTER) Network office and Sevilleta Field Station programs; (2) the 2007 completion of the Castetter Hall basement renovation for classrooms and teaching labs; (3) the South and Southeast additions to Castetter Hall, respectively, which were completed over several years starting in December, 2009 and which added substantial new office and lab space for research. These additions, combined with some faculty retirements, led to substantial new amounts of space becoming available in the older wings of Castetter Hall. Funding for renovations of these older (1950s–1960s) spaces is a continually lagging need in the department. Several critical research spaces remain in poor condition, including individual faculty labs and the Castetter Animal Research Facility.

Special Facilities
Molecular Biology Core Facility (MBF): The MBF provides (1) access to the tools and techniques of molecular biology for faculty and students who do not have suitably equipped labs, (2) common equipment for all molecular biology work, and (3) support and equipment to classes. Available equipment includes Next-Gen (Next-Seq) and Sanger DNA sequencers, various centrifuges, thermal-cyclers, incubators, gel documentation systems, equipment for quantifying and shearing DNA, and DNA analysis software and bioinformatics support.

Cell Biology Core Facility (CBF): The CBF provides support for researchers working on any aspects of plant and animal cell biology by offering cryosectioning (including for infectious materials), microscopy (including fluorescence and confocal), and flow cytometry (with four-color analysis and acoustic focusing).

Center for Stable Isotopes (CSI): CSI is housed in adjacent Northrop Hall (Earth and Planetary Sciences Dept.), and its Associate Director is Asst. Prof. Seth Newsome (Biol. Dept.). It was initiated in 2014 with major investments from UNM, and it has been a productive and growing interdisciplinary research hub since that time. It includes four newly renovated climate-controlled rooms (~2500 ft²) equipped with seven isotope ratio mass spectrometers, one quadrupole gas chromatograph mass spectrometer (GC-MS) system, and laboratory space for sample processing. It also has glass blowing facility, a small mineral separation facility, including micro-saws, a magnetic separator, microscopes, dissecting equipment and heavy liquid-acid digestion facilities, five Sartorius microbalances, three convection drying ovens, a high-temperature muffle furnace, hot water bath, sonicator, freeze-drier, a number of centrifuges, and a radio-carbon preparation lab. It serves Biology Department researchers from several labs who use it to do integrative research in ecology, physiology, water, biogeochemistry, and various aspects of environmental biology.

Controlled Environments Core Facility: The Controlled Environments Core (CEC) provides facilities for long-term storage of samples; it also provides controlled environments for experiments on non-model organisms. The Controlled Environments Core (CEC) provides investigators with facilities that enable safe long-term storage of research samples and provide unique controlled environments for maintenance and safe experimentation with non-traditional model organisms. It also includes ultra-cold freezers and a tissue-culture facility.

Castetter Research Greenhouses: When the Southeast addition of Castetter Hall was built several years ago, the research greenhouses needed to be moved. Six new research greenhouses were built on top of the existing roof of the 1967 wing (NW side) of Castetter Hall. Structural modifications were made to support the additional
roof-loading, and an exterior staircase was added for access to the roof. Each greenhouse bay has independent temperature and humidity controls.

**Castetter Animal Research Facility:** The primary function of the Animal Resource Facility (CARF, formerly Biology ARF) is to provide the best possible animal care and to assist investigators in fulfilling their obligation to plan and conduct animal research in accord with the highest scientific, humane, and ethical principles. The CARF is administered by a full-time staff member (Jeremy Roth), overseen by Veterinarian Dr. Kevin O'Hair, and inspected biannually by the Main Campus IACUC. The facility is undergoing renovation and expansion currently, funded by UNM, after several unsuccessful attempts to obtain NIH facilities funding for it.

A recent addition to the CARF is a fish facility, that has one wet laboratory with three independent freshwater aquarium systems. Each system has 6 six 20-gallon tanks and has UV disinfection, temperature control and photoperiod control. The system was built in Jan 2016, funded by both CETI and the Biology Department funds. So far the users have been all from Dr. Salinas’s group but new collaborations with other Biology faculty (Newsome) and industry partners will begin in 2017.

**Museum of Southwestern Biology (MSB):** The MSB is a major biodiversity collections repository, housed primarily in the CERIA building, with nine largely autonomous divisions. The Museum of Southwestern Biology documents, acts as a repository for, and interprets biological diversity in order to increase and disseminate knowledge of our natural environment. Each division (except for Natural Heritage) includes a 1.0 FTE Collections Manager, a graduate assistantship each spring and fall semester, and a faculty curator who is otherwise a regular faculty member in Biology with standard teaching, research, and service duties, and little or no compensation associated with their curatorial duties. MSB collections are an informatics treasure trove that helps to make it possible to assess of spatial and temporal changes in biodiversity of our planet. Specimens span the last 120 years and are global (strongest in western North America, Central and South America, but with significant holdings from Asia, Africa, Australia and Europe). Annually, our collections support a significant number of peer-reviewed publications (> 100 in 2016) and attract considerable grant dollars, metrics that attest to the fact that MSB, even when considered separately from the Biology Dept., is among the most productive research units on campus. MSB is also an active center of graduate and undergraduate training activities in research and curation. Furthermore, it is integrated into numerous organismal and evolutionary-themed courses in the Biology Department curriculum. These are the nine divisions (in no particular order):

1. **Mammals.** The largest and most productive division of MSB, the Mammal Division has, arguably, the best tissue collection in the world, and one of the largest collections of mammal skins, skeletons, and spirit specimens in the western hemisphere. Each year it contributes material to 60-80 scientific publications, it grows by several thousand specimens, and it sends expeditions to multiple countries around the world. The collection holds ~290,000 specimens that are fully online and searchable using the Arctos database.

2. **Birds.** The bird collection has doubled in size three times over the last 30 years, and is growing exponentially in research profile and importance. This exponential growth is reflected in annual citations. It contributes material to 20 scientific publications per year (as of 2016, number growing each year), and it maintains active international and domestic field collecting programs. The collection holds nearly 50,000 specimens that are fully online and searchable using the Arctos database.

3. **Genomic Resources.** The MSB Division of Genomic Resources holds a massive tissue collection that dates to the late 1970s, making it historic for a vertebrate cryo-collections. It comprises 18 ultra-cold chest freezers (-80 degrees C), but it is currently undergoing a major renovation and expansion that includes that addition of three large liquid-nitrogen dewars for cold and secure vapor-phase storage of high-quality frozen tissues (-196 degrees C). The renovation is jointly funded by UNM and NSF.

4. **Arthropods.** The MSB Division of Arthropods holds a rapidly growing collection of dried and fluid-preserved specimens that is global in extent. It is primarily built through research driven collection of the curator, Dr. Kelly Miller, and his graduate students, as well as through the activities of its two 0.5 FTE Collections Managers, including Dr. Sandy Brantley. Specimen data are served online at the Symbiota data portal.

5. **Natural Heritage New Mexico.** This is an applied conservation biology division that maintains databases of rare species occurrence and works primarily on state and federal contracts for surveys and
monitoring. It brings in a lot of extramural funds, though most of those funds are associated with restricted overhead rates (F&A). This is the only MSB division that does not archive specimens, though its activities are complimentary to those in other divisions. It is also less connected to the academic mission of the department because it lacks a faculty curator. However, there is clearly untapped potential for synergy between this unit and the rest of the Biology Department and MSB. The Director is near retirement, which raises some concern about the maintenance of an active Natural Heritage unit into the future.

6. Parasites. The MSB Division of Parasites is a relatively new unit that integrates other taxonomic divisions of the museum by archiving parasites from across the tree of life and using varied preservation techniques to serve disparate research goals. Its productivity and impact are growing fast, particularly as specimen-based studies of organismal interactions become increasingly technologically feasible and as their importance becomes increasingly recognized. Specimen data are served and managed in the Arctos database. The curator is near retirement, and revitalization of this unit in the near future would be a boon to the Biology Department and MSB.

7. Fishes. The MSB Division of Fishes is a large collection that is carefully curated by our most experienced Collections Manager. The MSB collection of fishes provides a 70-year record on the status and natural history of New Mexico’s imperiled native fishes and aquatic systems. The MSB has over 96,000 cataloged lots of fishes (4,153,582 specimens), representing 63 families, 178 genera, and 420 species, collected between 1938 and present day. The emeritus curator continues to engage in active collecting. This division has not been traditionally associated with specimens that are linked to frozen tissues, though this is starting to change. It is also transitioning to the Arctos database (data are served online at present through FishNet2).

8. Herpetology. The MSB Division of Herpetology has ~100,000 specimens, including substantial unique and historic collections from our region that is widely known for its diverse herpetofauna. The practice of making frozen tissue collections with each specimen is new to this division. Transition to the Arctos database is currently in progress. The curator is near retirement, and revitalization of this unit in the near future would be a boon to the Biology Department and MSB.

9. Herbarium. The MSB Herbarium has an historic and valuable collection of New Mexico plants. It has generally not been utilized for genomic work and it lacks a modern database system that is suitable to facilitate specimen-based research. The curator is near retirement, and revitalization of this unit in the near future would be a boon to the Biology Department and MSB.

**NSF LTER Network Office**: This office of multi-disciplinary ecologist and data scientists oversees the largest and longest-lived ecological network in the United States. It provides scientific expertise, research platforms, and long-term datasets necessary to document and analyze environmental change at the nation’s 25 LTER sites. It is housed in an office suite on the third floor of CERIA.

**Sevilleta LTER Field Station**: The field station is operated by the Biology Department in collaboration with the U.S. Fish and Wildlife Service. It supports research in biology, ecology, geology, and anthropology. The primary mission of the field station is to provide housing and research space for programs centered at the Sevilleta Wildlife Refuge. It also acts as a facility for meetings and small conferences. The facilities include housing for up to 48 people, general laboratories, specimen processing and storage facilities, reference collection, a computer center, a library and a large conference room. This facility has enormous potential for advancing our education and research missions, but has never been adequately financed by UNM. Provision of a recurring financial commitment of about $100K per year from either UNM or the state would allow this beautiful facility to achieve its full potential.

**Library Resources**: The University Libraries (UL) is a member of the Association of Research Libraries, and is composed of four separate facilities on the University of New Mexico’s Main Campus in Albuquerque: Zimmerman Library (education, social sciences, and humanities); Centennial Science and Engineering Library (CSEL); Parish Memorial Library (business and economics); and the Fine Arts and Design Library. The four branches of the UL hold more than two million print volumes in their collections. Currently, the UL has more than 8,000 subscriptions to print journals and nearly 17,000 subscriptions to electronic journals in all disciplines. There
are numerous special collections in the UL, including the Map and Geographic Information Center (MAGIC) at Centennial Library. The MAGIC collections include approximately 221,000 maps and cartographic images.

The UL provides 24/7 remote electronic access to more than 300 electronic databases, electronic journals, electronic reference sources and other books, and the library catalog (LIBROS) of print holdings. There are several electronic sources that specifically support research in biology at all levels. The JSTOR archive contains journal collections focusing on: general science; ecology and evolution; botany; developmental and cell science; health sciences; and zoology. BioOne provides electronic access to 84 journals in the biological sciences, including many society publications. The UL maintains the Searchable Ornithological Research Archive (SORA), which contains more than 120 years of international ornithological literature, much of which is not freely available elsewhere on the internet. The UL provides access to more than a dozen major databases covering various aspects of the world’s biological literature, including BIOSIS, Web of Knowledge, Zoological Record, and several environmental databases through Cambridge Scientific Abstracts.

The staff at CSEL provides library instruction to graduate and undergraduate students in the sciences and engineering. Many of those sessions were taught by the Life Sciences librarian. We are grateful to have a Life Sciences librarian, currently Assistant Professor Amy Jankowski, who provides additional assistance to the department by selecting books for the library’s collections and handling biology reference questions directly for any students, faculty, and staff in the department. Professor Jankowski has been very proactive in reaching out to our department to make us aware of resources as well as to check with us before cancelling seldom-used journal subscriptions. Additional reference support is provided by all CSEL librarians via the reference desk, which is staffed in person, by phone, and by e-mail over 50 hours per week.

There has been a longstanding general perception among department faculty that more complete electronic coverage of journals is needed for UNM to keep pace with its peer institutions. However, this shortcoming has fewer practical impacts each year as available methods for accessing electronic literature proliferate and improve. Inter-library loan services through UL are generally excellent and fast. In addition, the fast-growing industry of open-access scientific publishing has made it easier to access literature. UL has been progressive in this area by joining PeerJ as a member institution as a way to encourage UNM faculty to publish in reputable open-access venues. Aside from that, faculty and students use online open resources such as ResearchGate and Sci-Hub that provide access to most articles.

7B. Describe any computing facilities maintained by the unit.

The MBF (described in 7A above) maintains a staff bioinformatician (Dr. Lijing Bu), paid by the CORBE/CETI grant, who helps Biology researchers to solve problems relating to genomics. Computationally intense analyses rely on the CARC supercomputing facility, a Category III Research Center that is supported by the OVPR. IT support in the department is provided by a staff member, Matt Henkel, employed by the College of Arts & Sciences (this was one of the staff positions that used to reside in Biology that has recently been consolidated with College services; Mr. Henkel manages department servers and helps individual faculty and staff manage their computers. The department website content is maintained by Anne Rice, one of our longest serving staff members.
**Criterion 8. Program Comparisons**

The programs within the unit are of sufficient quality compared to relevant peers. (Differentiate by program where appropriate.)

8A. Provide information on the distinguishing characteristics of the programs within the unit (please use the template provided as Appendix G as a guide). Discuss the unit’s programs in comparison with other programs such as number of faculty, student characteristics, curricula, and types of programs:

- Parallel programs at any of our 22 peer institutions. [http://oia.unm.edu/miscellaneous/unm-peer-institutions.html](http://oia.unm.edu/miscellaneous/unm-peer-institutions.html)
- Parallel programs at other peer institutions identified by the unit.
- Regional and national comparisons of academic programs.

**National Rankings:** There are no routine comparisons of programs in biology, and given the breadth of the field, comparisons are rather difficult. We are still best known for our programs in Ecology and Evolution and Immunology, but do not have departments with those names. It is seldom possible to separate out just a part of a program for a review.

National Research Council (NRC): The latest NRC doctoral training ranking was published in 2010 (revisions in 2011), although the data used in the rankings were at least 5 years old at the time (circa 2005). Massive data quality issues caused a partial reanalysis and revised rankings to be issued in 2011. Given the data quality problems (not all of which were solved in the 2011 revision), the fact that this data is now at least 12 years old, and the fact that EEB programs generally recognized as being very good (e.g. U. of Arizona; UT Austin; U. Tennessee) do not rise to the top of the list, the rankings are probably of very limited utility. Nevertheless, we will report them here for completeness (Table 8-1). We chose to classify our program as an "Ecology and Evolutionary Biology" program given the preponderance of our faculty working on those areas, but note that obviously many of our faculty are not within those fields. Table 8-1 gives rankings for UNM and all peer institutions choosing to be ranked in EEB. It is hard to know how to compare our “current” (ca. 2005-2011) average rankings of 33 and 43.5 of 94 programs (on the R and S scales, respectively) to our previous NRC ranking (published in 1995) of 47 of 130 programs; that ranking was based on a completely different methodology.

**Table 8-1. 2011 National Research Council rankings of EEB doctoral programs at UNM and at all UNM peer institutions that chose to be ranked in EEB.** 94 EEB programs were ranked by the NRC. Lower numbers indicate higher relative ranking (i.e. #1 would be the best-ranked program). Rankings were reported as ranges on two scales: The R scale reflects a regression-based approach and the S-scale reflects a survey-based approach. Both are based on data in 20 categories (including such varied factors as publications per faculty member, citations, median time to degree, % non-Asian minority students, and student work space) but weight those categories differently. Ranges reported are the 5th and 95th percentile rankings during 500 runs of the ranking algorithm. Arbitrarily, this table is sorted by the "R avg" column.

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<td>48</td>
<td>48</td>
<td>78</td>
<td>35.0</td>
<td>63.0</td>
</tr>
<tr>
<td>University of Nebraska - Lincoln EEB</td>
<td>42</td>
<td>69</td>
<td>22</td>
<td>59</td>
<td>55.5</td>
<td>40.5</td>
</tr>
<tr>
<td>University of Houston EBE</td>
<td>46</td>
<td>70</td>
<td>29</td>
<td>76</td>
<td>58.0</td>
<td>52.5</td>
</tr>
<tr>
<td>Oklahoma State University Zoology</td>
<td>49</td>
<td>76</td>
<td>45</td>
<td>79</td>
<td>62.5</td>
<td>62.0</td>
</tr>
<tr>
<td>University of Tennessee EEB</td>
<td>59</td>
<td>80</td>
<td>39</td>
<td>72</td>
<td>69.5</td>
<td>55.5</td>
</tr>
<tr>
<td>University of Missouri - Columbia Fisheries &amp; Wildlife</td>
<td>74</td>
<td>92</td>
<td>33</td>
<td>78</td>
<td>83.0</td>
<td>55.5</td>
</tr>
</tbody>
</table>
Peer Institution Comparisons

We requested program data from departments at our 20 peer institutions; 15 have replied so far (Tables 8-2, 8-3, 8-4, and 8-5).

Program size and structure. In comparison to this group of peers, our undergraduate majors program is quite large (we rank 3rd largest of 17 departments), with a high number of majors per tenure-track faculty member (49.3) relative to the peer average (35.8) (Table 8-2). While our relatively large number of lecturers ensures quality instruction for lower-division courses, the high number of majors per tenure-track faculty member affects our ability to provide small, upper-division courses for majors and to provide significant research experiences to more than a small fraction of our majors.

Our graduate program is also relatively large (again, 3rd of 17 departments for total number of current graduate students), with a somewhat larger emphasis on the MS degree: 25% of our graduate students are pursuing a MS vs. 12% at peer institutions.

Table 8-2. Program sizes at UNM Biology and departments of responding peer institutions.

<table>
<thead>
<tr>
<th>University</th>
<th>Department</th>
<th>Majors</th>
<th>Majors Per TT Faculty Member</th>
<th>Ph.D. students</th>
<th>MS students</th>
<th>Total Grad Students</th>
<th>TT Faculty</th>
<th>Non-TT research Faculty</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Mexico State U.</td>
<td>Biology</td>
<td>490</td>
<td>24.5</td>
<td>43</td>
<td>18</td>
<td>61</td>
<td>20</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Oklahoma State U.</td>
<td>Integrative Biology</td>
<td>678</td>
<td>29.5</td>
<td>40</td>
<td>31</td>
<td>71</td>
<td>23</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Texas A&amp;M U.</td>
<td>Biology</td>
<td>1400</td>
<td>35.9</td>
<td>100</td>
<td>5</td>
<td>105</td>
<td>39</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td>Texas Tech U.</td>
<td>Biological Sciences</td>
<td>1320</td>
<td>34.7</td>
<td>81</td>
<td>22</td>
<td>103</td>
<td>38</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>U. of Arizona</td>
<td>Ecology and Evolutionary Biology</td>
<td>841</td>
<td>35.0</td>
<td>41</td>
<td>4</td>
<td>45</td>
<td>24</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>U. of California Riverside</td>
<td>Biology</td>
<td>2096</td>
<td>*104.8</td>
<td>54</td>
<td>1</td>
<td>55</td>
<td>20</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>U. of Colorado Denver</td>
<td>Integrative Biology</td>
<td>1227</td>
<td>72.2</td>
<td>14</td>
<td>27</td>
<td>41</td>
<td>17</td>
<td>0</td>
<td>6.9</td>
</tr>
<tr>
<td>U. of Colorado at Boulder</td>
<td>Molecular, Cellular, and Developmental Biology</td>
<td>754</td>
<td>30.2</td>
<td>63</td>
<td>0</td>
<td>63</td>
<td>25</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>U. of Colorado at Boulder</td>
<td>Ecology and Evolutionary Biology</td>
<td>1000</td>
<td>29.4</td>
<td>59</td>
<td>10</td>
<td>69</td>
<td>34</td>
<td>0</td>
<td>2.5</td>
</tr>
<tr>
<td>U. of Iowa</td>
<td>Biology</td>
<td>734</td>
<td>27.3</td>
<td>29</td>
<td>11</td>
<td>40</td>
<td>26.9</td>
<td>4.6</td>
<td>3.5</td>
</tr>
<tr>
<td>U. of Kansas</td>
<td>Ecology and Evolutionary Biology</td>
<td>1400</td>
<td>34.1</td>
<td>56</td>
<td>14</td>
<td>70</td>
<td>41</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>U. of Missouri at Columbia</td>
<td>Biological Sciences (Division of)</td>
<td>1228</td>
<td>36.1</td>
<td>74</td>
<td>4</td>
<td>78</td>
<td>34</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>U. of Nebraska</td>
<td>Biological Sciences (School of)</td>
<td>559</td>
<td>13.3</td>
<td>58</td>
<td>5</td>
<td>63</td>
<td>42</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>U. of Nevada Las Vegas</td>
<td>Life Sciences (School of)</td>
<td>1943</td>
<td>74.7</td>
<td>42</td>
<td>10</td>
<td>52</td>
<td>26</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>U. Texas at Austin</td>
<td>Integrative Biology</td>
<td>172</td>
<td>*4.5</td>
<td>85</td>
<td>6</td>
<td>91</td>
<td>38</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>U. of Utah</td>
<td>Biology</td>
<td>1176</td>
<td>24.0</td>
<td>76</td>
<td>4</td>
<td>80</td>
<td>49</td>
<td>27</td>
<td>9</td>
</tr>
</tbody>
</table>
Research productivity. We compared productivity to four of our aspirational peer institutions (Table 8-3). Productivity of course is multidimensional and difficult to measure, but we focused on the commonly used metrics of publication number and citation rate, corrected for the current number of tenure-track faculty. Overall, we compare favorably to these aspirational peers in terms of publication number per faculty member (23% more), but are lagging with respect to citation rates per faculty member (9% less).

Table 8-3. Research productivity at UNM Biology and four aspirational peer institutions over the past four years (2013-2016).

<table>
<thead>
<tr>
<th>University</th>
<th>Department</th>
<th>Publications</th>
<th>Citations</th>
<th>TTFac</th>
<th>Publications per Faculty Member</th>
<th>Citations per Faculty Member</th>
</tr>
</thead>
<tbody>
<tr>
<td>U. of Arizona</td>
<td>Ecology and Evolutionary Biology</td>
<td>547</td>
<td>5511</td>
<td>24</td>
<td>22.8</td>
<td>229.6</td>
</tr>
<tr>
<td>U. of Arizona</td>
<td>Molecular and Cellular Biology</td>
<td>140</td>
<td>1205</td>
<td>18</td>
<td>7.8</td>
<td>66.9</td>
</tr>
<tr>
<td>combined</td>
<td></td>
<td>687</td>
<td>6716</td>
<td>42</td>
<td>16.4</td>
<td>159.9</td>
</tr>
<tr>
<td>U. of Colorado Boulder</td>
<td>Ecology and Evolutionary Biology</td>
<td>615</td>
<td>5190</td>
<td>34</td>
<td>18.1</td>
<td>152.6</td>
</tr>
<tr>
<td>U. of Colorado Boulder</td>
<td>Molecular, Cellular, and Developmental Biology</td>
<td>332</td>
<td>3665</td>
<td>25</td>
<td>13.3</td>
<td>146.6</td>
</tr>
<tr>
<td>combined</td>
<td></td>
<td>947</td>
<td>8855</td>
<td>59</td>
<td>16.1</td>
<td>150.1</td>
</tr>
<tr>
<td>U. of Texas Austin</td>
<td>Integrative Biology</td>
<td>707</td>
<td>5894</td>
<td>38</td>
<td>18.6</td>
<td>155.1</td>
</tr>
<tr>
<td>U. of Utah</td>
<td>Biology</td>
<td>718</td>
<td>5939</td>
<td>49</td>
<td>14.7</td>
<td>121.2</td>
</tr>
<tr>
<td>Peer Averages</td>
<td></td>
<td>764.8</td>
<td>6851.0</td>
<td>47.0</td>
<td>16.4</td>
<td>146.6</td>
</tr>
<tr>
<td>UNM Biology</td>
<td></td>
<td>697.0</td>
<td>4617.0</td>
<td>34.5</td>
<td>20.2</td>
<td>133.8</td>
</tr>
</tbody>
</table>

Data from ISI Web of Science, 10 February 2017. Searches were made in the address field on the ISI abbreviated departmental name, e.g. "Univ New Mexico, Dept Biol".

Salaries. With regards to faculty salaries, UNM Biology is below average. Salaries at the Assistant, Associate, and Full ranks are 6%, 5%, and 14% lower, respectively, than at six responding peer institutions (Table 8-4). [A larger number of peers responded with data on average salaries across all ranks, but these are hard to compare across schools given differences in the age/rank structure at each institution]. Lecturer salaries also appear lower, although inconsistencies in how these numbers are reported make exact comparisons difficult; respondents may not have always converted to full-time equivalent salaries. Salaries for Assistant Professors – some of whom are currently making far less than our recently increased floor of $75,000 for new hires – are particularly problematic at UNM Biology and we are concerned they are going to lead to long-term recruitment and retention issues.
Table 8-4. Salaries at UNM Biology and departments of responding peer institutions.

<table>
<thead>
<tr>
<th>University</th>
<th>Dept</th>
<th>TT Avg</th>
<th>Starting Asst</th>
<th>Asst</th>
<th>Assoc</th>
<th>Full</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oklahoma State U.</td>
<td>Integrative Biology</td>
<td>$77,783</td>
<td>$64,855</td>
<td>$73,222</td>
<td>$104,094</td>
<td></td>
<td>$55,000</td>
</tr>
<tr>
<td>Texas A&amp;M U.</td>
<td>Biology</td>
<td>$72,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Texas Tech U.</td>
<td>Biological Sciences</td>
<td>$77,300</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Arizona</td>
<td>Ecology and Evolutionary Biology</td>
<td>$115,814</td>
<td>$83,360</td>
<td>$94,208</td>
<td>$125,987</td>
<td></td>
<td>$62,375</td>
</tr>
<tr>
<td>U. of California Riverside</td>
<td>Biology</td>
<td>$130,289</td>
<td>$79,950</td>
<td>$98,800</td>
<td>$149,092</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Colorado Denver</td>
<td>Integrative Biology</td>
<td>$85,543</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$64,485</td>
</tr>
<tr>
<td>U. of Colorado at Boulder</td>
<td>Molecular, Cellular, and Developmental</td>
<td>$108,632</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>$101,743</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Iowa</td>
<td>Biology</td>
<td>$104,617</td>
<td>$77,200</td>
<td>$91,248</td>
<td>$136,037</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Kansas</td>
<td>Ecology and Evolutionary Biology</td>
<td>$95,036</td>
<td>$80,305</td>
<td>$91,480</td>
<td>$104,755</td>
<td></td>
<td></td>
</tr>
<tr>
<td>U. of Missouri at Columbia</td>
<td>Biological Sciences (Division of)</td>
<td>$91,577</td>
<td>$75,000</td>
<td>$78,038</td>
<td>$79,476</td>
<td>$106,118</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Biological Sciences (School of)</td>
<td>$71,000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$56,000</td>
</tr>
<tr>
<td>U. of Nevada Las Vegas</td>
<td>Life Sciences (School of)</td>
<td>$90,264</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$40,000</td>
</tr>
<tr>
<td></td>
<td>Biology</td>
<td>$101,800</td>
<td>$88,000</td>
<td></td>
<td></td>
<td></td>
<td>$55,000</td>
</tr>
<tr>
<td>Peer Averages</td>
<td></td>
<td>$95,928</td>
<td>$75,550</td>
<td>$75,968</td>
<td>$86,801</td>
<td>$119,219</td>
<td>$52,993</td>
</tr>
<tr>
<td>UNM</td>
<td>Biology</td>
<td>$91,809</td>
<td>$75,000</td>
<td>$71,730</td>
<td>$82,307</td>
<td>$102,529</td>
<td>$49,916</td>
</tr>
</tbody>
</table>

Overall program comparisons. We focused on making overall program comparisons with four institutions we consider aspirational peers (Table 8-5). Overall UNM supports far greater numbers of majors per faculty member than these aspirational peers. With respect to Arizona, Colorado, and Texas, we would do well to strive for their apparent greater overall impact (citation rates).

Table 8-5. Peer Comparison Template: Aspirational Peer Institutions

<table>
<thead>
<tr>
<th>Name of Peer Institution</th>
<th>How similar is your program to the peer program in terms of overall organization?</th>
<th>Considered an aspirational peer?</th>
<th>Elaborate on how this program compares to your program in terms of program goals, curriculum, faculty, and students</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Arizona</td>
<td>UA has separate Ecology and Evolutionary Biology and Molecular and Cellular Biology departments while we are a unified Biology Department</td>
<td>yes</td>
<td>Program goals in research, undergraduate education, and graduate training are similar. Their ratio of majors to TT faculty members is much lower (35 vs. 49). Their average TT faculty salaries are 26% higher. Program size and salary information for MCB departments is not available. While their publication rate per faculty member is about 19% lower, their citation rates are 19% higher.</td>
</tr>
<tr>
<td>University of Colorado Boulder</td>
<td>UC Boulder has separate Ecology and Evolutionary Biology and Molecular, Cellular, and Developmental Bio departments while we are a unified Biology Department</td>
<td>yes</td>
<td>Program goals in research, undergraduate education, and graduate training are similar. Their undergraduate and graduate programs are about 16% and 13% larger than ours, respectively. Their ratio of majors to TT faculty members is much lower (30 vs. 49). Their average TT faculty salaries are 15% higher. While their publication rate per faculty member is about 21% lower, their citation rates are 12% higher.</td>
</tr>
</tbody>
</table>
Their undergraduate program is structured very differently from ours as they report only 10% of the number of undergraduate majors that UNM Biology supports (see Table 8-2 and footnote). Graduate programs are almost exactly the same size, as are average TT faculty salaries (they are 2% lower at UT). While their publication rate per faculty member is about 8% lower, their citation rates are 16% higher.

Program goals in research, undergraduate education, and graduate training are similar. Their undergraduate and graduate programs are about 30% and 13% smaller than ours, respectively. Their ratio of majors to TT faculty members is much lower (22 vs. 49). Their average TT faculty salaries are 11% higher. Their publication rate per faculty member is about 27% lower and their citation rates are 9% lower.

Within-UNM Comparisons: Biology is unique among the sciences at UNM in its large number of majors coupled with a strong enrollment in service courses. Since the service courses are now handled very well by lecturers, we want to comment first on the number of majors. The ratio of undergraduate majors to tenure-track faculty is far higher in the Biology Department than in any of the other hard-science departments at UNM (Table 8-6). This ratio of 49.3 majors per faculty member has increased substantially since our last Academic Program Review (2008) when it was 38.

Having increased our number of lecturers does not solve the problem that the high majors : tenure-track faculty ratio creates. Our majors are the students who need small, upper-division courses, access to research experiences in our laboratories, and mentoring from individual faculty. Obviously, our ability to do this is impaired by the relatively small size of the faculty. No faculty member can have 49 students in his or her lab.

Table 8-6. Ratios of undergraduate majors to tenure-track faculty members in UNM science departments.

<table>
<thead>
<tr>
<th>UNM Department</th>
<th>Faculty members*</th>
<th>Majors **</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>34.5</td>
<td>1689</td>
<td>49.3</td>
</tr>
<tr>
<td>Chemistry</td>
<td>22</td>
<td>239</td>
<td>10.9</td>
</tr>
<tr>
<td>Earth &amp; Planetary Sciences</td>
<td>19</td>
<td>159</td>
<td>8.4</td>
</tr>
<tr>
<td>Physics</td>
<td>26</td>
<td>135</td>
<td>5.2</td>
</tr>
</tbody>
</table>

* Spring 2017 data
** Fall 2015 data

Despite its large number of majors, Biology faculty continue to generate more overhead (F&A) dollars that any other single department, and a comparison of credit hours versus F&A generation underlines this point (Table 8-7).

Table 8-7. Credit hours taught and F&A generated in UNM STEM departments.

<table>
<thead>
<tr>
<th>Department</th>
<th>Credit hours Spring 2017¹</th>
<th>Total F&amp;A 2005-2012²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>12,352</td>
<td>21.5</td>
</tr>
<tr>
<td>Chemistry &amp; Chemical Biology</td>
<td>9,716</td>
<td>5.3</td>
</tr>
<tr>
<td>Earth &amp; Planetary Sciences</td>
<td>2,213</td>
<td>4.8*</td>
</tr>
<tr>
<td>Physics &amp; Astronomy</td>
<td>5,620</td>
<td>12.5</td>
</tr>
</tbody>
</table>

* without Meteoritics. EPS F&A with Meteoritics is 7.2
1. Includes all hours for all sections
2. This period summarized because data were readily available

Unfortunately, this level of accomplishment does not seem to be recognized institutionally, because average compensation for Biology faculty lags behind all of the other hard-science departments (Figure 8-1).
Strikingly, the highest Assistant Professor salary within Biology is equal to or lower than the lowest salary at that rank in two other STEM departments. Naturally, this has created some concerns within our ranks, particularly when compared to several impressive measures of productivity and success for our department. We hope that we can initiate discussions with the administration to understand how this situation arose, and how it can be addressed.

Figure 8-1. Average faculty salaries in UNM STEM departments, 2017. Bars show the salary range. Biology has the lowest salaries at any rank.

To investigate this further, we performed a principal component analysis of the four hard-science departments, comparing overhead (F&A) generation per faculty member, majors per faculty member, credit hours per faculty member, and average tenure-track faculty salary at each rank (Figure 8-2). This analysis underscored that Biology is different to the other comparing departments, but unfortunately also underlined that our higher metrics extended to higher majors per faculty member, higher F&A generation per faculty member, more credit hours taught per faculty member, but not higher salary per rank.

Figure 8-2. Comparison of four science departments in the UNM College of A&S using principle components analysis. We used four standardized and scaled variables: overhead (F&A) generation per faculty member, majors per faculty member, credit hours per faculty member, and average tenure-track faculty salary at each rank. Factor loadings are plotted as vectors; these show that Biology faculty have low salaries despite outstanding grant production, exceptionally high student:faculty ratios, and high credit-hour production.
Criterion 9. Future Directions
The unit engages in strategic planning and prioritization in order to achieve its mission and vision.

9A. Provide a summary of strengths and challenges for the unit.

Strengths
Our department has a number of strengths that enrich our activities and success. First, we are a broad-based department that covers the gamut of modern biology from cell/molecular biology, through physiology, ecology and evolution to genomics. The dynamic of our department supports and enables several cross-disciplinary approaches and use of non-model organisms, such that natural history collections are pollinated by genomics, and infectious disease studies cover a broad approach from cell/molecular biology to comparative immunology and field work. Whilst other larger biology departments in the country have split to form separate units, our faculty are invested in the opportunities brought by remaining a single unit.

Second, within this breadth, we have a number of cluster areas of strength. These have historically included (and continue to include) the MSB and our ecology program. More recently, we have developed strengths in comparative immunology as a result of faculty investment followed by the successful CETI/COBRE program, and in microbial ecology as a result of two recent hires. These areas of strength are advantageous for a number of reasons, including facilitating graduate applications as a result of our increased profile in those research areas; and the development of broader program grants (such as has been achieved with CETI and the LTER) that support these faculty areas of excellence.

Third, as is evidenced by the data presented in the prior section, we have a productive faculty, where every faculty member is research-active, and most are funded by federal and/or foundation funding.

Fourth, we have a diverse student body that makes UNM one of the only R1 research university that is also a majority-minority institution. This diversity not only enriches our undergraduate and graduate student pools, it also makes us an ideal location for minority research training programs. As a result of leadership by Biology faculty, several of these federally-funded training programs are administered in Biology and have been in effect for many years. These include the Sevilleta Summer Program, and the IMSD, MARC, PREP and (more recently) FlyBase training programs. These activities make UNM a hub of minority training.

Fifth, we have been fortunate in recent years to enjoy significant addition of new research space plus renovation of a subset of our existing facilities. These have enhanced research opportunities for both researchers and trainees, and will positively impact our recruitment and retention efforts.

Challenges
Despite these strengths, UNM Biology still operates under a number of challenges, some of which are external to UNM, some within UNM but external to the department, and some internal challenges that we hope to address going forwards. At a recent faculty meeting to collaboratively prepare this section on strengths and challenges, there was a strong feeling amongst the faculty that the department is at a crisis point: despite all of the positives that we can list, there is a major concern that we will continue to lose faculty members to retirement and jobs elsewhere, and there are signs that new faculty hires in the next few years will be extremely limited. It is possible that we will dip below 30 tenured/tenure-track faculty in the next five years, which would be the lowest faculty number in decades.

At the State level, the New Mexico economy appears to be going backwards, with low oil and gas prices negatively impacting state income, and thereby limiting resources available for state entities (including UNM and school districts). This translates into a number of negative effects: increased poverty in the state and limited resources for public schools results in students attending UNM that can be unprepared for the rigours of higher education. Decreases in state support for UNM result in faculty and staff hiring freezes, and little-to-no funds available for faculty and staff raises. This places us at a significant competitive disadvantage for recruitment of faculty, and for faculty retention. More broadly, a struggling state economy and a resulting failure of the housing market to improve (especially when compared to other states) is a major concern for those faculty who might wish to leave the state upon retirement – their purchasing power will be low, and may prompt further movement of faculty away from UNM.
At the broad university level, UNM continues to bear a number of challenges, in addition to those resulting from limited resources. University administration has been heavily criticized by both insiders and outsiders over the last eight years, with a faculty no-confidence vote in the former president and Board or Regents, a revolving door of presidents, an increasing number of upper administrators, and several higher administrative appointments being made for political rather than functional reasons. These problems directly impact the instructional and research mission of UNM, affecting faculty:student ratios due to lack of funds for new hires, a focus upon business-reasons for administrative decisions that does not appreciate the more unique subtleties of academia, and an overall demoralizing atmosphere that this document has done little to dispel. Moreover, some historical aspects of state law in some cases make it impossible for Material Transfer Agreements to be signed by UNM, while there is a general feeling that most other universities in the country would not have such limitations.

Problems with the administrative support of research is also negatively impacting the research (and thereby teaching and training) mission of the university, and in the past two years this support has become even less helpful. Some examples: the Office of the Vice Provost for Research (OVPR) recently (and apparently arbitrarily) decided to change its definition of off-campus research, which meant that a Biology PI elected to run their proposal through a different institution; the pre-award office (that is now run by the University Controller and not the VPR) instituted strict deadlines for proposal submission, so strict that even when there was an extenuating circumstance the office flatly refused to submit an R01 application to NIH on time, and suggested that the PI instead rely on the good nature of the funding agency for a variance in submission date; and recently pre-award submitted an NSF pre-proposal for a Biology PI, then withdrew it for solely internal corrections, then was unable to contact the PI to resubmit the proposal on time, resulting in rejection by NSF and the PI having to wait another year to submit this project. These issues have been ongoing for years, but reached a head in the last year, although there is some anecdotal evidence that in the past few months the flexibility and the helpfulness of the office has improved.

On top of these issues are the ever-increasing regulatory requirements that have to be met; while these requirements are federal in origin, there is a concern that UNM is not doing its best to make meeting these requirements as simple as possible for the PIs. In a research-heavy department such as Biology, these are major obstructions to moving research programs forwards.

There are also concerns about overhead return to units. UNM has a system whereby F&A generated by faculty is distributed through the system. Traditionally, 65% of the overhead generated was retained by the OVPR (to support research infrastructure and provide salaries for all pre-award and OVPR staff). The remaining 35% was then returned to the cognate college, and from there smaller amounts were returned to the unit and the PI. In recent years, there has been significant flux in this return, and over the last three years the amount of overhead returned to the College of Arts & Sciences has dwindled from 34% to 31% to 27%. At the same time, whereas the OVPR used to provide a significant proportion of faculty start-up costs (from its 65% cut), the office recently elected to be “out of the start-up game”, and foisted the full financial burden upon the college and unit sans discussion nor negotiation. This has created significant hardship upon the colleges and units, and with no discernible improvement in research support nor infrastructure coming from the OVPR.

Perhaps more concerning, this change in overhead return plus a withdrawal from supporting start-up costs places extreme burdens upon the colleges and departments. Biology generally offers start-up costs in the vicinity of $400,000 to new faculty, however, for a recent cell/molecular biology hire we were competing for candidates with institutions that offered $1M! Clearly, if we are to make a number of faculty hires to address our needs and our constituents, it is critical that we increase our start-up offers. However, it is not clear where the funds will arise for even one hire (let alone multiple hires), because of the diminished overhead returns to the College and to Biology, and the withdrawal of the OVPR from supporting start-up costs.

Within the department, there are a number of challenges upon which we can focus our attention, and for which we must plan in the future. Naturally, the most prominent of these issues focuses upon faculty hires. As discussed above, there are concerns about loss of faculty, and since vacated faculty lines return to the College of Arts & Sciences, there is a need to work with the Dean to ensure that these lines get returned to Biology – that is not a given, however, due to other constraints within the College. In addition, while we have been fortunate to hire new assistant professors in the last few years, most of these are now advanced in rank, and unless we continue to hire new faculty we will soon be left with only one assistant professor.
In preparing this document, it was discovered that one department in Arts & Sciences (Earth & Planetary Sciences) was the recipient of a salary make-over. This arose from a retention offer made to an assistant professor, that caused salary inversion at all ranks within the department. The Dean acted by adjusting the salaries of apparently every faculty member in the department. This is a source of frustration for Biology, since we also have salary inversion due to a recent assistant professor hire and three associate professor hires since 2012, but were told by the Dean that funds were not available to fix that in Biology, and separately it was commented that Biology was too big of a department to fix in the same manner. In studying the salary distributions of faculty in the hard-sciences departments, it appears that Biology is behind several other units, despite displaying far superior metrics in almost all categories. This issue needs to be addressed, presumably at the Provost level, in order to bring Biology at least into the same level as the other science departments.

We must also address the range of faculty expertise. We have a number of both historical and recent areas of strength within the department, however one historical area of focus, animal behaviour, has seen a significant de-emphasis due to faculty retirements. This is of course not the only need: there are some impending retirements in the MSB that must be re-filled in a timely manner; two faculty in the successful CETI/COBRE program have either left or are on leave; other faculty retirements are on the horizon; we recently lost expertise in molecular evolution and population genetics (probably two faculty) that creates a significant hole in our instructional and research capabilities; and we need to respond to any other faculty vacancies that might occur due to faculty leaving. While the most desired solution might be a swath of new hires, this seems unlikely given the current disposition of the state and the university. Instead it may be important for faculty to be encouraged to generate programmatic activities and grants that enable faculty hires (like CETI/COBRE), and for us to think about how single hires can positively solve multiple challenges without dilution of the impact.

We have had conversations as a faculty about future hires, most recently at a faculty retreat in 2015 and a subsequent faculty discussion. These discussions generally have a three-pronged outcome: are there areas of strength that we can build that are unique to New Mexico, such as water resources and planning? How can we address and re-dress recent and impending faculty departures? And what areas of the department are underserved, such as cell/molecular biology/genetics faculty? It can be valuable to plan for these events, however, considerations of faculty hiring are to a certain extent an exercise in futility. This is because we are by nature a state-funded university, therefore it is not possible to predict a pattern of hiring even from one year to the next. This limits us because if we could put together (for example) a five-year hiring plan, even those constituents that are not immediate beneficiaries of a new colleague could look forward with some confidence to a hire two or three years hence.

Also within Biology, we have been significant beneficiaries of the infrastructure, faculty and research support that has been provided by the CETI/COBRE program. This program has, essentially single-handedly, kept the Department abreast of recent techniques and technology in cell and molecular biology, facilitating the purchase and maintenance of a number of critical equipment items, including a new confocal microscope, cell counters, quantitative RT-PCR machines, and next-generation sequencing capabilities. The program has benefited a large number of faculty across our diverse department. The CETI/COBRE award is in its 13th year out of a maximum of 15 years of funding, and one must ask how the Department can continue to be current once this program goes away? Discussions by some faculty about a new COBRE award have been initiated, but with the paucity of cell/molecular faculty in the department (and since COBRE is funded by NIH and thereby focused upon broadly biomedical research) it may not be possible to identify a new program area that is cohesive with the existing personnel. Should future faculty hires be planned with such a possibility in mind?

As well as a consideration with the development of areas of excellence is the need to retain breadth with the ever-widening scope of modern biology, How can we continue to provide both breadth and emphasis?

9B. Describe the unit’s strategic planning efforts.

The department is committed to strategic planning, although enthusiasm for this effort is somewhat attenuated by the reality of our situation, as discussed above. The most recent faculty retreat was February 21, 2015, and prior to that it was 2004. In between these activities, was the prior APR, which was an opportunity for introspection and to receive guidance over the next several years. As described at the start of this document, we have addressed many of the suggestions that are within our power.
At the 2015 retreat, we discussed a number of issues, including the faculty annual review process, undergraduate curriculum issues, and (you'd never guess) faculty hiring. As a result of these activities, we generated a prioritized list for faculty hires (that was re-addressed at a subsequent meeting and upon which we are now acting); and we revamped the faculty review process, to enable the consideration of more quantitative data, and to more broadly consider faculty progress in the context of a three-year window.

9C. Describe the strategic directions and priorities for the unit.
Based upon the considerations in the document above, we suggest that the following considerations be made as we move forward. We hope that these consideration can be assessed by the review team in the context of their own expertise and experience, in order to provide guidance and support of our future goals. Strategic goals include:

- **Increase faculty number.** Most comparable broad biology departments have up to 60 faculty, and this will improve our faculty: student ratio. Given that Biology faculty are proven grant-winners, an increase in faculty numbers would improve research operations across campus, as well as provide additional discretionary funds for Biology to support infrastructure and equipment.

- **Increase faculty ethnic and gender diversity.** While we have tried hard to recruit ethnic minority faculty to our department, we have overall had relatively little success. This is an important challenge, because we house several minority training programs whose stated overall goals are to ultimately diversify the professoriate, however we have not achieved that diversification in our own ranks. At one point, there were funds within UNM to support minority hires, but these have now dried up.

- **Improve student compensation.** TA and GA support levels have been relatively flat (and low) for many years, and there is concern that we are becoming less competitive for the top graduate students.

- **Improve graduate applications for all disciplines within the department.** While a number of programs see several excellent graduate applicants each year, there are some concerns that other programs, particularly within cell/molecular biology, do no attract top candidates.

- **Rebuild historical strength in behavioural ecology.** As indicated above, retirement over the last ten years have removed all of our expertise in behavioural ecology, a traditional strength of the department.

- **Rebuild strength in Molecular Evolution, Genomics, and other areas of Evolutionary Biology.** Recent departures have reduced faculty expertise in this critical subdiscipline. We no longer offer courses in molecular evolution, population genetics, and related topics.

- **Support growing areas of emphasis in the department, such as microbial ecology, large-scale ecology, and encourage the development of large collaborative grants within those groups.**

- **Clarify and formalize the duties, roles, review and compensation for faculty curators.** In consideration of potential retirements in the MSB, this agreement should ideally be in place before new hires are made. Also determine if this model of compensation should apply to other administration-heavy duties within the department.

- **Increase faculty strength in cell/molecular biology, both to more effectively service our students and to generate a core area of research to support a new COBRE.**

- **Enhance research infrastructure.** This can be achieved in a number of ways, but might at least involve enhancing the return of F&A funds to the unit, and by performing strategic hires to enable groups of faculty to obtain program grants, much along the lines of what the COBRE program has done for us.

- **Sustain existing strengths in ecology.**

- **Find ways to incentivize faculty obtaining grants and publishing impactful research.**

- **Find ways to stabilize Biology advising staffing.** We have recently observed a turnover in advisors who work in Biology. This may be due to their high level of training by A&S, which qualifies them for higher-paying advising jobs elsewhere in the university.
Department of Biology Academic Program Review

List of appendices.

0-1 Departmental committee list.

0-2 Biology-MSB agreement.

1-1 Undergraduate degree requirements.

2-1 Concentration in Biotechnology requirements.

2-2 Concentration in Conservation Biology requirements.

2-3 Concentration in Ecology, Evolution and Organismal Biology requirements.

2-4 Worksheet for UNM core curriculum.

2-5 Graduate student handbook.

3-1 Assessment plan for undergraduate General Education core.

3-2 Assessment plan for Biology BA.

3-3 Assessment plan for Biology BS.

3-4 Assessment plan for Biology MSI.

3-5 Assessment plan for Biology MSII.

3-6 Assessment plan for Biology PhD.

5-1 Faculty CVs (short format).

5-2 Faculty Google Scholar accounts.

6-1 FY15/16 budget details for Biology.
2016 - 2017 Biology Faculty Committee Assignments
October 10, 2016

Chair
Will Pockman

Associate Chairs
Kelly Miller
Howard Snell
Lee Taylor

Department Administration
BGSA Computer Pod
Catalina Tomé, BGSA

Greenhouses
Ken Whitney, Chair
Andrea McArdle
David Hanson
Diane Marshall
Michelle Facette
John Roesgen, BGSA

Field Programs and Vehicles
Blair Wolf

Library Liaison
Chris Johnston

Seminars
Tina Takacs-Vesbach

Space/Buildings
Lee Taylor, Chair
Coen Adema
Bruce Milne
Jennifer Rudgers
John Cox
Donna George
Bethaney Fehrenkamp, BGSA

Tenure and Promotion
Howard Snell, Chair
Scott Collins
Tina Takacs-Vesbach
Bob Sinsabaugh
Felisa Smith
Eric Denkers

Lecturer Promotion
Howard Snell, Chair
Bruce Hofkin
Irene Salinas

Annual Faculty Review
Howard Snell, Chair
Jenn Rudgers
Helen Wearing
Sam Loker
Chris Johnston
Marieken Shaner

Wed. Brown Bag Seminar
Chris Witt
Erika Gendron, BGSA

Academic Program Review
Richard Cripps, Chair
Marcy Litvak
Kenneth Whitney
Chris Witt

Unit Administration
LTER Director
Will Pockman

CREST Director
Bob Waide

Sevilleta Field Station Director
Don Natvig

IMSD Director
Maggie Werner-Washburne

Center for Research in Ecological Sci and Tech (CREST)
Bob Waide

PIBBS Director
Felisa Smith

MARC Director
Tina Takacs-Vesbach

SEEDS Chapter
Scott Collins

PREP Director
Rich Cripps

CETI Director
Sam Loker

CETI Coordinator
Charles Cunningham

Mol. Biology Core
Rich Cripps

Cell Biology Core
Eric Denkers

Controlled Environments Core
Coen Adema

UNM Center for Stable Isotopes, Associate Director
Seth Newsome

UNM Sustainability Studies Program Director
Bruce Milne

Graduate Program
Biology Graduate Student Association (BGSA)
Matt Hurteau
Marie Westover, BGSA
Anny Chung, BGSA

Graduate Student Selection
Stephen Stricker, Chair
Blair Wolf
Scott Collins
Mike Andersen
Michelle Facette
Cheryl Martin
Rachael Alfaro, BGSA

Graduate Policy
Lee Taylor, Chair
Irene Salinas
Felisa Smith
Tim Lowrey
Don Natvig
Cheryl Martin
Rae Devan, BGSA

New Grad Student Orientation
Matt Hurteau
Cheryl Martin

Appendix 0-1 1
Scholarships
Felisa Smith, Chair
Eric Toolson
Matt Hurteau
Cheryl Martin
Nathan Holscher
Ali Fretz, BGSA

Undergraduate Program
Dept Assessment Coordinator
Kelly Howe

Graduation
Satya Witt (Co-Chair)
Bruce Hofkin (Co-Chair)
Don Natvig
Donna George
John Cox
Anne Rice
Kellen Paine, BGSA

Honors Program
Jenn Rudgers
Seth Newsome

Undergraduate Policy Committee
Marcy Litvak, Chair
Eric Toolson
Matt Hurteau
Tom Kennedy
Kelly Howe
Marieken Shaner
Cara Lea Council
Miriam Hutchinson, BGSA

BA/MD Committee on Curriculum and Student Progress
Helen Wearing
Chris Johnston
Kelly Howe

BA/MD Program Liaison
Helen Wearing

Research Day
Bob Waide, Co-Chair
Dorothy Scholl, Co-Chair
Steve Poe
Cathy Osborn
Catherine St. Clair
Anne Rice

Ben Hanelt
Emily Arzate
Kellen Paine, BGSA
Kel Cook, BGSA

Undergraduate Academic Advising
David Hanson
Karen Majors
Regina Peña

Pre-Vet Advising
Bruce Hofkin

Museum Administration

Museum of SW Biology
Joe Cook, Director
Chris Witt, Asst Director

Curators
Joe Cook, Mammals
Tim Lowrey, Herbarium
Kelly Miller, Arthropods
Howard Snell, Amphibians/Reptiles
Tom Turner, Fishes
Chris Witt, Birds
Joe Cook, Genomic Resources
Sam Loker, Parasites
Esteban Muldavin, Director, NM Natural Heritage

Museum SW Biology Exec Committee
Joe Cook, Chair
MSB Curators
Bob Waide

Biology Liaison to MSB
Bob Sinsabaugh

University Service

Animal Care and Use
Lex Snyder
Tom Gierekowski
Sara Brant
Jeremy Roth
Chris Witt

A&S College Assessment Review Committee
Kelly Howe

A&S Curriculum
Kelly Miller

A&S Tenure and Promotion
Ken Whitney
Lee Taylor

Faculty Senate
Marieken Shaner
Howard Snell

Faculty Senate General Education Task Force
Marieken Shaner

Faculty Senate Operations Committee
Marieken Shaner

Faculty Senate Research Policy Committee
Dave Hanson, Chair
Blair Wolf

Faculty Senate Undergraduate Committee
Marieken Shaner

Goldwater Scholar Selection Committee
Stephen Stricker

Latin American and Iberian Institute Grants and Awards Committee
Irene Salinas

Limited Competitions
Scott Collins

NM EPSCoR Management
David Hanson

Research Allocation Comm.
Sam Loker

Statewide Common Course Numbering
Kelly Miller

Appendix 0-1 2
UNM Chemical & Laboratory Safety Committee
Bob Sinsabaugh

UNM Biosafety
Eric Denkers

UNM Radiation Control Committee
David Hanson

Stable Isotope Steering Committee
David Hanson
Blair Wolf
Administrative Reorganization of the Museum of Southwestern Biology

Administrative Change: The Museum of Southwestern Biology (MSB) is a distinct division and administrative unit of the Department of Biology at the University of New Mexico as detailed below. This permanent agreement as ratified by the Department of Biology Faculty in May 2001 replaces the temporary agreement of 1 July 1999.

COMPONENTS OF THE ADMINISTRATIVE CHANGE:
1. New Division of Biology: The MSB is a distinct administrative unit of the Department of Biology. Presently, the MSB comprises the following seven divisions:
   1. Arthropods
   2. Birds
   3. fishes
   4. Herpetology
   5. Herbarium
   6. Mammals
   7. Genomic Resources

   Additional divisions may be added in the future. On March 1, 2002 the New Mexico Natural Heritage Program officially becomes part of the Museum of Southwestern Biology. This merger is detailed in a separate agreement between the MSB and Biology Department. This separate agreement is subsumed within this agreement.

   In 1993, the Mid-Continent Ecological Science Center of the U. S. Geological Survey (USGS) moved the Biological Survey Collection—Fort Collins (BS/FC) and its curatorial staff to the MSB. The USGS Collection is staffed by the following federal employees: curator, collection manager, and secretary. This collection includes more than 535,000 specimens of vertebrates, many from federal lands in the western United States. Curatorial interactions between the MSB, the University, and the USGS are detailed in a cooperative agreement signed by the two parties.

2. Administration and authority:
A. The Director of the MSB reports directly to the Dean of Arts and Sciences. The Dean allocates the budgetary monies from UNM directly to the MSB Director. The exact allocation of the separate budget shall be listed in a separate document. The I&G, staff lines, and student work-study portions of the budget will be maintained at current levels. Increases above current levels shall be allocated by the Dean of A&S in the same manner as for other administrative units in the College. The Director shall be responsible for budget oversight and allocation to the separate divisions within the Museum.
B. The Director supervises Curators and will have line authority over other museum personnel. However, the responsibility for Tenure and Promotion of the Curators shall reside in the Department of Biology. The Chair of Biology shall prepare the Tenure and Promotion reports for the curators with advice from the Director. The Director shall work closely with the Chair of Biology to maintain and promote the cohesiveness of the Department of Biology. The
Director shall become a member of the Council of Chairs within the College of Arts and Sciences.

C. The Museum Administration Board determines Museum policy. The Board consists of the faculty curators and one faculty member of the Biology Department who is not a curator. The Chair of Biology appoints the non-museum Board member.

3. Selection and tenure of Director: The Dean of Arts and Sciences appoints The Director of the MSB with advisement by the Museum Administration Board. The recommendation shall be determined by a formalized majority vote of the Museum Administration Board with the addition of one collective vote of the collection managers. The term of office shall be four years subject to renewal by the Dean of A&S upon consultation with the Museum Administration Board. With the exception of unusual circumstances it is expected that no Director shall serve longer than two consecutive terms. The Director shall be evaluated annually in the same manner as departmental chairs in the College.

4. Teaching Load and Compensation for the Director:

A. Teaching load: The Director shall be expected to teach one full and one seminar course per year.
B. Compensation: The Director shall receive remuneration and a 9 month appointment as determined by negotiation with the Dean of Arts and Sciences.

5. Teaching: The allocation of teaching duties for the MSB faculty shall remain the responsibility of the Chair of Biology.

A. Undergraduate Education: Historically and presently, the faculty curators (and occasionally staff) of the MSB are responsible for teaching the following undergraduate courses: General Vertebrate Zoology, Herpetology, Conservation Biology, Flora of New Mexico, Mammalogy, Ichthyology, Ornithology, Bosque Biology, and Entomology (when taught). These courses can only be taught successfully with the use of specimens obtained, prepared, and curated by the Museum of Southwestern Biology. The curators will continue to teach these courses, as determined by the Chair of Biology. They may teach additional courses as needed by the Department of Biology. The MSB, therefore, has a significant and integral role in the undergraduate curriculum at UNM. Undergraduate students receive training in curation and museum practice that is unavailable elsewhere in the Department and the University. The major role in undergraduate education played by the Museum will be maintained and strengthened where possible.

B. Graduate Education: The MSB is responsible for graduate education in the field of study represented by the faculty curators and in museum curation. Graduate student teaching assistants are employed in the collections, participate in graduate courses linked to the museum, and utilize the museum collections in their research. Historically, the faculty curators teach the main taxonomy and systematics graduate level courses. The faculty curators are expected to supervise graduate students and play a major role in graduate education through this activity. In summary, the MSB plays a significant role in the graduate program at the curriculum and research level in the Biology Department.

6. Faculty Curators:
A. Curators will continue to be Biology Department Faculty with a portion of their responsibilities allocated to the Museum. Curators with a significant level of responsibility in the MSB will receive, as possible, a reduced teaching load to be determined by the Chair of Biology upon the advice of the Director. The following non-exhaustive list of responsibilities of any Faculty Curator
delimits necessary and important functions that demonstrate the need for teaching load reduction in a university setting: supervision of the maintenance of collections, responsibility for policy decisions for the collection, supervision and participation in collection growth, participation in advisory roles with state and federal agencies, responsibility for granting specimen loans and ensuring the protection of loans received, fundraising, public outreach, and collection-based research. The Chair of Biology shall decide the teaching assignment for each faculty curator in consultation with the Director. A reduced teaching load will be given with the understanding that it is not to be detrimental to the Department of Biology and that it is to be supported by the Dean of Arts and Sciences.

B. Hiring of Curators: The Department of Biology explicitly agrees that faculty curators shall be replaced by faculty curators when a vacancy occurs. The hiring of a new curator to fill a vacant FTE position as Curator of a division of MSB will be done by a majority vote of the full Biology faculty as is currently done. The search committee shall have a minimum requirement of the membership of one MSB curator who shall chair the committee. The position will have the requirement of curatorial experience and commitment to administrative supervision of the respective division. These requirements are to be stated in the job advertisement. It is expected that the Curator shall have education and experience in curation of the organisms contained in the particular collection in question. The tenure requirements will be the same as for any other Biology faculty member with the provisos that excellence in curation will be taken into account for tenure. Faculty curators will not be penalized for having a reduced teaching load approved by the Chair of Biology. The Museum Board shall develop for the department and the College of A&S, an explicit statement of the procedure for the consideration and inclusion of curatorial accomplishments in recommendations for tenure and promotion. The requirements for service, research and teaching will not change from current standards in the Biology Department and the UNM Faculty Handbook. The faculty curators will receive an annual evaluation prepared by the Chair of Biology. The curatorial component of the evaluation shall be prepared by the Director and included in the Chair's evaluation.

7. Grant Indirect Cost Allocation: The MSB receives its own allocation of contract and grant IDC for only those grants that have a significant component of Museum support included. This allocation shall be handled internally in the Department of Biology unless other arrangements are made. Contracts and grants that are received by Curators for research not involving the Museum will have the IDC allocated to the Department of Biology as is presently done. Contracts and grants that have a dual component of Department and Museum shall split the IDC in proportion to the workload stated in the proposal and agreed upon by the MSB Director and Chair of Biology.

8. Graduate Student Teaching Assistants: Each division of the Museum presently receives a 0.5 TA line (20 hrs. per week) for each semester. During the summer each division receives a 0.25 TA line (10 hr. per week). This allotment shall be maintained. The TAs shall be selected by the respective Faculty curator from graduate students admitted into the degree program of the Department of Biology. The teaching assistants employed in the museum divisions are expected to participate in preparation and/or laboratory teaching of the courses in which there is a significant use of museum specimens from the respective division. These courses are commonly referred to as the "ologies".

9. Clerical and Administrative Staff: Currently there are no administrative or clerical personnel with state supported lines in the Museum. It is a stated goal of the Museum in the short term to obtain one staff position whose duties
shall include secretarial and grants administrative responsibilities. This staff member shall assist the Department of Biology when possible. The director shall supervise this staff member.

10. Collection Managers: It is the stated goal of the MSB to acquire a full-time Collection Manager staff line for each of the seven divisions within the museum. All collection manager positions have been obtained through cost-share agreements resulting from grant awards and/or through startup funds for new faculty members. The MSB will continue to pursue staff lines through these mechanisms. It must be recognized that the archival nature of the Museum mandates that a collection manager be eventually employed in each division. This requirement is recognized by the National Science Foundation as demonstration of minimal institutional support of a museum.

11. MSB Publications: The MSB currently issues two publication series: Occasional Papers, featuring concise research studies, and Special Publications featuring more extensive articles. The publication series will continue to be an important feature of the Museum and Department of Biology. The Centennial Science and Engineering Library presently uses the series as one of its main items for publication exchange. An editorial board consisting of all the faculty curators including the USGS Curator and any other researchers as deemed appropriate by a majority vote of the curators shall be responsible for policy and supervision of the quality and timely production of the issues. An editor appointed by the editorial board is responsible for the receipt, processing, reviewing, and publication of both series. The costs for the production and publication of the series shall be borne by the Museum and shall be offset by page charges and publication sales where possible.


Timothy K. Lowrey
Director of the Museum of Southwestern Biology

Kathryn Vogel
Chair, Department of Biology

Reed Dassenbrock
Dean, College of Arts and Sciences

DATE: 1 March 2002

DATE: 3-1-02

DATE: 4/2/2002

Appendix 0-2 4
UNM BIOLOGY MAJOR – BS TRACK – 37 HOURS
This information is effective for the FALL 2015 catalog

All course in Biology and supportive courses must be completed with a minimum grade of C or higher. Note: In order to fulfill the 50% major residency requirement, at least 19 credit hours of biology major coursework must be completed at UNM.

1: Complete the 4-course introductory sequence:

<table>
<thead>
<tr>
<th>Introductory Courses</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Pre/Co-Requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201L</td>
<td>Molecular &amp; Cell Biology</td>
<td>4</td>
<td>Prerequisite: CHEM 121 &amp; 123L</td>
</tr>
<tr>
<td>BIOL 202L</td>
<td>Genetics</td>
<td>4</td>
<td>Prerequisites: CHEM 121 &amp; 123L and BIOL 201L</td>
</tr>
<tr>
<td></td>
<td>Pre or Co-requisite: CHEM 122 &amp; 124L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 203 &amp; 203L</td>
<td>Ecology &amp; Evolution</td>
<td>4 (3/1)</td>
<td>Prerequisites: CHEM 121 &amp; 123L, CHEM 122 &amp; 124L, BIOL 201L, BIOL 202L</td>
</tr>
<tr>
<td></td>
<td>Pre or Co-requisite: MATH 180 (or MATH 162)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BIOL 204 &amp; 204L</td>
<td>Plant &amp; Animal Form &amp; Function</td>
<td>4 (3/1)</td>
<td>Prerequisites: CHEM 121 &amp; 123L, CHEM 122 &amp; 124L, BIOL 201L, BIOL 202L, BIOL 203 &amp; 203L, MATH 180 (or 162)</td>
</tr>
</tbody>
</table>

2: Complete ONE (1) of the following 300-level courses w/lab:

<table>
<thead>
<tr>
<th>300-level Course w/lab</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 351 &amp; 352L</td>
<td>General Microbiology</td>
<td>4 (3/1)</td>
<td>Prerequisites: BIOL 204 &amp; 204L</td>
</tr>
<tr>
<td>BIOL 360L</td>
<td>General Botany</td>
<td>4</td>
<td>Prerequisites: BIOL 203 &amp; 203L, 204 &amp; 204L</td>
</tr>
<tr>
<td>BIOL 371L</td>
<td>Invertebrate Biology</td>
<td>4</td>
<td>Prerequisites: BIOL 203 &amp; 203L, 204 &amp; 204L</td>
</tr>
<tr>
<td>BIOL 386L</td>
<td>General Vertebrate Zoology</td>
<td>4</td>
<td>Prerequisites: BIOL 203 &amp; 203L, 204 &amp; 204L</td>
</tr>
</tbody>
</table>

3: Complete FOUR (4) 400-level courses from THREE (3) different categories/areas: (Prerequisites vary; check catalog. BIOL 400, BIOL 402, BIOL 499 cannot count toward this requirement.)

<table>
<thead>
<tr>
<th>400-level Course</th>
<th>Course category/area</th>
<th>Course category/area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Any</td>
<td>Any</td>
</tr>
<tr>
<td>2)</td>
<td>Must be different category/area than course #1 &amp; #3</td>
<td>Must be different category/area than course #1 &amp; #2</td>
</tr>
<tr>
<td>3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4)</td>
<td></td>
<td>Any</td>
</tr>
</tbody>
</table>

400-level course categories/areas listed on reverse

4: Complete additional biology major elective courses so that the total number of biology hours totals at least 37.

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following courses cannot be applied toward biology elective hours: BIOL 110, BIOL 112L, BIOL 123, BIOL 124L, and BIOL 239L.

Up to 4 credit hours of BIOL 402 may be applied toward the biology elective hours.

Up to 4 credit hours of BIOL 400 may be applied toward the biology elective hours.

Up to 2 credit hours of BIOL 499 may be applied toward the biology elective hours.

BIOC 423 may be used toward the biology elective hours ONLY if it is not being used toward the chemistry minor.

Appendix 1-1 1
### Supportive Courses

#### MATH

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>OR</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Engineering/Math/Physics majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 180</td>
<td>Elements of Calculus I</td>
<td></td>
<td>MATH 162</td>
<td>Calculus I</td>
<td>Engineering/Math/Physics majors</td>
</tr>
<tr>
<td>MATH 181</td>
<td>Elements of Calculus II</td>
<td></td>
<td>MATH163</td>
<td>Calculus II</td>
<td>Engineering/Math/Physics majors</td>
</tr>
</tbody>
</table>

#### PHYSICS

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>OR</th>
<th>Course Code</th>
<th>Course Name</th>
<th>Engineering/Math/Physics majors</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYC 151</td>
<td>General Physics I</td>
<td></td>
<td>PHYC 160</td>
<td>General Physics I</td>
<td>Engineering/Math/Physics majors</td>
</tr>
<tr>
<td>PHYC 152</td>
<td>General Physics II</td>
<td></td>
<td>PHYC 161</td>
<td>General Physics II</td>
<td>Engineering/Math/Physics majors</td>
</tr>
</tbody>
</table>

#### CHEMISTRY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>OR</th>
<th>Course Code</th>
<th>Course Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 121/123L</td>
<td>General Chemistry I w/lab</td>
<td></td>
<td>CHEM 212</td>
<td>Integrated Organic Chemistry &amp; Biochemistry</td>
</tr>
<tr>
<td>CHEM 122/124L</td>
<td>General Chemistry II w/lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 301/303L</td>
<td>Organic Chemistry I w/lab</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Section 3 Requirement: Choose courses from at least three (3) different categories/areas:

#### CELL/MOLECULAR (CM)
- 401 Topics in Cell and Molecular Biology (3)
- 410 Genome & Computational Biology (3)
- 412 Developmental Biology (3)
- 425 Molecular Genetics (3)
- 428 Human Heredity (3)
- 429 Molecular Cell Biology (3)
- 444 Genomes and Genomic Analysis (3)
- 446L Lab Methods in Molecular Biology (4)
- 450 Virology (3)
- 490 Infectious Organisms (3)
- 497 Principles of Gene Expression (3)
- 498L Genome Editing (3)

#### PHYSIOLOGY (PH)
- 404 Topics in Physiology (3)
- 416L Histology (4)
- 435L Animal Physiology (4)
- 445 Biology of Toxins (3)
- 456 Immunology (3)
- 460 Microbial Physiology (3)
- 478L Plant Physiology (4)

#### ECOLOGY/EVOLUTION (EE)
- 405 Ecosystem Dynamics (3)
- 408L Bosque Internship (3) (Can Be Taken Multiple Times)
- 409 Topics in Ecology and Evolution (3)
- 436L Phylogenetics (4)
- 437 Evolutionary Genetics (3)
- 451 Microbial Ecology (3)
- 455 Ethology: Animal Behavior (3)
- 461L Introduction to Tropical Biology (3)
- 475 Plant Community Ecology (3)
- 491 Population Genetics (3)
- 494 Biogeography (3)

#### INTERDISCIPLINARY (ID)
- 419 Topics in Interdisciplinary Science (3)
- 470L Biology: Discovery & Innovation (4)
- 471 Plant Physiological Ecology (3)
- 480 Global Change Biology (3)
- 492 Introduction to Mathematical Biology (3)
- 495 Limnology (3)

#### ORGANISMAL (OR)
- 406 Topics in Organismal Biology (3)
- 463L Flora of New M Exico (4)
- 482L Parasitology (4)
- 484 Biology of Fungi (4)
- 485L Entomology (4)
- 486L Ornithology (4)
- 487L Ichthyology (4)
- 488L Herpetology (4)
- 489L Mammalogy (4)

Updated 10/6/2016

Appendix 1-1 2
UNM BIOLOGY MAJOR – BA TRACK – 32 HOURS
This information is effective for the FALL 2015 catalog

All course in Biology and supportive courses must be completed with a minimum grade of C or higher.
Note: In order to fulfill the 50% major residency requirement, at least 16 credit hours of biology major coursework must be completed at UNM.

1: Complete the 4-course introductory sequence:

<table>
<thead>
<tr>
<th>Introductory Courses</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Pre/Co-Requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201L</td>
<td>Molecular &amp; Cell Biology</td>
<td>4</td>
<td>Prerequisite: CHEM 121 &amp; 123L</td>
</tr>
<tr>
<td>BIOL 202L</td>
<td>Genetics</td>
<td>4</td>
<td>Prerequisites: CHEM 121 &amp; 123L and BIOL 201L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre or Co-requisite: CHEM 122 &amp; 124L</td>
</tr>
<tr>
<td>BIOL 203 &amp; 203L</td>
<td>Ecology &amp; Evolution</td>
<td>4 (3/1)</td>
<td>Prerequisites: CHEM 121 &amp; 123L, CHEM 122 &amp; 124L, BIOL 201L, BIOL 202L</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pre or Co-requisite: MATH 180 (or MATH 162)</td>
</tr>
<tr>
<td>BIOL 204 &amp; 204L</td>
<td>Plant &amp; Animal Form &amp; Function</td>
<td>4 (3/1)</td>
<td>Prerequisites: CHEM 121 &amp; 123L, CHEM 122 &amp; 124L, BIOL 201L, BIOL 202L, BIOL 203 &amp; 203L, MATH 180 (or 162)</td>
</tr>
</tbody>
</table>

2: Complete TWO (2) 300-level/400-level biology courses: (Prerequisites vary; check catalog. BIOL 400, BIOL 402, BIOL 499 cannot count toward this requirement.)

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
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<td></td>
</tr>
</tbody>
</table>

3: Complete additional biology major elective courses so that the total number of biology hours totals at least 32.

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following courses **cannot be applied toward biology elective hours**: BIOL 110, BIOL 112L, BIOL 123, BIOL 124L, 239L

**Up to 4 credit hours** of BIOL 402 may be applied toward the biology major.

**Up to 4 credit hours** of BIOL 400 may be applied toward the biology major.

**Up to 2 credit hours** of BIOL 499 may be applied toward the biology major.

BIOC 423 may be used toward the biology elective hours ONLY if it is not being used toward the chemistry minor.
### Supportive Courses

#### MATH

<table>
<thead>
<tr>
<th>MATH 180</th>
<th>AND</th>
<th>MATH 181</th>
</tr>
</thead>
<tbody>
<tr>
<td>OR</td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td>MATH 162</td>
<td></td>
<td>MATH 163</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>OR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STAT 145</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td>CS 150L</td>
</tr>
</tbody>
</table>

#### PHYSICS

<table>
<thead>
<tr>
<th>PHYC 151</th>
<th>General Physics I</th>
<th>OR</th>
<th>PHYC 160</th>
<th>General Physics I</th>
<th>OR</th>
<th>PHYC 102</th>
<th>Introduction to Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>AND</td>
<td></td>
<td></td>
<td>AND</td>
<td></td>
<td></td>
<td>AND</td>
<td></td>
</tr>
<tr>
<td>PHYC 152</td>
<td>General Physics II</td>
<td>OR</td>
<td>PHYC 161</td>
<td>General Physics II</td>
<td>OR</td>
<td>EPS 101</td>
<td>How the Earth Works</td>
</tr>
</tbody>
</table>

#### CHEMISTRY

<table>
<thead>
<tr>
<th>CHEM 121/123L</th>
<th>General Chemistry I w/lab</th>
<th>OR</th>
<th>CHEM 212</th>
<th>Integrated Organic Chemistry &amp; Biochemistry</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM 122/124L</td>
<td>General Chemistry II w/lab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 301/303L</td>
<td>Organic Chemistry I w/lab</td>
<td>OR</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Updated 10/6/2016*
MINOR IN UNM BIOLOGY – 22 HOURS

All courses in Biology and supportive courses must be completed with a minimum grade of C or higher. Note: In order to fulfill the 25% minor residency requirement, at least 6 credit hours of biology minor coursework must be completed at UNM.

1: Complete the 4-course introductory sequence:

<table>
<thead>
<tr>
<th>Introductory Courses</th>
<th>Course Name</th>
<th>Credit Hours</th>
<th>Pre/Co-Requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL 201L</td>
<td>Molecular &amp; Cell Biology</td>
<td>4</td>
<td>Prerequisite: CHEM 121 &amp; 123L</td>
</tr>
</tbody>
</table>
| BIOL 202L            | Genetics                     | 4            | Prerequisites: CHEM 121 & 123L and BIOL 201L
Pre or Co-requisite: CHEM 122 & 124L |
| BIOL 203 & 203L       | Ecology & Evolution          | 4 (3/1)      | Prerequisites: CHEM 121 & 123L, CHEM 122 & 124L, BIOL 201L, BIOL 202L
Pre or Co-requisite: MATH 180 (or MATH 162) |
| BIOL 204 & 204L       | Plant & Animal Form & Function | 4 (3/1)       | Prerequisites: CHEM 121 & 123L, CHEM 122 & 124L, BIOL 201L, BIOL 202L, BIOL 203 & 203L, MATH 180 (or 162) |

2: Complete additional biology minor elective courses so that the total number of biology hours totals at least 22.

<table>
<thead>
<tr>
<th>Courses</th>
<th>Credit hours</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The following courses **cannot be applied toward biology elective hours**: BIOL 110, BIOL 112L, BIOL 123, BIOL 124L, and BIOL 239L

**Up to 4 credit hours** of BIOL 402 may be applied toward the biology minor.

**Up to 4 credit hours** of BIOL 400 may be applied toward the biology minor.

**Up to 2 credit hours** of BIOL 499 may be applied toward the biology minor.

BIOC 423 may be used toward the biology elective hours ONLY if it is not being used toward a chemistry minor.

Updated 10/6/2016
Appendix 2-1 Concentration in Biotechnology

Students who the Biotechnology A.S. degree and Biotechnology Certificate at CNM may receive a Bachelor of Science degree in Biology at UNM with a concentration in Biotechnology. The concentration in Biotechnology provides students with specific laboratory skills required for employment in biological and health professions, and make graduates more competitive and successful candidates for admission into graduate programs around the country. The concentration is based on existing CNM Biotechnology course work and the curriculum is designed to meet competencies common to biotechnology programs around the nation and to be responsive to industry needs. Departmental advisement is required for students who wish to complete the concentration in Biotechnology.

Majors in biology seeking a Bachelor of Science degree with a concentration in Biotechnology must satisfy the requirements given below in sections 1-5:

1. The B.S. degree with a concentration in Biotechnology requires a minimum of 45 credit hours earned in biology courses. These courses must include: BIOL 201L, 202L, 203 and 203L, 204 and 204L; at least one of the following: **351 and **352L, *371L, 386L.

2. At CNM the curriculum includes 11 credit hours encompassed within three laboratory-based classes. The three classes are taught in sequential order, starting in the summer semester (Term 1 - BIOT 1020: Biotechnology Lab Techniques I), continuing in the fall semester (Term 2 – BIOT 2110: Biotechnology Lab Techniques II) and culminating the following spring semester (Term 3 – BIOT 2210: Biotechnology Lab Techniques III). These courses transfer to UNM as BIOL 2XX (4 credits), 2XY (4 credits), and 2XZ (3 credits).

3. To satisfy an upper-division breadth requirement for the Biology B.S., each student must complete at least three 400-level courses that are spread across three of the following five categories: 1) Cell/Molecular (CM); 2) Physiology (PH); 3) Organismal (OR); 4) Ecology/Evolution (EE); 5) Interdisciplinary Science (ID). Note: the category to which each eligible course belongs is listed in parentheses (CM, PH, OR, EE, or ID), and completing three of these courses from only one or two categories does NOT satisfy the breadth requirement.

4. Required Supportive Courses for the B.S.: MATH 162-163 or 180-181; PHYC 151-152 or 160-161; CHEM 121, 123L, 122, 124L (or 131, 123L, 132, 124L) and **301-303L (or 212). For those interested in microbiology, molecular/cellular biology, physiology or medicine, CHEM **301-303L and **302-304L are recommended.

5. Candidates for the B.S. degree in Biology with a concentration in Biotechnology must take a minimum of 6 credit hours to be taken from a list of complementary interdisciplinary electives available from the department advisor.

Notes:
- BIOL 110, 112L, 123, 124L, 136 and 239L do not count toward a biology major.
- A course fulfilling one requirement cannot be used towards another (e.g., no double-dipping); although each BIOL 419 section is considered a different course, if it has a different instructor/title.
- Student must verify that course work meets requirements for a B.S. in Biology.
- Grade of "C" or better required in all of the above courses.
- Transfer students must complete at least 19 credit hours of biology course work at UNM.

Departmental advisement is required for students who wish to complete the concentration in Biotechnology.
Appendix 2-2 Concentration in Conservation Biology

The growing emphasis on Conservation in the biological sciences supports this concentration. Students may receive either the Bachelor of Science or Bachelor of Arts degree in Biology with a concentration in Conservation Biology. The concentration provides students with a strong background in biology as well as the complementary interdisciplinary skills critical to understanding and addressing contemporary conservation questions. Departmental advisement is required for students who wish to complete the concentration in Conservation Biology.

Majors in biology seeking a Bachelor of Science degree with a concentration in Conservation Biology must satisfy the requirements given in sections 1, 2, 3 and 6. No minor study is required for a B.S. with a concentration in Conservation Biology.

Majors in biology seeking a Bachelor of Arts degree must satisfy the requirements in sections 4, 5, and 6.

1. The B.S. program with a Concentration in Conservation Biology requires a minimum of 45 credit hours earned in biology courses. These courses must include: BIOL 201L, 202L, 203 and 203L, 204 and 204L, 310, 360L, 379; at least one of the following: **351 and **352L, *371L, 386L. A minimum of 3 credit hours must be from the Conservation Biology Seminar 402.

2. To satisfy an upper-division breadth requirement for the Biology B.S., each student must complete at least three 400-level courses that are spread across three of the following five categories: 1) Cell/Molecular (CM); 2) Physiology (PH); 3) Organismal (OR); 4) Ecology/Evolution (EE); 5) Interdisciplinary Science (ID). Note: the category to which each eligible course belongs is listed in parentheses (CM, PH, OR, EE, or ID), and completing three of these courses from only one or two categories does NOT satisfy the breadth requirement.

3. The B.A. program with a concentration in Conservation Biology requires a minimum of 37 credit hours earned in biology courses. These courses must include: BIOL 201L, 202L, 203 and 203L, 204 and 204L, 310, 360L, 379; and at least one of the following: **351 and **352L, *371L, 386L. A minimum of 3 credit hours must be from the Conservation Biology Seminar 402. A minimum of one 400-level course must be successfully completed.

4. Required Supportive Courses for the B.S.: MATH 162-163 or 180-181; PHYC 151-152 or 160-161; CHEM 121, 123L, 122, 124L (or 131, 123L, 132, 124L) and **301-303L (or 212). For those interested in microbiology, molecular/cellular biology, physiology or medicine, CHEM **301-303L and **302-304L are recommended.

5. Required Supportive Courses for the B.A.: A total of seven semesters of math, physics, and chemistry courses must be completed from the following four sets of courses: 1) two semesters of math courses: (MATH 180 or MATH 162) and (CS 150L or MATH 163 or MATH 181 or STAT 145); and 2) two semesters of physics courses: (PHYC 102 and EPS 101) or (PHYC 151 and 152) or (PHYC 160 and 161); and 3) two semesters of general chemistry courses: (CHEM 121/123L and CHEM 122/124L) or (CHEM 131/123L and CHEM 132/124L); and 4) one semester of organic chemistry: (CHEM **301/303L or CHEM 212). A minimum of 6 credit hours to be taken from a list of complementary interdisciplinary electives available from the department advisor.

Note:

- Grade of "C" or better required in all of the above courses.
Appendix 2-3 **Concentration in Ecology, Evolution, and Organismal Biology**

Climate change and other pressing environmental problems have led to the increased importance of a solid understanding of Ecology, Evolution, and Organismal Biology (EEOB). The concentration provides a depth of understanding at multiple hierarchies of biological organization and exposes students to the techniques, methodologies and approaches used by these sub-disciplines. Students develop expertise with the biology of a group of organisms, familiarity with methodologies used in study, expertise with the systematics of classification, and significant hands-on experience in the field or research laboratory. The concentration, available to students pursuing either the Bachelor of Science or Bachelor of Arts in Biology, is designed to provide a comprehensive background for students planning to pursue graduate school or seek a career in a governmental agency.

Majors in biology seeking a Bachelor of Science degree with a concentration in EEOB must satisfy the requirements given in sections 1, 2, 3 and 6. Majors in biology seeking a Bachelor of Arts degree must satisfy the requirements in sections 4, 5, and 6.

**Requirements**

<table>
<thead>
<tr>
<th>Credit Hours</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Successful completion of the four-course introductory sequence:</td>
<td></td>
</tr>
<tr>
<td>BIOL 201L Molecular and Cell Biology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 202L Genetics</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 203 Ecology and Evolution</td>
<td>4</td>
</tr>
<tr>
<td>-and-</td>
<td></td>
</tr>
<tr>
<td>BIOL 203L Ecology and Evolution Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 204 Plant and Animal Form and Function</td>
<td>4</td>
</tr>
<tr>
<td>-and-</td>
<td></td>
</tr>
<tr>
<td>BIOL 204L Plant and Animal Form and Function Laboratory</td>
<td>4</td>
</tr>
<tr>
<td>Subtotal</td>
<td><strong>16</strong></td>
</tr>
<tr>
<td><strong>2.</strong> Successful completion of upper-division courses in both Ecology and Evolution:</td>
<td></td>
</tr>
<tr>
<td>BIOL 300 Evolution</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 310 Principles of Ecology</td>
<td>3</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>6-7</strong></td>
</tr>
<tr>
<td><strong>3.</strong> Successful completion of at least one taxonomic based course from the following:</td>
<td></td>
</tr>
<tr>
<td>BIOL *450 General Virology</td>
<td>3</td>
</tr>
<tr>
<td>BIOL *463L Flora of New Mexico</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 482L Parasitology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL 484 Biology of Fungi</td>
<td>3</td>
</tr>
<tr>
<td>BIOL 485L Entomology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL *486L Ornithology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL *487L Ichthyology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL *488L Herpetology</td>
<td>4</td>
</tr>
<tr>
<td>BIOL *489L Mammalogy</td>
<td>4</td>
</tr>
<tr>
<td><strong>Subtotal</strong></td>
<td><strong>3-4</strong></td>
</tr>
</tbody>
</table>
4. Successful completion of at least one synthetic/comparative taxonomic based course and lab from the following:

- **BIOL 351** General Microbiology 3
- **BIOL 360L** General Botany 4
- **BIOL 371L** Invertebrate Biology 4
- **BIOL 386L** General Vertebrate Zoology 4

Subtotal 4

5. Successful completion of at least one statistics course from the following:

- **PSY 200** Statistical Principles 3
- **STAT 145** Introduction to Statistics 3
- **STAT 345** Elements of Mathematical Statistics and Probability Theory 3
- **STAT 427** Advanced Data Analysis I 3

Or other course with prior approval from EEOB faculty advisory committee

Subtotal 3

6. Successful completion of at least one course from each of the following clusters:

A) Individual (Genes/Physiology) Cluster

- **BIOL 401** T: Microbial Genetics 3
- **BIOL 435** Animal Physiology 4
- **BIOL 436L** Phylogenetics 4
- **BIOL 437** Evolutionary Genetics 3
- **BIOL 460** Microbial Physiology 3
- **BIOL 471** Plant Physiological Ecology 3
- **BIOL 478L** Plant Physiology 4

Or other course with prior approval from EEOB faculty advisory committee

B) Population (Behavior/Population Biology) Cluster

- **BIOL 409** T: Conservation Genetics 3
- **BIOL 409** T: Sexual Systems in Animals: Diversity and Evolution 3
- **BIOL 455** Ethology: Animal Behavior 3
- **BIOL 491** Population Genetics 3
- **ANTH 360** Human Behavioral Ecology 3
- **ANTH 363** Primate Social Behavior 3
- **ANTH 491** Population Genetics 3

Or other course with prior approval from EEOB faculty advisory committee

C) Community/Ecosystem Cluster
BIOL 405  Ecosystem Dynamics  
BIOL 409  T: Ecology of Plant Microbe Symbiosis  
BIOL 419  T: Global Change Biology  
BIOL *451  Microbial Ecology  
BIOL 475  Community Ecology  
BIOL *495  Limnology  
BIOL 511  Macroecology*  
BIOL 514  Ecosystem Studies*  
BIOL/EPS 535  Freshwater Ecosystems*  

Or other course with prior approval from EEOB faculty advisory committee

* Graduate courses which need approval for undergraduate enrollment.

Subtotal  9-12

7.  

Demonstration of significant hands-on experience in the field or research laboratory. Choose one:

BIOL 400  Senior Honors Thesis  
BIOL 408L  Bosque Internship  
BIOL 409  T: Ornithological Field Expedition  
BIOL 461L  Introduction to Tropical Biology  
BIOL *463L  Flora of New Mexico  
BIOL *496L  Limnology Laboratory  
BIOL 499  Undergraduate Problems  
PSY 465L  Gorilla Observation Laboratory  

Successful completion of an approved field course offered at UNM or at another accredited institution

Participation in a NSF REU program at UNM or elsewhere

Other field experience with prior approval from EEOB faculty advisory committee

Subtotal  0-4

8.  

Successful completion of at least one interdisciplinary synthetic course:

BIOL 324L  Natural History of the Southwest  
BIOL 379  Conservation Biology  
BIOL 419  Topics in Interdisciplinary Science  
BIOL 445  Biology of Toxins  
BIOL 470  Biology: Discovery and Innovation
BIOL*490  Biology of Infectious Organisms 3
BIOL 492  Introductory Mathematical Biology 3
BIOL*494  Biogeography 3
BIOL*495  Limnology 3
BIOL/EPS 535  Freshwater Ecosystems* 3
BIOL/EPS 558  Geomicrobiology* 3
ANTH*350  Human Biology 3
ANTH 357  Human Origins 3
BIOC*423  Introductory Biochemistry 3
EPS 352  Global Climate Change 3
EPS*439  Paleoclimatologoy 3

Or other course with prior approval from EEOB faculty advisory committee

* Graduate courses which need approval for undergraduate enrollment.

Subtotal 3-4

9.

Successful completion of at least one semester of the "Brown Bag" seminar:

BIOL 402  Topics in Biology: Brown Bag 1

Subtotal 1-2

10.

Successful completion of additional Biology courses so that the total number of Biology credit hours is greater than or equal to 48.

11.

Successful completion of supporting courses in Math, Physics, and Chemistry:

Math: (180 and 181) or (162 and 163)
Physics: (151 and 152) or (160 and 161)
Chemistry: (121 and 123L and 122 and 124L) or (131 and 123L and 132 and 124L)

PLUS one semester of organic chemistry (**301 and 303L) or (212 and 124L)

Subtotal 24-27

Notes:

• BIOL 110, 112L, 123, 124L, 136 and 239L do not count toward a biology major.
• A course fulfilling one requirement cannot be used towards another (e.g., no double-dipping); BIOL 419 is considered a different course, if it has a different instructor/title.
• Verify that course work meets with requirements for a B.S. in Biology. Specifically, course work must include three 400-level courses from different categories, as identified in the Catalog (cell/molecular, interdisciplinary, ecology/evolution, organismal).
• All courses in Biology and supporting areas must be completed with a grade of "C" or better.
• Transfer students must complete at least 19 credit hours of biology course work at UNM.
Appendix 2-4

UNM CORE CURRICULUM WORKSHEET

All UNM Students are required to complete the Core Curriculum as part of their baccalaureate (Bachelor’s) degree program. There are VERY limited, specific exceptions allowed, and only for certain specific colleges or majors. Unless noted, all courses are one semester in length and all courses are 3 credit hours.

A GRADE OF C (NOT C-) IS NEEDED FOR ALL COURSES TO SATISFY THE CORE REQUIREMENT.

AREA 1: WRITING AND SPEAKING – 9 credit hours required, including English 110, English 120 and 1 additional course.

Pre-Fall 2014: ENGL 101: Composition 1
ENGL 110: Accelerated Composition
ENGL 113: Enhanced Composition

Pre-Fall 2014: ENGL 102: Composition 2
ENGL 111 & 112: Composition 1 & 2 (2 Semesters)
ENGL 120: Composition 3

All Students are required to demonstrate competency in English 120 and complete one additional course from the following:

ENGL 219: Technical Writing
CI 130: Public Speaking
ENGL 220: Expository Writing
PHIL 156: Reasoning & Critical Thinking

AREA 2: MATHEMATICS – 3 credit hours required. Choose one course from the following:

MATH 121: College Algebra
MATH 150: Pre-Calculus
MATH 129: Survey of Mathematics
MATH 153: Pre-Calculus & Trigonometry (5cr)
MATH 215: Math for Elementary Teachers 3
MATH 162: Calculus 1 (4cr)
MATH 163: Calculus 2 (4cr)

AREA 3: PHYSICAL AND NATURAL SCIENCES – 7 credit hours required. Choose two courses from the following:

(1cr)

ANTH 120L: Opt Lab for ANTH 120
ANTH 122L: Required Lab for ANTH 122
ANTH 150L: Evolution & Human Emergence
ANTH 151L: Opt Lab for ANTH 150
ANTH 160: Human Life Course
ANTH 161L: Opt Lab for ANTH 160
ASTR 101: Intro to Astronomy
ASTR 101L: Opt Lab for ASTR 101
BIOL 110: Biology for Non-Majors
BIOL 112L: Opt Lab for BIOL 110
BIOL 121L: Principles of Biology
BIOL 121L: Principles of Biology (4cr)
BIOL 122L: Principles of Biology (4cr)
BIOL 123: Bio for Health Majors
BIOL 124L: Opt Lab for BIOL 123
CHEM 101: Chemistry in Our Community
CHEM 102L: Opt Lab for CHEM 101
CHEM 121: General Chemistry 1
CHEM 123L: Req Lab for CHEM 121 and 131
CHEM 122L: General Chemistry 2
CHEM 124L: Req Lab for CHEM 122 and 132
CHEM 131: Principles of Chemistry (3cr)
CHEM 132: Principles of Chemistry (3cr)
CHEM 108L: Opt Lab for Musical Acoustics (1cr)
CHEM 108L: Opt Lab for Musical Acoustics (1cr)
CHEM 109: General Chemistry 1
CHEM 110L: Opt Lab for CHEM 121
CHEM 111: Elements of General Chemistry (4cr)
CHEM 112: General Chemistry 2
CHEM 131: Principles of Chemistry (3cr)
CHEM 132: Principles of Chemistry (3cr)
CI 130: Public Speaking

course must include a 1cr lab:

MATH 180: Elements of Calculus
MATH 181: Elements of Calculus 2
MATH 184: Elements of Linear Algebra
MATH 185: Elements of Linear Algebra

AREA 4 – SOCIAL AND BEHAVIORAL SCIENCES – 6 credit hours required. Choose two courses from the following:

AFST/CSCS/NATV/SUST/WMST 109: Intro to Comparative and Global Ethnic Societies
AMST 182: Intro to Environment and Social Justice
AMST 185: Race, Class & Ethnicity
ANTH 101: Intro to Anthropology
ANTH 130: Cultures of the World
ANTH 220: World Archaeology
ECON 105: Intro to Macroeconomics
ECON 106: Intro to Microeconomics

AREA 5: HUMANITIES – 6 credit hours required. Choose two courses from the following:

AFST 104: Intro to Africana Studies
AMST 186: Intro to Southwest Studies
AMST/CSCS/NATV 201: Intro to Chicana & Chicano Studies
CLST 107: Greek Mythology
CLST 204: Greek Civilization
CLST 205: Roman Civilization

PRE-FALL 2012 CLS 223/224 Lit Questions

PRE-FALL 2014: ENGL 200: Intro to Literature
ENGL 215: Study of Literature
ENGL 240: World Lit: Ancient World – 16th Century
ENGL 241: World Lit: 17th Century Through Present
ENGL 292: World Lit: 20th Century
ENGL 293: World Lit: 17th Century
ENGL 294: World Lit: 18th Century
ENGL 295: World Lit: 19th Century
ENGL 296: World Lit: 20th Century
ENGL 297: World Lit: 21st Century
ENGL 298: World Lit: 22nd Century

AREA 6: FOREIGN LANGUAGE – 3 credit hours required.

One course chosen from any lower-division non-English language offerings from the Department of Linguistics (including SIGN 201), Spanish and Portuguese, Foreign Languages and literatures, and foreign languages in other departments or programs (except Latin 105, Pre-Spring 2007).

Foreign Language Course:

AREA 7: FINE ARTS – 3 credit hours required. Choose one from the following:

ARCH 121: Intro to Architecture
ARCH 101: Intro to Architecture
ARCH 201: History of Art I
ARCH 202: History of Art 2
DANC 105: Dance Appreciation
FA 284: Experiencing The Arts
IFDM 105: Intro to Film & Digital Media
MA 210: Intro to Film Studies
MUS 139: Music Appreciation
MUS 142: Rock Music Appreciation

Pre-Fall 2010: THEA 122: Theatre Appreciation
Pre-Fall 2010: THEA 122: Theatre Appreciation
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Pre-Fall 2010: THEA 122: Theatre Appreciation
Pre-Fall 2010: THEA 122: Theatre Appreciation

Any 3 credit hour studio or performance course offered by the Department of Art & Art History, Music, Theatre & Dance, Media Arts, or IFDM will also complete Area 7 of core.

Appendix 2-4

Course is no longer offered but will be accepted.

Prepared by JCONN 5/3/2016
The University of New Mexico
Department of Biology
Graduate Student Handbook
Fall 2012
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INTRODUCTION

This Handbook serves as a guide to graduate studies in The Department of Biology at the University of New Mexico by setting forth the practices, procedures, rules and regulations that apply to the major academic aspects of graduate activities. It is a supplement to the UNM Catalog, http://catalog.unm.edu/catalogs/2012-2013/, which should also be consulted for additional details.

IT IS YOUR RESPONSIBILITY TO READ CAREFULLY THIS HANDBOOK AT THE BEGINNING OF YOUR GRADUATE PROGRAM. DON’T PUT YOURSELF AT A DISADVANTAGE BY NOT TAKING THE TIME TO UNDERSTAND FULLY THE RULES AND REGULATIONS OF THE BIOLOGY DEPARTMENT DESCRIBED BELOW. STUDENTS ALSO ARE EXPECTED TO UNDERSTAND THE POLICIES AND PROCEDURES OF THE OFFICE OF GRADUATE STUDIES AND UNM.

This Handbook is about the nuts and bolts of your graduate education - subjects that at times seem to be hurdles or arbitrary constraints. Such policies are needed to maintain a rigorous, equitable and smoothly functioning graduate program in the Department. Policies, however, only form the framework of a graduate education; you must complete the structure and determine the depth and quality of your training by selecting the most appropriate programs of course work and research and by making the most of the many opportunities that graduate work provides. This is a period in which you should be able to become fully involved in biology, to live and breathe science, and to experience a growing professional awareness and confidence. It affords the opportunity for you to take an active role in shaping the nature of your future professional life and contributions, and to form lasting personal and professional relationships. To maximize these benefits, both you and the Department must make commitments. The Department must make available the resources, both intellectual and physical, that are necessary for you to pursue your program and realize your potential, and must give you every opportunity to maximize your scholarly growth. For your part, you must take advantage of the many opportunities the Department and UNM offer by being highly motivated to study biology in the first place, and by directing that motivation in a productive manner. If you and the Department proceed appropriately, the policies outlined in this Handbook should become guidelines and exciting challenges rather than hurdles or hindrances.

It is important to ask the Graduate Program Coordinator any questions you may have as early as possible to avoid extra challenges.

DEGREE PROGRAMS

Graduate students in the Biology Department may undertake one of three degree programs: M.S. Plan I, M.S. Plan II, or Ph.D. Each serves a specific purpose and you should select the program that is appropriate for your long-term goals. While it is possible to transfer from one program to another, a program can be planned more effectively if your decision is made at the outset of your studies.

Master Degree

Two alternatives exist for obtaining a Master’s degree in Biology. The M.S. Plan I program provides advanced training in a sub-discipline of Biology that emphasizes research preparation. A combination of course work and active research provides a program that develops an ability to conduct scientific research. This plan often leads to a Ph.D. program, either at the University of New Mexico or another institution. A thesis or its equivalent is required.

The M.S. Plan II stresses advanced course work in Biology and may involve no active research by the student. No thesis is required and students generally take more course work than in the Plan I program. Plan II is most appropriate for individuals desiring exposure to biology course work beyond that obtained in a typical B.S. program. You should not register for this program if your career goal involves substantial research or technical laboratory work, or if you intend to pursue a Ph.D. degree at UNM.
Doctoral Degree

The emphasis of the Ph.D. degree is upon advanced training in the subject matter and conceptual bases of a sub-discipline of Biology and upon demonstration of the ability to design and implement significant independent research at an advanced level. The degree program in Biology is designed to develop both scholarship and technical expertise as the foundations for continuing scientific activity and contributions.

While many students enter the Ph.D. program after obtaining a Master’s degree, it is often preferable to design a program for the Ph.D. that bypasses the M.S. degree. You should confer with your prospective Major Advisor or a member of the Biology Graduate Faculty before you begin your graduate studies if you are at all uncertain about which program is most appropriate for your goals.

Changing Degree Level

It is possible to change from the Master’s program to the Ph.D. program or the Ph.D. program to Master’s program if your educational goals have changed. You must discuss this with your Committee on Studies. It is important that you make this request as early as possible in your academic training, normally during the third semester.

Master’s to Ph.D.

Master’s students deciding to change to the Ph.D. program must submit a request to the Graduate Selection Committee during the normal admission period. Please submit a memo to the Graduate Selection Committee by December 1st requesting the change, along with a copy of a current transcript (unofficial is acceptable), a letter of support from your advisor and the Office of Graduate Studies (OGS) Change of Degree Level form. The student will be evaluated, along with other applicants, by the departmental Graduate Student Selection Committee during their normal screening period in early spring. Once the request has been approved by the Biology Department, it will be forwarded to the Office of Graduate Studies. The student will be notified of the final decision. All approved students must complete the Ph.D. degree requirements. Students making this change must be in good academic standing and progressing in a timely manner.

Ph.D. to Master’s

Ph.D. students changing to the Master’s program must submit a request to the Biology Graduate Program Office. This request must include a memo to the Graduate Policy Committee, a supporting statement from the Advisor of your committee and a completed OGS Change of Degree Level form. This change can be effective any semester. The deadline for the Fall semester is July 1st, the Spring deadline is October 1st and the summer deadline is March 1st to ensure time to submit to OGS by their deadline. We will notify the student, once approved by OGS. All students approved must follow the Master’s curriculum and procedures.

Master’s Enroute [En route per OGS website] to Ph.D.

The Office of Graduate Studies allows students admitted directly to a Ph.D. without a master’s degree to earn a master’s degree enroute to the Ph.D., provided it is in the same major. The Biology Graduate Program allows students to do so before they have passed their doctoral comprehensive exam. The student must write a memo to the Graduate Program Coordinator or Graduate Policy Committee requesting a Master’s enroute to their Ph.D. The student’s advisor also must write a letter of support of this request as well. With advanced approval from the department and OGS, the doctoral comprehensive examination may serve as the master’s examination provided that the committee composition fulfills the necessary Master committee requirements. Students choosing this route must complete a Program of Studies (POS) and an Application for Candidacy (AC), using the Exam as the qualifying exam. The Master’s degree can be either Plan I or II.
DUAL DEGREE PROGRAM

Students in dual degree programs must complete both degrees in the same semester. Students must adhere to the general degree requirements. For detailed information, refer to the graduate section of the UNM catalog.

THE MAJOR ADVISOR AND COMMITTEE ON STUDIES

Major Advisor

The Major Advisor plays a key role in fostering your progress as a developing scientist; he or she is responsible for establishing your plan of study and course work, for seeing that you progress toward degree requirements in a timely fashion, for helping to assemble your Committee on Studies, and, most important, for working closely with you in your graduate research. The bonds you form with your major professor during your graduate studies are often firm and lasting, and are founded upon a close, professional working relationship. Accordingly, you should select a Major Advisor with care. Major Advisors must be members of the Biology Graduate Faculty.

Professors differ in their philosophies of graduate training: some spend considerable time with their students, closely directing their studies, often training students who continue his or her own lines of research. Other professors allow their students to explore widely and view their role as a sounding board on which students may try out new research ideas; at the extreme, this can produce a situation in which the student receives little direction and may flounder unless he or she is highly motivated and independent. Most professors, of course, fall somewhere between these extremes. You should consider such aspects of style and personality along with the idea of expertise or research activity of a faculty member in your selection of a sponsor.

A graduate student in Biology must have a Major Advisor at all times throughout his/her graduate program. While acceptance by a sponsor is a prerequisite for admission into the Graduate Program of this department, this does not mean that this relationship must be fixed for the duration of your graduate studies. Often students establish contact with a professor prior to completing their application for admission to the Department, but later elect to choose another faculty member to serve as their Major Advisor. You should not hesitate to consider changing your Major Advisor if your scientific interests diverge or your personalities are incompatible. The Major Advisor also has the right to terminate his/her relationship with a student if the relationship becomes strained, if the student’s progress is unsatisfactory, or if the student exhibits inappropriate behavior. If your current arrangement does not seem to be working, you should discuss this change with your Major Advisor before making a decision to change professors. Either or both of you may then wish to involve the prospective new advisor and the Chairperson of the Department in these discussions.

If a graduate student’s relationship with the Major Advisor is ended, either by the student, the advisor, or both, the student has 60 days to obtain a new Major Advisor. If a new advisor is not obtained on this schedule, the student will be terminated from the Graduate Program in Biology. This termination will eliminate any future financial support of the student by this department. It is the student’s responsibility to find a new Major Advisor according to this schedule and provide a letter, co-signed by the new Major Advisor, requesting a change in advisors, to the Chairperson of Biology and the Chair of the Graduate Policy Committee. Additionally, the Graduate Program Coordinator will receive a copy of the letter approved by the Chairperson of Biology and the Chair of the Graduate Policy Committee. The final decision on the student’s request to change to a new Major Advisor will be made by these two chairs.

In some cases, it may be appropriate to have two individuals serve as co-chairpersons of your Committee on Studies and as your Major Advisors. At least one of these individuals must be a member of the Biology Graduate Faculty. An Adjunct Professor of Biology may serve, along with a member of the Biology Graduate Faculty, as a co-chairperson. An Adjunct Professor may not serve as the sole chairperson of the Committee on Studies.
Committee on Studies

The Committee on Studies (COS) helps the student to plan an integrated program of study that will satisfy the goals of the student and the degree requirements of the Department and the University. The COS consists of three members: a major advisor, a Biology faculty and a UNM faculty member. All members must be approved for instruction by OGS. The Committee determines the course work necessary for satisfaction of degree requirements, recommends transfer of credits from other institutions, establishes and certifies completion of the non-biological skill requirements, certifies that the residency requirement has been met, and interacts with the student in the formulation and implementation of the research program. Normally, for Ph.D. students, the Committee on Studies administers the Ph.D. comprehensive examination and serves as the core of the Dissertation Committee (see below).

You must confer with your Major Advisor within the first semester of your graduate studies about the establishment of your Committee on Studies. The composition of the Committee must be approved by the Major Advisor and the Office of Graduate Studies. The membership of the Dissertation Committee of Ph.D. candidates is larger than that of the Committee on Studies (see below); it is a good idea to form the larger committee at the outset of your program.

The appointment of your Committee on Studies must be reported on a “Committee on Studies” form, obtained from the Graduate Program Coordinator and returned to the Coordinator after the appropriate signatures have been obtained. For Ph.D. candidates, the Committee must be appointed before 24 graduate credit hours are completed but no later than the fourth semester, and for Master’s candidates, before 12 graduate credit hours are completed but no later than the second semester.

The Committee on Studies of each graduate student who is in residence in the Biology Department must meet with the student once during each academic year. The format of this meeting is open, but it should provide an opportunity for the Committee to monitor the student’s progress, discuss course work, review recent research efforts, plan future research, etc. A brief (one paragraph) report of this meeting must be placed in the student’s file in the Graduate Program Coordinator’s Office by the student’s Major Advisor within one week of the meeting. This form, and others needed to document the fulfillment of departmental degree requirements, may be obtained from the Graduate Program Coordinator. The Graduate Coordinator will contact both the student and his/her advisor if a Committee on Studies Report has not been turned in by March of each academic year.

Students should take the initiative in prompting their Major Advisor to call this meeting, using it to present your most recent ideas to your Committee, discuss and plan your academic progress, or to obtain their guidance on the problems that seem most pressing to you.

All students must meet with their Major Advisor by Fall break to ensure they will be eligible for funding for the Spring. Students must submit a Committee on Studies Report. Anyone not complying with this policy may lose their funding for the semester.

You have the right to call for a review of the membership of your Committee at any time. You may call for such a review, or address any other grievance, to your Committee Chairperson (Major Advisor), the Department Chairperson, the Dean of Graduate Studies, or the Faculty Senate Committee on Graduate Programs and Standards. Refer to The UNM Student Handbook at http://pathfinder.unm.edu.

REGISTRATION

You should confer with your Major Advisor or one of the department’s Graduate Advisors before registering for each semester. This provides an opportunity to assess your academic progress, to change courses required on your degree program, if needed, and to maintain contact with your Advisor. Students who are in good academic standing and do not have any financial holds on their account will be able to register online using UNM’s Lobo Web system. To find the day registration begins, please go to the Office of the Registrar’s website (http://registrar.unm.edu/Registration/index.html). You should make every effort to register on time. A late-registration fee is assessed if you fail to register by the published deadlines. Generally, you may not register in graduate courses later than the end of the second week of a
regular semester, or the end of the first week of a summer session, without the approval of the instructor(s) and the Dean of Arts & Sciences.

If you hold an assistantship appointment, you must be registered for a minimum of six (6) credit hours by the first day of the semester (excluding summers). Other forms of financial aid, such as loans or scholarships, may have different enrollment requirements; please consult with the UNM Financial Aid Office for details. The Biology Department recommends that students register for a full load (12 credit hours) each semester. This may be done by adding hours of Biology 551 (Problems), 599 (Master’s Thesis), 651 (Advanced Field Biology), or 699 (Dissertation), as appropriate. Students holding an assistantship are required to supply the Biology Graduate office with a copy of their schedule of classes.
MASTER DEGREE

REQUIREMENTS FOR MASTER’S DEGREE

It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures, to the Department’s Graduate Program Coordinator. Do not submit forms directly to the Office of Graduate Studies (OGS).

To meet the formal requirements for the Master’s degree, you must:

1) Attend the New Graduate Student Seminar (Biol. 500). Attendance is mandatory;

2) Successfully complete the course work requirements for Plan I or II with a cumulative GPA of at least 3.0;

3) Successfully complete the graduate core curriculum requirement;

4) Successfully present at a Brown Bag seminar in the second or third semester;

5) Successfully complete the non-biological skill requirement (see p. 8);

6) Complete a Program of Studies to be approved by the Office of Graduate Studies no later than the semester prior to graduation (see p. 10);

7) Maintain continuous enrollment in at least one (1) credit hour of Thesis hours once these hours are started through graduation, (more information can be found on the OGS website under General Academic Regulations);

8) Submit a research proposal (Plan I only; see p. 10);

9) Pass the Master’s Examination and/or Master’s Exam for Thesis (see p. 12); and

10) Present and successfully defend a thesis acceptable to the Department and the Dean of Graduate Studies (Plan I only; see p. 12).

In either Plan I or Plan II, you and your Major Advisor may design a program of studies in which all work is done in the major department, in the major department and the minor department, or in the major department and one or more related departments.

The following provisions also must be observed:

1) Programs meeting the minimum requirements of Plan I or II do not automatically constitute a master’s program. Each program must be approved by the Department and the Dean of Graduate Studies;

2) After the Program of Studies has been filed, minor changes to course work being applied towards degree requirements may be made by memo with approval from your advisor; see the Graduate Program Coordinator for details. Significant changes, including changes between Plans I and II, will require a new Program of Studies form and new approvals;

3) All course work used to fulfill the degree requirements, including any non-degree or transfer work, must be completed within a seven-year period before the semester of graduation;

4) If you opt for a formal minor as part of your program, (a) you should consult with a member of the minor department in the planning of that program; (b) the Biology Department shall include a faculty member from the minor department on your Master’s Examination Committee, unless this right is waived by the Chairperson of the minor department; and (c) you must submit a Request for Transcribed Minor form to the Office of Graduate Studies for final approval. This form is
available from the Graduate Program Coordinator’s office. For further details, see the 2012–13 OGS forms page in graduation section; and

5) For rules on transfer credits, see the 2012–13 UNM Catalog.

Course Work Requirements

Plan I

- A minimum of 24 hours of biology-related course work (exclusive of Biol. 500 and thesis hours [Biol. 599]) with a minimum of 15 hours of graduate level Biology courses. The number of hours refers to semester hours in the combined major and minor (or related) fields.
- A minimum of six (6) hours of 500-level course work.
- A maximum of six (6) hours of Problems (Biol. 551) and five (5) hours of Field Biology (Biol. 651).
- Only 12 hours (exclusive of thesis hours) may be taken with a single professor.
- At least 50% of required course work must be completed after admission to the graduate program, unless further limited by the graduate program.
- Core Biology Course Work includes: Three courses selected from the Graduate Curriculum. Three UNM Biology Department courses of 400 or 500 level (excluding 402/502, 500, 551, 599 or 651). Two courses have to be 500, however all three courses may be at the 500 level.
- A minimum of six (6) Thesis hours (Biol. 599). Students must be continually enrolled in at least one credit hour of Thesis once they begin Thesis hours.
- Completion of a master’s thesis.
- A maximum of nine (9) hours of course work done in non-degree at UNM may be included in the Master’s degree.
- Course selection must be made with the approval of the student’s Committee on Studies. Students with interests in ecology and evolution are strongly encouraged to take Biology courses 516 and 517.

Plan II

- A minimum of 32 hours of biology-related course work (exclusive of Biol. 500) with a minimum of 18 hours in the major field and 12 hours in the minor, if a minor is declared. The number of hours refers to semester hours in the combined major and minor (or related) fields.
- A minimum of 12 hours of 500-level courses.
- A maximum of 12 hours of Problems (Biol. 551) and a maximum of eight (8) hours of Field Biology (Biol. 651).
- Only 12 hours may be taken with a single professor.
- At least 50% of required course work must be completed after admission to the graduate program, unless further limited by the graduate program (16 credit hours UNM).
- Core Biology Course work to include: Three courses selected from the Graduate Curriculum.
- A maximum of nine (9) hours of course work done in non-degree at UNM may be included in the Master’s degree.
- Course selection must be made with the approval of the student’s Committee on Studies. Students with interests in ecology and evolution are strongly encouraged to take Biology courses 516 and 517.

Core Curriculum Requirements

- Master’s students are expected to complete the graduate curriculum course requirement within their first year in the program: three UNM Biology Department courses at the 400 or 500 level (excluding 402/502, 500, 551, 599 or 651). Two courses have to be at the 500 level, and only one may be at the 400 level.
This requirement will be tracked by a Graduate Curriculum Form signed by the student’s Committee on Studies members listing the courses to be taken, and signed by the Major Advisor when the courses are completed. The completed and approved form is included in the student’s file in the Graduate Program Coordinator’s Office.

**Brown Bag Presentation**

Brown Bag noon presentations are open to the public and are an opportunity support one another. One of the requirements to complete your Plan I degree is to present at one of the Department’s Brown Bag seminars. Students should do this by the end of their third semester, in preparation to their final oral exam. Students may discuss their topic to present with their Committee on Studies. All students must register for Biology 502 the semester they plan on presenting. Students must contact the 502 instructor or student coordinator to schedule a presentation time. Students must complete and submit the Brown Bag form. Please note: Plan II students are not required to present at the Brown Bag seminar.

**Non-biological Skills Requirement (Tool Skills)**

Pursuing an advanced degree requires not only training in a specific discipline, but also the development of some skills in related areas that will supplement this training, broaden an individual’s exposure to other disciplines, and provide some tools that may be quite useful in later professional work. Accordingly, the Office of Graduate Studies and the Biology Department require all degree candidates to demonstrate proficiency in one (M.S. Plans I and II) or two (Ph.D.) non-biological skills. Except for foreign languages, this requirement may be satisfied by completing six semester credits per skill area with a grade of B or better. Courses taken to meet this requirement may be applied toward the total number of semester hours needed for a graduate degree or contained in the program of study. You also may satisfy the skill requirement in an area by demonstrating competency in the skill to the satisfaction of your Committee on Studies and the Biology Graduate Policy Committee. Any method of fulfilling the requirement that is not verifiable as university course work must be documented by a memo (from the Chairperson of the Committee on Studies, or the faculty member/agency administering the exam) describing the nature of the work done and the results. This memo should be attached to the Tool Skills form for review by the Office of Graduate Studies. Acceptance of a student’s skills is the responsibility of the Committee on Studies or (for an M.S. Plan II) the Major Advisor, and is subject to approval by the Graduate Policy Committee and the Department Chairperson.

The tool skills requirement may be met by:

1) one foreign language and one other non-biological skill;
2) two non-language, non-biological skills; or
3) two foreign languages.

The language skill(s) may be met by:

1) completion of two years of a foreign language with an average grade of B or better as an undergraduate or as a graduate student (e.g., Spanish 101-102 and 201-202);
2) completion of a second year of a foreign language with a grade of B or better as a graduate student (e.g., Spanish 201-202 or Conversational Spanish 203, if offered), provided that the student has taken one year of a foreign language as an undergraduate (e.g., Spanish 101-102);
3) passing the national standard language exam; or
4) a translation of a paper, with passing to be determined by an appropriate professor in the Foreign Language Department or other acceptable person fluent in the language chosen.

The above criteria also apply to students using a foreign language as a non-biological skill for the M.S. International students should demonstrate a proficiency in English, not in their native language.
Listed below are some examples of courses that may be used to fulfill the non-biological skill requirement in other areas. The list is not exhaustive, but does include courses that have received favorable reports from previously enrolled graduate students.

1) Statistics
   - Math 312 Partial Differential Equations for Engineering (3)
   - Math 313 Complex Variables for Engineering (3)
   - Math 314 Linear Algebra with Applications (3)
   - Math 316 Applied Ordinary Differential Equations (3)
   - Stat 345 Elements of Mathematical Statistics and Probability Theory (3)
   - Stat 427/527 Advanced Data Analysis I (3)
   - Stat 428/528 Advanced Data Analysis II (3)
   - Math 441 Probability (3)
   - Stat 445/545 Analysis of Variance and Experimental Design (3)
   - Stat 547 Multivariate Analysis and Advanced Linear Models (3)
   - Stat 481/581 Introduction to Time Series Analysis (3)
   - Stat 440/540 Regression Analysis (3)

2) Computer Science
   - CS 151 Computer Programming (3)
   - CS 341L Introduction to Computing Systems (3)
   - Math 375 Introduction to Numerical Computing (2)
   - CS 433 Computer Graphics (3)
   - Geog 386 Remote Sensing Systems (3)
   - Geog 484/584 Applied Remote Sensing (3)

3) Chemistry / Earth & Planetary Sciences
   - Biom 448L Biochemical Methods (3)
   - EPS 415/515 Geochemistry of Natural Waters (3)
   - EPS 439 Paleoclimatology (3)
   - EPS 462/562 Hydrogeology (3)
   - EPS 481/581 Geomorphology and Surficial Geology (4)
   - EPS 488L Scanning Electron Microscopy (3)
   - EPS 503 Organic Geochemistry (3)
   - EPS 405L/505L Stable Isotope Geochemistry (3)

4) Biomedical Instrumentation
   - Biol 446/546 Laboratory Methods in Molecular Biology (4)
   - Biol 547 Advanced Techniques in Light Microscopy (4)

You must obtain permission in advance from your Committee on Studies and from the Biology Graduate Policy Committee for all non-biological skills requirements. You should select your non-biological skill areas and make arrangements to satisfy the requirements early in your program of study as the courses may be offered infrequently and because the skill may (in fact, should) be useful in your thesis or dissertation research. It is also possible, with the approval of the Dean of Graduate Studies, to transfer graduate level courses (or undergraduate, in the case of a language) taken at other institutions to use in fulfilling this requirement.

Once your non-biological skills requirement has been completed, submit a completed Tool Skills form, signed by your major professor, to the Graduate Program Coordinator’s office for further processing.
Research Proposal

Each student registered for graduate studies leading to a research-based degree in the Biology Department must submit a formal research proposal. This proposal should provide relevant literature background for the research that you intend to pursue for the degree and should include a full description of the objectives of the study, the methods of data collection and analysis, and the anticipated results. A short proposal adhering to the NSF Doctoral Dissertation Research Grants will suffice. The proposal should be discussed initially with your Major Advisor and Committee on Studies, revised as appropriate, submitted to the Program Graduate Coordinator for submission to the Biology Graduate Policy Committee for final review and approval along with an Approval of Research Proposal form, available from the Graduate Program Coordinator. A copy of the research proposal will be placed in your departmental file.

Students registered in a Master’s degree program must submit this proposal no later than the end of their second semester in the graduate program.

The proposal should have the same format as proposals by faculty members for support of their own research (see: “Grants for Research and Education in Science and Engineering,” NSF 92-89 Oct. 1992). A project summary (220-word maximum) of the proposed research, suitable for publication, is required. The main body of the proposal should not exceed eight single-spaced typewritten pages and should include: (1) description of the scientific significance of the work and the design of the project in sufficient detail to permit evaluation; (2) presentation and interpretation of progress to date if the research is already underway; (3) statement of the items for which funds are requested and their estimated costs, with an explanation of their necessity for the research; and (4) schedule for the research including the date funds will be required.

Program of Studies

A Program of Studies (POS) for the Master’s Degree should be filed with the Graduate Program Coordinator after you have completed 12 hours of graduate work and no later than the last day of classes of the semester before you expect to complete degree requirements. The POS is a listing of all courses to be counted towards the degree requirements by the Office of Graduate Studies (OGS). It is important to list only the courses you wish to be used in obtaining your degree.

This form may be obtained from the Office of Graduate Studies, the OGS website (http://ogs.unm.edu); the completed form is to be submitted to the Biology Graduate Program Office. The Program of Studies should be planned in consultation with your Major Advisor and/or Committee on Studies. Please meet with the Graduate Program Coordinator to confirm all requirements are met. The Graduate Program Coordinator will obtain the necessary signature from the Department Chairperson before submitting to the Dean of Graduate Studies. Approval of this form will be given only after: (1) all undergraduate pre-requisites have been satisfied; (2) at least 12 hours of graduate credit have been completed with a B average or better; and (3) the departmental non-biological skill requirement has been met or has been decided on and approved.

Notification of Intent to Graduate

You need to officially inform the Biology Department of your intention to complete all degree requirements by completing the departmental Intent to Graduate form (obtained from the Graduate Program Coordinator’s office) and submitting the form to the Biology Department (with your advisor’s signature) no later the second Friday in July for Fall semester, second Friday in November for Spring semester, second Friday in April for Summer semester. Degrees are awarded three times during the year; however, Biology Department Commencement exercises are held only in May; everyone who completed their degree requirements during the year is invited to participate.
Thesis Guidelines

Each candidate for the Master’s degree under Plan I must submit a thesis that gives evidence of capacity for sound research. The thesis must be approved by your Committee of at least three faculty members. The Thesis Director will serve as Chairperson of this Committee and assume the major responsibility for guiding the student’s work.

The University of New Mexico is requiring all theses and dissertations to be submitted electronically for Office of Graduate Studies approval and archiving at LoboVault, the UNM Library’s online institutional repository. Be sure to carefully follow the thesis format guidelines available on the Office of Graduate Studies website at: http://ogs.unm.edu/degree-completion/thesis-dissertations/guidelines.html. The Biology Department strongly encourages students to attend an OGS Thesis/Dissertation workshop, which is offered throughout the academic year.

If you are following Plan I, you must complete a minimum of six (6) hours of Thesis (599) credit. Once you have begun thesis hours, you must continue to register for a minimum of one (1) hour of Biol. 599 during each regular semester (exclusive of summers, unless you plan on graduating during that session) until the thesis is approved by the Dean of Graduate Studies. This rule applies whether or not you are enrolled for anything else. A thesis from a student who is not enrolled for the current semester will not be accepted.

There are two acceptable, alternative formats for the thesis: the traditional and the manuscript-based. The latter is often referred to in the Department as a “hybrid” thesis. Students may opt to use either style. However, approval of which style is used will be obtained from the committee chair and the members of the committee prior to preparing the thesis or dissertation.

For either style, the rules and regulations established by the Office of Graduate Studies (OGS) regarding format (front matter, text, reference matter, paper dimensions, margins, etc.) must be adhered to. The OGS guidelines are available at the forms web page in manuscripts section http://ogs.unm.edu/degree-completion/thesis-dissertations/guidelines.html.

**Traditional Thesis**

The traditional thesis is a single manuscript, authored solely by the student, presenting original research performed by the student. The text section is typically subdivided into: Introduction, Materials and Methods, Results, Discussion, References, and Appendices (optional).

**Manuscript-based Thesis**

A manuscript-based thesis is a collection of manuscripts or articles formatted for publication and presented as separate chapters of a single thesis. This style must satisfy the following guidelines:

1) The articles or manuscripts must report original research that is primarily the student’s or to which the student contributed significantly. The student must be the first author on at least one of the manuscripts in their thesis. The inclusion of a particular manuscript in the thesis will be with the approval of the student’s advisor and the members of the examination committee;

2) The manuscripts must be articles published in a peer-reviewed national or international journal and/or manuscripts prepared for publication in a peer-reviewed national or international journal. This guideline allows for a single thesis to consist of a mixture of published and unpublished material;

3) The chapters may be in the format style for the journal to which they are intended. However, the student’s advisor and the members of the examination committee have the option to require reformatting of chapters to a single uniform style;

4) The names of all co-authors on multi-authored manuscripts will be included. If one or more of the manuscripts are already published at the time the thesis is submitted, the article’s citation will be provided at the beginning of each chapter.
5) Students should consult OGS regulations regarding issues related to copyright. Students are responsible for obtaining permission to use a published, copyrighted manuscript in their thesis from the journal in which the paper is published. Students are advised to consult the policies of the journal regarding release of copyright for use in theses. Many journals openly state in their policies and guides to authors that published manuscripts may be used for thesis without obtaining additional permission.

6) The completed thesis will contain:

   (a) An abstract that collectively summarizes the individual manuscripts or chapters;

   (b) A general introduction that lists the individual manuscripts and describes how each chapter or manuscript related to a general theme of the thesis is recommended. The student should seek the advice of their faculty mentor and members of their thesis defense committee on the content of the introduction;

   (c) The articles or manuscripts as separate chapters;

   (d) A conclusion or summary that provides an overview of the collective findings reported in the separate chapters is recommended at the discretion of the committee; and

   (e) An optional appendix containing any additional material that will not be submitted for publication may be included or a literature review section, as appropriate.

**Master's Examination**

The Master’s Examination and/or Master’s Exam for Thesis must be passed by all candidates for the Master’s degree. The examination, drawn from the major and minor or related fields as appropriate, may be written, oral, or both, at the option of the Committee on Studies; it is conducted by your Committee. The master’s exam may be taken only after the Program of Studies has been approved by OGS. The student must be in good standing and enrolled in at least one credit of Biol. 599.

The examination for the Master’s degree will be conducted by a committee of three members approved for graduate instruction, at least two of whom must hold regular, full-time faculty appointments at UNM. The chair of the examination must be a Biology faculty member. **At least two weeks prior to the date of the Master’s Examination and/or Master’s Exam for Thesis, the student must notify the Biology Department and the Office of Graduate Studies of the date, time and place of the examination by completing an “Announcement of Examination” form.** This form is available from the Department’s Graduate Program Coordinator or on the OGS forms website and must be submitted to the Department no later than November 1 (Fall), April 1 (Spring), or July 1 (Summer). Once this form is approved by the Office of Graduate Studies, it will be returned to you, and you must give it to the chairperson of your committee. Results of the examination are reported on the reverse side of the form by your committee and returned to the Graduate Program Coordinator.

You must be notified of the results of the examination no later than two weeks from the date of examination. If your Committee anticipates being unable to meet this deadline, it must give you written notice to this effect prior to this examination; in this event, you must be notified of the results of the examination no later than three weeks from the date of the examination. The results of examinations taken between semesters or during the summer must be given no later than two weeks after the first day of classes of the next regular semester. Results of the examination shall be provided to the Office of Graduate Studies by November 15 (Fall), April 15 (Spring), or July 15 (Summer). If a candidate fails the examination, a six-month interval should elapse before a second examination is given. A candidate may take this examination only twice. Failure to pass the second time will result in the student’s termination from the graduate program.
Final Submission of Thesis

Your thesis, in perfect form and approved by your Committee, shall be submitted electronically for the approval of the Dean of Graduate Studies by **November 15, April 15, or July 15 for Fall, Spring or Summer graduation, respectively.**

Along with your thesis, you must also submit the **Certification of Final Form**, approved by your committee chair, and your committee members’ evaluations of your work as reported on the **Report on Thesis** (“gray sheets”). See the Graduate Program Coordinator for help with submitting these forms. In addition, a copy of your thesis shall be given to the Biology Department for its collection. This may be delivered on a Compact Disc or in printed format.

90-Day Rule

A master’s student must submit his/her thesis to the Dean of Graduate Studies within ninety (90) days of his/her final examination for the thesis. If the manuscript is not submitted within that time, the student must schedule and complete a second final examination for the thesis. In all cases the results of the thesis defense must be submitted to OGS no later than two weeks after the announced date of the thesis defense.

Courtesy Policy

University regulations require that the student be enrolled and complete a minimum of one (1) hour of graduate credit for Master students and three (3) hours for PhD students in the term they complete degree requirements. Should the student miss the graduation deadline (July 15 for summer graduation, November 15 for fall graduation, April 15 for spring graduation), but complete all degree requirements on or before the last day of that term, the student is not required to register for the next term. See the Graduate Program Coordinator for more details about taking advantage of this “courtesy policy.”

**SUGGESTED SCHEDULE FOR COMPLETING A M.S. IN BIOLOGY**

*It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures, to the Department’s Graduate Program Coordinator. Do not submit forms directly to the Office of Graduate Studies.*

**Year 1**

- Meet with Major Advisor; set up Committee on Studies. This Committee MUST meet with the student **AT LEAST ONCE A YEAR.** (submit a **Committee on Studies Form** naming your committee members. A **Committee on Studies Report** must be submitted each year [including the first time the committee meets])
- Fulfill the graduate course curriculum requirement. (submit a **Graduate Core Curriculum Form**).
- Submit Research Proposal; start research. For Plan I students only. (submit **Research Proposal Approval Form** with approved research proposal attached)
- Complete non-biological skill. For Plan I and Plan II students, this requirement may be filled by six (6) or more credits of either a language or statistics/math/biometry, etc. as agreed upon by the Committee on Studies members. The credits you use for the Tool Skill may be transferred from another institution. (submit a **Tool Skills Form**)
- Submit the Program of Studies with the Biology Department and the Office of Graduate Studies, after completing 12 hours of graduate course work. For Plan I and Plan II students. (**The Program of Studies Form** lists all course work to be counted toward the degree.)
- Register for Biology 502: Brown Bag and contact instructor to schedule a time. Submit **Brown Bag** form once completed.

**Year 2**

- Write thesis. (Plan I students only.)
• Notify the Department of your intent to graduate. Complete the **Intent to Graduate Form** (obtained from and returned to the Biology Department’s Graduate Program Coordinator’s office).

• Take Master’s Examination (Plan II students) or Master’s Exam for Thesis (Plan I students). (submit the **Exam Announcement Form**)

• Submit thesis by the published deadline. (Plan I students only: **Certification of Final Form, Report on Thesis**)

• The department requires all their graduating students to complete a survey. This survey is provided with the Report of Exam form and gray sheets. This paper survey is returned to the Program Coordinators office.

• If you decide, with the approval of your Committee of Studies, to change from Plan I to Plan II, or vice versa, and you have already had your Program of Studies approved by the Dean of Graduate Studies, you need to submit an entire new Program of Studies to your Major Advisor, the Department Chair, the department’s Graduate Program Coordinator, and the Dean of Graduate Studies for approval.

### Important Dates

1) Notify the Office of Graduate Studies of date, time and place of Master’s Exam (using the **Exam Announcement Form**) at least two (2) weeks prior to exam.

2) Master’s Exam results should be submitted to the Office of Graduate Studies no later than **November 15 (Fall), April 15 (Spring), or July 15 (Summer)**.

3) Submit the approved thesis (Plan I students) to the Office of Graduate Studies, using the online submission guidelines, no later than 90 days after successful completion of your defense, and also no later than **November 15 (Fall), April 15 (Spring), or July 15 (Summer)**. Submit one copy of the thesis to the Biology Department for its collection.

All of the forms mentioned above require a variety of departmental and non-departmental signatures. Please complete all the forms required, obtain all necessary committee members signatures and submit the forms to the Graduate Program Coordinator for further processing.

### Master’s Checklist

**It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures to the Biology Graduate Coordinator’s Office. This checklist should serve as an aid.** All forms are available from the Biology website, the BGSA website or the Graduate Coordinator office.

Students must meet with the Committee on Studies (COS) at least once during each academic year. Students are responsible for scheduling these meetings. Students with funding must submit the COS report prior to Fall break to receive Spring semester funding. Graduate students must complete a “Committee on Studies Report” after each meeting and submit to the Graduate Coordinator. Additionally the advisor will have to sign the Assistantship request form.

<table>
<thead>
<tr>
<th>FORM</th>
<th>WHEN TO SUBMIT</th>
<th>SIGNATURES REQUIRED FROM STUDENT</th>
<th>WHERE TO SUBMIT</th>
<th>DATE SUBMITTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Committee on Studies</td>
<td>As soon as the committee has been created</td>
<td>Committee member and Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Committee on Studies Report</td>
<td>Each year until Final Exam has been passed</td>
<td>Student and Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
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<tr>
<td>Program of Studies</td>
<td>After completion of 12 hours of graduate work (tool skill must be completed); file no later than the semester before planning to graduate.</td>
<td>Major Advisor</td>
<td>Graduate Coordinator</td>
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<tr>
<td><strong>Research Proposal Approval (with proposal attached)</strong></td>
<td>End of second semester</td>
<td>Committee on Studies</td>
<td>Graduate Coordinator</td>
<td></td>
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<tr>
<td><strong>Graduate Curriculum Form</strong></td>
<td>End of the third semester</td>
<td>Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
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<tr>
<td><strong>Tool Skill</strong></td>
<td>Prior to and upon completion of skill</td>
<td>Committee on Studies</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td><strong>Brown Bag</strong></td>
<td>Once during tenure in preparation to your defense or oral exam for Plan I students only</td>
<td>Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
</tbody>
</table>
| **Notification of Intention to Graduate** | Spring: November 15th  
Summer: April 15th  
Fall: July 15th | Committee Chair and members | Graduate Coordinator |
| **Announcement of Exam** | At least two weeks prior to exam date; thesis must be submitted within 90 days of the defense or OGS deadline  
OGS Thesis deadlines:  
Fall: Nov. 15  
Spring: April 1  
Summer: July 15 | Committee Chair and members | Graduate Coordinator |
| **Report on Examination** (see the reserve side of the Announcement of Exam) | After exam | Each member of Committee on Studies | Graduate Coordinator |
| **Report on Thesis** (”gray sheets”) | After exam | One copy to each member of Committee on Studies | Graduate Coordinator |
| **Certification of Final Form of Thesis** | After final approval of thesis (submit with required copies of thesis) | Major Advisor | Office of Graduate Studies |
| **Thesis** | Once approved by committee  
This must be uploaded per OGS policy.  
Students should attend the Thesis/Dissertation Workshop the semester before finishing | none | OGS, Graduate Coordinator; each Committee member |

** Requirements not required for students on Plan II.

OGS’ Master Plan I or Plan II Snapshot

Review the Master’s Snapshot. All of the forms below can be found on the OGS website: [http://ogs.unm.edu](http://ogs.unm.edu) at OGS Forms. Students approaching the end of their master’s program must complete and submit by the appropriate deadlines the following forms in order to graduate:

_____ **Program of Studies (POS) form for the Master’s Degree**—Please submit to OGS by the following deadlines: March 1 for Summer term, July 1 for Fall term, and October 1 for Spring term. Turning this form in late will delay your graduation. OGS must approve the POS before you can take the master’s examination.

_____ **Proposed Graduation List form (submitted by the graduate unit)**—You must notify your department graduate staff advisor before the last day of the term prior to the term in which you intend to graduate or by the department internal deadline for notification to graduate, whichever comes first.

_____ **Announcement of Examination form**—Please submit this to OGS at least two weeks before your thesis defense or master’s examination is scheduled. In all cases, you must submit the results of the thesis defense or exam to OGS no later than two weeks after the announced date of the defense/examination.
The Report of Examination (Results) form—This form is due in OGS by the graduation deadline (see deadline dates below). Usually your advisor/committee chair or the department graduate staff handles this paperwork. Check with your advisor/committee chair if you have questions about these forms.

For Master Plan I–Thesis Defense—One Report on Thesis or Dissertation form (formerly known as the “Gray Sheet”) from each of your committee members is due in OGS by the graduation deadline.

Submitting the Thesis:

The University of New Mexico encourages open access to all theses and dissertations produced for graduate degrees. Therefore, all theses and dissertations are submitted electronically in PDF format to the Office of Graduate Studies. These electronically submitted theses and dissertations (ETDs) are uploaded on a server housed in a UNM repository (LoboVault), where they are accessible for search and download through web search engines such as Google. In most cases, students submitting ETDs benefit from having their work available in the open access repository. In some special cases, however, students may want to delay making their work available for varying lengths of time. For this reason, UNM has implemented an embargo policy that enables students, with approval from their advisers and OGS, to delay public-wide access to their work in the LoboVault repository. While under embargo, the manuscript nonetheless remains available to the University of New Mexico academic community in order to satisfy requirements for the degree. Before submitting your thesis or dissertation, please consult with your committee chair and review the embargo restriction policy at the OGS website → OGS Forms → Manuscript Block to determine whether or not you should release your work to open access or petition for an appropriate embargo option.

You must register at UNM–LoboVault digital repository (https://repository.unm.edu/). Before you can register online, you must notify the OGS Manuscript Coordinator of your registration, because the OGS Coordinator must identify you as a user of the ETD collection at LoboVault repository to authorize the transaction. Note: No Binding Fee is required for Electronic submission to LoboVault repository.

IMPORTANT: All Plan I Master’s students must submit their thesis to OGS within (90) ninety days of their final thesis defense or by the specific graduation term degree requirement deadline, whichever comes first. You will find Thesis/Dissertation formatting guidelines at http://ogs.unm.edu/degree-completion/thesis-dissertations/guidelines.html.

Please submit your thesis electronically when all revisions are complete and approved by the committee. You must submit the thesis electronically ONLY at the LoboVault digital repository–UNM (see above). To register at the LoboVault repository: http://repository.unm.edu/. Front Matter Templates (Red Border pages/Examples of Completed Front Matter): http://www.unm.edu/grad/manuscripts/manutemp.html.

You must submit all manuscript forms listed below to the Office of Graduate Studies to the Manuscript Coordinator, either by a student appointment or by an email attachment, which can be found at the OGS Forms page under Manuscript http://ogs.unm.edu/resources/ogs-forms/index.html).

_____ Information Cover Sheet form—This form requires no signatures. Please submit this form to the Office of Graduate Studies.

_____ Certification of Final form (CFF)—This form requires signatures from you and your thesis committee chair. The CFF is the approval page with original signatures. The committee chair must sign this form. Please submit this form to the Office of Graduate Studies before you electronically submit your thesis.

_____ Printed (hardcopy) Red Border Signature page with original committee chair/all committee member signatures (IMPORTANT)—The Red Border signature page must be scanned to the electronic PDF file as the first page of the Front Matter (roman numeral pagination p. i) per the manuscript guidelines at the OGS website. You should submit the Red Border Signature page(s) to your committee members before or at the time of the thesis defense in order to have ample time to incorporate
these forms into the final electronic file for submitting it to the LoboVault repository. Please submit this form to the Office of Graduate Studies before you electronically submit your thesis.

_____Printed (hardcopy) Red Border Title Page—This document must be turned in with the others. Please submit this form to the Office of Graduate Studies before you electronically submit your thesis.

_____ETD Release form—As the author of the thesis, you (not your thesis advisor or committee chair) must sign this form. Please submit this form to the Office of Graduate Studies before you electronically submit your thesis.

ProQuest UMI Master’s Microfilm Registration is NOT required (Optional). If you choose to use ProQuest/UMI registration, you must follow the online procedure to complete the UMI Master’s Thesis Agreement online, pay electronically by credit/debit card, and lastly, complete the electronic thesis submission procedure at the University of New Mexico UMI ETD Administrator website: www.etdadmin.com. The ProQuest/UMI electronic thesis submission is NOT the same as the LoboVault electronic thesis submission.

DEADLINES: In order to graduate in a particular term, you must complete all your degree requirements, complete your thesis defense or master’s examination, make all necessary revisions to your manuscript (if applicable) and have it accepted by OGS by the following dates:

Spring Graduation — April 15  Summer Graduation — July 15  Fall Graduation — November 15

Please note: The deadlines above are posted OGS deadlines. To meet these and all OGS deadlines, the Biology Department requires two weeks of preparation time. Please submit paperwork at least two weeks in advance of the posted dates.

NOTE: If any of the deadlines that appear on this sheet occur on a weekend or a holiday for which UNM is closed, the deadline will be moved to the next business day.
DOCTORAL DEGREE

REQUIREMENTS FOR THE BIOLOGY DOCTORAL DEGREE

It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures, to the Department’s Graduate Program Coordinator. Do not submit forms directly to the Office of Graduate Studies.

To meet the formal requirements for the Ph.D. degree, you must:

1) Attend the New Graduate Student Seminar (Orientation). Attendance is mandatory;
2) Successfully complete the course work requirements;
3) Successfully complete the graduate core curriculum requirement;
4) Successfully complete the non-biological skill requirement;
5) Successfully complete the Ph.D. teaching requirement;
6) Pass the Ph.D. comprehensive examination;
7) Apply for and be admitted to doctoral candidacy;
8) Submit a research proposal;
9) Present and successfully defend a dissertation acceptable to the Department and the Dean of Graduate Studies (see p. 25) within five (5) years of passing the comprehensive exam.

The Doctorate is a degree representing broad scholarly achievement, a deep grasp of a field of study, and expertise in conceiving, conducting and reporting independent, individual research. As such, its attainment is not simply a matter of “meeting requirements.” The requirements described below should be viewed only as a minimal formal context in which you are expected to grow in the professional stature represented by the doctoral degree.

Curriculum Requirements

1) A minimum of 48 hours of graduate credit course work plus an additional 18 credit hours of Biol. 699: dissertation must be completed. The requirements for the 48 graduate credit course work are shown below.

2) Graduate Core Curriculum: Four UNM Biology Department courses of 400 or 500 level (excluding 402/502, 500, 551, 599, 651 or 699) with at least two of the four courses at the 500 level, as discussed and agreed upon by your Major Advisor and Committee on Studies members. Each course must be taken from a different graduate faculty member. Students should consult with their major advisor or Committee on Studies for appropriate courses. These courses must be completed in the first four semesters and reported on the Graduate Core Curriculum form.

3) At least 24 hours of graduate credit course work must be completed at The University of New Mexico, of which at least 18 hours of graduate credit course work must be completed after admission to the doctoral program.

4) A minimum of 18 hours of graduate credit course work must be earned in The University of New Mexico courses numbered 500 or above.

5) No more than 50% of the required course credits at The University of New Mexico may be taken with a single faculty member. (Course work that has been completed for the master’s degree is included in this limit.)

6) A minimum of 18 hours of dissertation credits (Biol. 699) over and above the 48 credit hours for the degree requirement. (Once beginning Dissertation hours, a student must continue until graduation enrolling three [3] hours of Dissertation.)
7) The doctoral student must enroll continuously with a minimum of three (3) dissertation hours each semester until the dissertation is defended (excluding Summer unless defending in the Summer).

8) Must be enrolled the semester in which you complete degree requirements, including the summer session.

9) Course selection must be made with the approval of the student’s Committee on Studies. Students with interests in ecology and evolution are strongly encouraged to take Biology courses 516 and 517.

Core Curriculum Requirement

Ph.D. students are required to complete the graduate curriculum course requirement by the end of their third semester in the program. This requirement will be tracked by a Graduate Curriculum Form signed by the student’s Committee of Studies listing the courses to be taken, and signed by the Major Advisor when the courses are completed. The completed and approved form is then included in the student’s file in the Graduate Program Coordinator’s Office.

Brown Bag Presentation

One of the requirements to complete your degree is to present at two of the Department’s Brown Bag seminars. This presentation is to help prepare students for their oral exam and for their final defense. Students may choose the best semester to present their findings or to prepare for a conference presentation. It is suggested that students discuss their topic with their Committee on Studies. All students must register for Biol. 502 the semester they will be presenting. Students must contact the instructor to schedule a time to give the presentation. Upon completion, students must complete and submit the Brown Bag form.

Non-biological Skills Requirement (Tool Skills)

Pursuing an advanced degree requires not only training in a specific discipline, but also the development of some skills in related areas that will supplement this training, broaden an individual’s exposure to other disciplines, and provide some tools that may be quite useful in later professional work. Accordingly, the Office of Graduate Studies and the Biology Department require all degree candidates to demonstrate proficiency in one (M.S. Plans I and II) or two (Ph.D.) non-biological skills. Except for foreign languages, this requirement may be satisfied by completing six (6) semester credits per skill area with a grade of B or better. Courses taken to meet this requirement may be applied toward the total number of semester hours needed for a graduate degree or contained in the program of study. You also may satisfy the skill requirement in an area by demonstrating competency in the skill to the satisfaction of your Committee on Studies and the Biology Graduate Policy Committee. Any method of fulfilling the requirement that is not verifiable as university course work must be documented by a memo (from the Chairperson of the Committee on Studies, or the faculty member/agency administering the exam) describing the nature of the work done and the results. This memo should be attached to the Tool Skills form (available in the Department Office) for review at the Office of Graduate Studies.

Acceptance of a student’s skills is the responsibility of the Committee on Studies (or for an M.S. Plan II, the Major Advisor), and is subject to approval by the Graduate Policy Committee and the Department Chairperson.

The tool skills requirement may be met by:

1) one foreign language and one other non-biological skill;
2) two non-language, non-biological skills; or
3) two foreign languages.

The language skill(s) may be met by:

1) completion of two years of a foreign language with an average grade of B or better as an undergraduate or as a graduate student (e.g., Spanish 101-102 and 201-202);
2) completion of a second year of a foreign language with a grade of B or better as a graduate student (e.g., Spanish 201-202 or Conversational Spanish 203, if offered), provided that the student has taken one (1) year of a foreign language as an undergraduate (e.g., Spanish 101-102);

3) passing the national standard language exam; or

4) a translation of a paper, with passing to be determined by an appropriate professor in the Foreign Language Department or other acceptable person fluent in the language chosen.

The above criteria also apply to students using a foreign language as a non-biological skill for the Master’s. International students should demonstrate a proficiency in English, not in their native language.

Listed below are some examples of courses that may be used to fulfill the non-biological skill requirement in other areas. The list is not exhaustive, but does include courses that have received favorable reports from previously enrolled graduate students.

1) Statistics
   Math 312 Partial Differential Equations for Engineering (3)
   Math 313 Complex Variables for Engineering (3)
   Math 314 Linear Algebra with Applications (3)
   Math 316 Applied Ordinary Differential Equations (3)
   Stat 345 Elements of Mathematical Statistics and Probability Theory (3)
   Stat 427/527 Advanced Data Analysis I (3)
   Stat 428/528 Advanced Data Analysis II (3)
   Math 441 Probability (3)
   Stat 445/545 Analysis of Variance and Experimental Design (3)
   Stat 547 Multivariate Analysis and Advanced Linear Models (3)
   Stat 481/581 Introduction to Time Series Analysis (3)
   Stat 440/540 Regression Analysis (3)

2) Computer Science
   CS 151 Computer Programming fundamentals for Non-Majors (3)
   CS 341L Introduction to Computing Systems (3)
   Math 375 Introduction to Numerical Computing (2)
   Geog 484/584 Applied Remote Sensing (3)

3) Chemistry / Earth & Planetary Sciences
   Biom 448L Biochemical Methods (3)
   EPS 415/515 Geochemistry of Natural Waters (3)
   EPS 439 Paleoclimatology (3)
   EPS 462/562 Hydrogeology (3)
   EPS 481/581 Geomorphology and Surficial Geology (4)
   EPS 488L Scanning Electron Microscopy (3)
   EPS 503 Organic Geochemistry (3)
   EPS 405L/505L Stable Isotope Geochemistry (3)

4) Biomedical Instrumentation
   Biol 446/546 Laboratory Methods in Molecular Biology (4)
   Biol 547 Advanced Techniques in Light Microscopy (4)

_Students must obtain permission in advance from your Committee on Studies and from the Biology Graduate Policy Committee for all non-biological skills requirements._ You should select your non-biological skill areas and make arrangements to satisfy the requirements early in your program of study as the courses may be offered only infrequently and because the skill may (in fact, should) be useful in your thesis or dissertation research. It is also possible, with the approval of the Dean of Graduate Studies, to
transfer graduate level courses (or undergraduate, in the case of a language) taken at other institutions to use in fulfilling this requirement.

Once your non-biological skills requirement has been completed, submit a completed Tool Skills form, signed by your major professor, to the Graduate Program Coordinator’s office for further processing.

**Doctoral Comprehensive Examination**

The Doctoral student must pass written and oral comprehensive examinations in the major field of study. The examinations are not limited to the areas of your course work, but will test your grasp of the field as a whole. You must be in good academic standing to take these examinations. The comprehensive examination should be taken in the fourth or fifth semester of your academic career; and, it must be prior to your Application for Candidacy. At least two weeks prior to the planned examinations, you must notify the Dean of Graduate Studies of the date, time and place of the examinations (by using the Announcement of Examination form available in the Biology Department Graduate Office).

You must be notified of the results of the examinations no later than two weeks from the date of the examinations. If your committee anticipates having difficulty in meeting this deadline, you must be given written notice to this effect prior to the examinations; in this event, you must be notified of the results of the examinations no later than three weeks after the first day of classes of the next regular semester.

Results of the examinations shall be reported to the Dean of Graduate Studies on the form provided. The student will receive the following: distinction, pass, conditional pass, and fail. The Committee on Studies confers on the level of award, privately, at the time of the exam. Pass and Conditional Pass are the two frequently used evaluations.

- **Distinction** is awarded when the students’ knowledge and exam results are above expectations.
- **Pass** is given when the students’ knowledge base and evaluation results meet expectations.
- **Conditional Pass** is given when the student missed minor key points/questions during the exam or the student needs additional knowledge before proceeding with their dissertation. The conditions of the committee must be completed by the student by the end of the following semester. Therefore, if the student takes their exam in the Fall, they must complete the requirements by the end of the Spring semester. The committee chair must write a memo to OGS stating that the student has completed the conditions.
- **Failure** is awarded when the student requires substantial knowledge before continuing with their dissertation. If a student fails the examination, the Committee on Studies shall make an appropriate recommendation to the Dean of Graduate Studies regarding a possible reexamination (which must be administered within one year from the date of the last exam). Failure to pass the second time will result in the student’s termination from the graduate program.

**Ph.D. Teaching Requirement**

The Biology Department faculty approved the policy below in Fall 2009. Students may teach in a lecture under the guidance of the instructor or may T.A. for one or more semesters. One semester of teaching experience in the Biology Department is required of all Ph.D. degree candidates.

**Teaching in a lecture.** Students must teach a minimum of six (6) lecture hours delivered in a formal course offered by the Biology Department. The student, in collaboration with the instructor, will select the appropriate block of lectures to satisfy this requirement. In addition to delivering the six (6) lectures, the student should be deeply involved in the course as a whole. This should include working with the instructor of the course to design the lectures in a way that fits smoothly into the overall course plan, attending other lectures in the course to obtain a feeling for the style of the course and the interests and level of training of the students, preparing the lecture independently, and participating in the examination of students regarding the material presented in these lectures. Normally, the course selected to fulfill this requirement should be in the student’s own disciplinary area. Undergraduate or graduate courses offered during the regular academic year or courses team-taught with a faculty member or with another graduate
student under faculty direction during a Summer Session are appropriate, so long as they are formal
courses involving regularly scheduled lectures.

The plan that you propose to follow for fulfilling the teaching requirement must be filed on a Ph.D. Teaching Requirement form (available from the department’s Graduate Program Coordinator’s office) and approved by the Biology Graduate Policy Committee prior to the semester in which the requirement is to be satisfied. At the conclusion of that semester, the instructor of the course must prepare an evaluation of your performance and your Major Advisor must file a statement certifying that the teaching requirement has been satisfied. These reports are returned to the Graduate Program Coordinator and become part of your permanent file. The teaching requirement must be fulfilled no later than the semester proceeding the semester in which the Final Examination is scheduled.

**Teaching Assistantship for a semester.** Students who have or will be a T.A. assignment for at least one (1) semester will satisfy the teaching requirement. At the beginning of the teaching assignment, the student will pick up and complete the Teaching requirement form from the Graduate Program Coordinator. Upon completion of the assignment the student will complete a second form obtaining the necessary signature from the TA supervisor.

**Research Proposal**

Each student registered for graduate studies leading to a research-based degree in the Biology Department must submit a formal research proposal. This proposal should provide relevant literature background for the research that you intend to pursue for the degree and should include a full description of the objectives of the study, the methods of data collection and analysis, and the anticipated results. For students in a Ph.D. program, the proposal should adhere to the guidelines for NSF Doctoral Dissertation Research Grants. The proposal should be discussed initially with your Major Advisor and Committee on Studies, revised as appropriate, submitted to the Program Graduate Coordinator for submission to the Biology Graduate Policy Committee for final review and approval along with an Approval of Research Proposal form, available from the Graduate Program Coordinator. A copy of the research proposal will be placed in your departmental file.

Students registered in a Ph.D. degree program must submit this proposal at the end of the third semester for students who entered with a Master’s degree, or the end of the fifth semester for students who initiated their Ph.D. studies with a Bachelor’s degree.

The proposal should have the same format as proposals by faculty members for support of their own research (see: “Grants for Research and Education in Science and Engineering,” NSF 92-89 Oct. 1992). A project summary (220-word maximum) of the proposed research, suitable for publication, is required. The main body of the proposal should not exceed eight single-spaced typewritten pages and should include: (1) description of the scientific significance of the work and the design of the project in sufficient detail to permit evaluation; (2) presentation and interpretation of progress to date if the research is already underway; (3) statement of the items for which funds are requested and their estimated costs, with an explanation of their necessity for the research; and (4) schedule for the research including the date funds will be required.

For Ph.D. students, the research proposal should be approved by the dissertation committee as soon as possible after passing the Comprehensive Exam, and at least one year before the anticipated completion of the research. The student’s actual research may deviate from the proposed research. The dissertation is judged, after the research has been completed and written up, on whether it meets the quality and quantity requirements rather than whether it exactly follows the research proposal.

**Ph.D. Dissertation Committee**

The Ph.D. dissertation is reviewed by a Dissertation Committee, which must include at least four members. Three members must hold tenure-track faculty positions. Of these three, two must hold tenure-track positions at The University of New Mexico. One of these four must be from the Biology Department. One committee member must be a tenure-track member of the UNM Graduate Faculty.

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outside the Biology Department or from another institution other than UNM, and must be qualified to review the dissertation. Dissertation committee members usually comprise of the Committee on Studies and UNM faculty outside Biology or from another institution. When the committee does not include someone outside of the University, it is advisable that an individual at another college or university be asked to serve as an outside reader of the dissertation. The outside committee member must be approved by OGS. Please see the Biology Graduate Program Coordinator for further instructions. This individual should be chosen on the basis of his or her competence in the research area of the dissertation, and should be invited to serve in this capacity at least six (6) months prior to the completion of the dissertation. Funds may be available to bring outside readers to the campus at the time of the final exam, if you and your Major Advisor consider it worthwhile. You must report the names of your Dissertation Committee members on an “Appointment of Dissertation Committee” form. This form must be submitted to the Graduate Program Coordinator no later than the first semester in which you are enrolled in dissertation hours (Biol. 699). After gaining departmental approval, the form will be submitted to the Office of Graduate Studies for final approval. All committee members must be present at dissertation defense or by teleconference if needed. A complete copy of the dissertation must be submitted to each member of your Dissertation Committee at least two (2) weeks before the final examination.

Advancing to Candidacy

The Doctoral student must apply for and be admitted to candidacy for the degree. The Application for Candidacy form (AC) is the vehicle that formally summarizes your program of studies.

The following requirements must be successfully met before an Application for Candidacy form is filed. Those requirements are as follows (in no order):

1) Approved Tool Skills form (Language Requirement can be part of the tool skill);
2) Required course work (four courses, all 400 level or above, at least two courses must be 500 level or above) submitted on Graduate Core Curriculum form;
3) Completion of the Comprehensive Examination; and
4) Appointment of Dissertation Committee form submitted and approved. Courses selected to satisfy this requirement will, of course, also count to satisfy the total number of credit hours accumulated for the degree.

Application for Candidacy forms are available on the Office of Graduate Studies website (http://ogs.unm.edu). The form must be approved by the Committee on Studies and returned to the Graduate Program Coordinator for further processing.

Five-year Limit

OGS policy states that “Doctoral candidates have five (5) calendar years from the semester in which they pass their doctoral comprehensive examination to complete the degree requirements. The final requirement is generally the acceptance of the student’s dissertation by the Dean of Graduate Studies.” The Biology Dissertation Committee and the Department Chair must first approve the dissertation before it may be forwarded to the Office of Graduate Studies. Generally, candidates who have interrupted their graduate education for professional work in their field will be granted an extension of the time limit, but a petition must be filed (see “Leave of Absence,” p. 30). Any request for an extension of the limit for this or other reasons must be originated by the student, supported by the Department, and addressed to the Dean of Graduate Studies.

Note that the period of the department’s obligation of financial support to Ph.D. students is the first five (5) years (10 semesters) of their period of graduate study. The department has agreed to extra support for students in their sixth year of the program. (See “Duration of Financial Support,” page 34 for more details.)
Ph.D. Dissertation

The program for the doctorate includes a minimum of 18 hours of Dissertation (Biol. 699) credit. You should consult with your Major Advisor concerning the time of the initial enrollment and the number of Biol. 699 hours to be carried each semester, 12 hours being the maximum. You may not be enrolled in 699 prior to the semester in which you take your comprehensive examination. If you fail to complete the comprehensive examination in the semester of the initial 699 registration, you will receive a “W” for 699 for that semester. If you begin Dissertation research prior to completion of the comprehensive exam, you should enroll in Biol. 551.

Once you start taking Dissertation hours, you must continue to register for 699 during each regular semester (exclusive of summers, unless you plan to graduate during that semester) until the dissertation is approved by the Dean of Graduate Studies. All students registering in Dissertation (699) must enroll for at least three (3) hours per semester. A student may register for up to 12 hours each regular semester. Consult with your Major Advisor about the number of hours you should enroll. The maximum in the Summer Session is nine (9) hours. The Dean of Graduate Studies will not accept a dissertation from a student who is not enrolled for the current semester.

All doctoral students are required to prepare a dissertation as part of the fulfillment of the degree requirements. There are two acceptable, alternative formats for the dissertation: the traditional and the manuscript-based. The latter is often referred to in the Department as a “hybrid” dissertation. Students may opt to use either style. However, approval of which style is used will be obtained from the committee chair and the members of the dissertation committee prior to preparing the thesis or dissertation.

For either style, the rules and regulations established by the Office of Graduate Studies (OGS) regarding format (Front matter, text, reference matter, paper dimensions, margins, etc.) must be adhered to. The OGS guidelines are available at the forms web page in the manuscripts section: http://ogs.unm.edu/degree-completion/thesis-dissertations/guidelines.html.

The University of New Mexico requires all theses and dissertations to be submitted electronically for Office of Graduate Studies approval and archiving at LoboVault, the UNM Library’s online institutional repository. Be sure to follow carefully the thesis format guidelines available on the Office of Graduate Studies website at: http://ogs.unm.edu/degree-completion/thesis-dissertations/guidelines.html. OGS also offers Thesis/Dissertation workshops throughout the academic year, which you are strongly encouraged to attend.

Traditional Dissertation

The traditional dissertation is a single manuscript, authored solely by the student, presenting original research performed by the student. The text section is typically subdivided into: Introduction, Materials and Methods, Results, Discussion, References, and Appendices (optional).

Manuscript-based Dissertation

A manuscript-based dissertation is a collection of manuscripts or articles formatted for publication and presented as separate chapters of a single thesis or dissertation. This style must satisfy the following guidelines:

1) the articles or manuscripts must report original research that is primarily the student’s or to which the student contributed significantly. The student must be the first author on at least one of the manuscripts in their dissertation. The inclusion of a particular manuscript in the dissertation will be with the approval of the student’s advisor and the members of the examination committee;

2) the manuscripts must be articles published in a peer-reviewed national or international journal and/or manuscripts prepared for publication in a peer-reviewed national or international journal. This guideline allows for a single dissertation to consist of a mixture of published and unpublished material;
3) the chapters may be in the format style for the journal for which they are intended. However, the student’s advisor and the members of the examination committee have the option to require re-formatting of chapters to a single uniform style;

4) the names of all co-authors on multi-authored manuscripts will be included. If one or more of the manuscripts are already published at the time the dissertation is submitted, the article’s citation will be provided at the beginning of each chapter.

5) Students should consult OGS regulations regarding issues related to copyright. Students are responsible for obtaining permission to use a published, copyrighted manuscript in their dissertation from the journal in which the paper is published. Students are advised to consult the policies of the journal regarding release of copyright for use in dissertations. Many journals openly state in their policies and guides to authors that published manuscripts may be used for dissertations without obtaining additional permission.

6) the completed dissertation will contain:
   (a) an abstract that collectively summarizes the individual manuscripts or chapters;
   (b) a general introduction that lists the individual manuscripts and describes how each chapter or manuscript relate to a general theme of the dissertation is recommended. The student should seek the advice of their faculty mentor and members of their dissertation defense committee on the content of the introduction.
   (c) the articles or manuscripts as separate chapters;
   (d) a conclusion or summary that provides an overview of the collective findings reported in the separate chapters is recommended at the discretion of the committee;
   (e) an optional appendix containing any additional material that will not be submitted for publication may be included or a literature review section, as appropriate.

Doctoral Final Examination (Defense)

All candidates must pass a final examination dealing primarily with the dissertation and its relationship to the candidate’s major field.

At least two (2) weeks before the date set for the final examination, you should notify the Dean of Graduate Studies of the date, time and place of the defense (using the Announcement of Examination form available from the Department’s Graduate Program Coordinator’s office). Once the Office of Graduate Studies approves the form, it is returned to the Graduate Program Office for you to pick up to give to your committee chair on the day of your defense; results of the examination are reported on the reverse side of the form; once your committee has completed the report side of the form, it is returned to the Biology Graduate Office. The examination is chaired by your Major Advisor. A complete copy of the dissertation must be submitted to each member of the Dissertation Committee at least two weeks before the defense.

At the conclusion of the examination, the members of the Dissertation Committee shall confer and vote on their recommendations, which must be agreed upon by at least three of the four members. The Committee may: (1) recommend that the dissertation be approved without change; (2) recommend that the dissertation be approved subject only to minor editorial corrections, or (3) require that the dissertation be revised before approval. In the cases of (1) and (2), no further meeting of the Committee will be needed, although in the case of (2), the Major Advisor will be responsible for seeing that the corrections are made before the dissertation goes to the Office of Graduate Studies. In the case of (3), the full Committee will decide that their stipulations have been met. The results of the examination will be reported on the back of the Announcement of Examination form and returned to the Graduate Program Coordinator for processing.

A portion of the final examination must consist of a formal, 50-minute oral presentation open to the general public. Formal announcement of this event should be made at least one (1) week in advance of the
presentation using the normal format that is used by the Department for regularly invited seminar speakers. After the seminar, the candidate and the Dissertation Committee will meet privately to continue the examination. Each reader of the dissertation must fill out an evaluation form (Report on Dissertation), and, in addition, the Chairperson of the Dissertation Committee must fill out a "Certification of Final Form," which needs to be turned in to the Biology Graduate Office (which will obtain the needed signatures and deliver it to the Office of Graduate Studies) immediately after the defense. These forms are available at the Biology Department Office or from the OGS website (http://ogs.unm.edu).

Final Submission of Dissertation

Your dissertation, in perfect form and approved by your Committee, shall be submitted electronically for the approval of the Dean of Graduate Studies by November 15, April 15, or July 15 for Fall, Spring or Summer graduation, respectively.

Along with your dissertation, you also must submit the Certification of Final Form, approved by your committee chair, and your committee members’ evaluations of your work as reported on the Report on Dissertation Report ("gray sheets"). The Graduate Program Coordinator provides a copy of these to give to your committee at your defense. The gray sheets are returned to the Office for appropriate signatures and delivery to the Office of Graduate Studies. In addition to the copy of the dissertation to each committee member, a copy of the final dissertation shall be given to the Biology Department for its collection. This may be delivered on a Compact Disc or in a printed format.

OGS offers workshops during the semester to explain and demonstrate how to complete the above task. This workshop is highly recommended as it is helpful when you are ready to submit your final documents and the appropriate paperwork.

90-Day Rule

A Ph.D. student must submit his/her dissertation to the Dean of Graduate Studies within ninety (90) days of his/her final examination for the dissertation or the term graduation deadline, whichever comes first. If the manuscript is not submitted within that time, the student must schedule and complete a second final examination for the thesis. In all cases, the results of the thesis defense must be submitted to OGS no later than two weeks after the announced date of the thesis defense.

Courtesy Policy

University regulations require that the student be enrolled and complete a minimum of three (3) hours for Ph.D. students in the term they complete the degree requirements. Should the student miss the graduation deadline (July 15 for summer graduation, November 15 for fall graduation, April 15 for spring graduation), but complete all degree requirements on or before the last day of that term, the student is not required to register for the next term. Consult with the Graduate Program Coordinator for more details about taking advantage of this “courtesy policy.”

**SUGGESTED SCHEDULE FOR PH.D. IN BIOLOGY**

*It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures, to the Department’s Graduate Program Coordinator.*

*Do not submit forms directly to the Office of Graduate Studies.*

**Year 1:**

- Arrange for Major Advisor and set up Committee on Studies. This Committee MUST meet with the student AT LEAST ONCE A YEAR. *(Committee on Studies Form)*
- Begin taking required courses in your area of specialization.
- Choose dissertation project/gather preliminary data.
• Start non-biological skills. Except for foreign languages, this requirement may be satisfied by completing six semester credits per skill area with a grade of B or better. The credits you use for the Tool Skill may be transferred from another institution. (Tool Skill Form)

Year 2:
• Successfully completion of the Doctoral Comprehensive Examination. (Report of Exam Form) (submit the Announcement of Exam form at least two weeks in advance of the exam)
• Fulfill graduate curriculum course requirement. (Graduate Curriculum Form)
• Submit Research Proposal; start research. (Research Proposal Approval Form)
• Complete a Committee on Studies Report Form. This form must be signed by both the student and their major professor reporting the activities of the student during the year.
• Fulfill Teaching Requirement. (Teaching Requirement Form)
• Set up Dissertation Committee. (Appointment of Dissertation Committee Form)
• The outside committee member must be approved by the Office of Graduate Studies. Submit a C.V. for the outside committee member to the Biology Graduate Program Office if this committee member is not on the OGS approved Committee list found on their forms website (http://ogs.unm.edu)
• Make formal Application for Candidacy with the Department and the Office of Graduate Studies. The Application for Candidacy Form must list all course work to be counted toward the degree.

Years 3–5:
• Complete a Yearly Progress Report Form. This form must be signed by your major professor reporting the activities of the student during the year.
• Write dissertation.
• Notify the department’s Graduate Program Coordinator of Intent to Graduate. Complete the Intent to Graduate Form, obtained from and returned to the Biology Department’s Graduate Program Coordinator’s office.
• Defense of Dissertation. The Announcement of Final Examination Form, Certification of Final Form, Report on Dissertation form (one to be filled out by each reader of your dissertation) and Title Pages (these are on bond paper and have red-line borders.) They can be purchased at the bookstore or downloaded from the OGS website (http://ogs.unm.edu) and printed in red.

Important Dates
1) Contact the Biology Grad Office to discuss and schedule your exam. Complete the Announcement of Exam form notifying the Office of Graduate Studies of date, time and place of Doctoral Comprehensive Exam and Defense of Dissertation (using Announcement of Final Examination for Doctorate Form) at least two (2) weeks prior to exam.
2) Results of the Dissertation Defense should be submitted no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer).
3) Submit the approved Dissertation to the Office of Graduate Studies following the electronic submission guidelines no later than 90 days after successful completion of your defense, or no later than November 15 (Fall), April 15 (Spring), or July 15 (Summer) whichever comes first. Submit one copy of the dissertation to the Biology Department for its collection; this may be submitted on a CD.
4) UMI Fee: All doctoral students, as part of graduation requirements, must have their dissertations published through University Microfilms International (UMI). This involves the completion of a contract, available from the Manuscript Coordinator at the OGS, and payment of a fee to UMI.
5) In addition to the above mentioned forms that must accompany the dissertation manuscript, a Survey of Earned Doctorate Form must be submitted.
6) The department requires all their graduating students to complete a survey. This survey is provided with the Report of Exam form and gray sheets. This paper survey is returned to the Program Coordinators office.

All of the forms mentioned above require a variety of departmental and non-departmental signatures. Please get all forms completed up to the point where the Chair’s signature is required, and then return the form to the Graduate Program Coordinator for further processing.

Ph.D. Checklist

It is the responsibility of the student to ensure that all forms are completed and submitted on schedule, with the appropriate signatures to the Biology Graduate Coordinator's Office. This checklist should serve as an aid. All forms are available from the Biology website, the BGSA website or the Graduate Coordinator office.

Students must meet with the Committee on Studies (COS) at least once during each academic year. Students are responsible for scheduling these meetings. Students with funding must submit the COS report prior to Fall break to receive Spring semester funding. Graduate students must complete a “Committee on Studies Report” after each meeting and submit to the Graduate Coordinator. Additionally, the advisor will have to sign the Assistantship request form.

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<th>SIGNATURES REQUIRED FROM STUDENT</th>
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<td></td>
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<tr>
<td>Committee on Studies Report</td>
<td>Each year until the Comprehensive Exam is passed</td>
<td>Committee members and Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td># Application for Candidacy</td>
<td>After comprehensive exam has been passed &amp; the language &amp; tool skill requirements have been fulfilled</td>
<td>Committee of Studies members</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Brown Bag</td>
<td>Twice during tenure in preparation to your defense or oral exam</td>
<td>Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td># Tool Skills (including Language)</td>
<td>Prior to &amp; upon completion of each skill; submit with/or before Application for Candidacy is completed</td>
<td>Committee of Studies members</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Ph.D. Teaching Requirement</td>
<td>No later than the semester preceding Ph.D. final exam</td>
<td>Committee of Studies</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Graduate Curriculum Form</td>
<td>End of the third semester</td>
<td>Major Advisor</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Research Proposal Approval (with the Proposal)</td>
<td>End of the third semester beyond Master’s; end of the semester beyond Bachelor’s</td>
<td>Committee of Studies</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td># Appointment of Dissertation Committee</td>
<td>After passing the comprehensive exam BUT no later than the first semester enrolling in BIOL 699</td>
<td>Dissertation Director</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Notification of Intent to Graduate</td>
<td>Spring: last week in Nov; Summer: last week in Apr; Fall: second week in July</td>
<td>Dissertation Committee</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Announcement of Final Exam</td>
<td>At least two weeks prior to exam date</td>
<td>Dissertation Director and Committee</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Semester Deadlines:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Fall: Nov. 15</td>
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<tr>
<td>Spring: Apr. 15</td>
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<td>Summer: July 15</td>
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</tr>
<tr>
<td>Report on Examination</td>
<td>After defense</td>
<td>All Dissertation Committee members</td>
<td>Graduate Coordinator</td>
<td></td>
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<tr>
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<td></td>
</tr>
<tr>
<td>Report on Dissertation (&quot;gray sheets&quot;)</td>
<td>After defense</td>
<td>One copy to each member of Dissertation Committee</td>
<td>Graduate Coordinator</td>
<td></td>
</tr>
<tr>
<td>Certification of Final Form of Dissertation</td>
<td>After final approval of dissertation</td>
<td>Dissertation Director/Chair</td>
<td>Office of Graduate Studies</td>
<td></td>
</tr>
</tbody>
</table>

| Dissertation | Once approved by committee, this document must be uploaded per OGS policy. Students should attend the Thesis/Dissertation Workshop | None | OGS, Graduate Coordinator, each Committee Members |

# To Advance to Candidacy, a student must pass the Comprehensive Exam; receive an approved OGS Application for Candidacy form; satisfy Language/Skills and have an OGS approved Appointment of Dissertation Committee form.

### OGS’s Ph.D. Snapshot

Please review the Doctoral Snapshot, any forms referred to can be found on the OGS website: [www.unm.edu/grad at OGS Forms](http://www.unm.edu/grad). All students nearing completion of their doctoral program must complete and submit by the appropriate deadlines all of the following forms in order to graduate:

- _____ Application for Candidacy form—Submit this to OGS through the Biology Graduate Program Office after the Ph.D. comprehensives have been completed and passed.

- _____ Appointment for Dissertation form—This form must be signed by the candidate, the dissertation director/chair, and the chairperson of the graduate unit, and approved by the Dean of Graduate Studies. Please file this form no later than the first semester of your enrollment in 699 “Dissertation.”

- _____ Proposed Graduation List form (submitted by the graduate unit)—Please notify your department graduate staff advisor before the last day of the term prior to the term in which you intend to graduate or by your department’s internal deadline for notification to graduate, whichever comes first.

- _____ Announcement of Examination form—Please submit to OGS at least two weeks before your dissertation defense is scheduled. In all cases, you must submit the results of the dissertation defense to OGS no later than two weeks after the announced date of the dissertation defense.

The Report of Examination (Results) form and one Report on Thesis or Dissertation form (formerly known as the “Gray Sheet”) from each of your committee members is due in OGS by the graduation deadline (see deadline dates below). Usually your advisor/committee chair or the department graduate staff handles this paperwork. Check with your advisor/committee chair if you have questions about these forms.

### Manuscript Submission:

The University of New Mexico encourages open access to all theses and dissertations produced for graduate degrees. Therefore, all theses and dissertations are submitted electronically in PDF format to the Office of Graduate Studies. These electronically submitted theses and dissertations (ETDs) are uploaded on a server housed in a UNM repository, LoboVault, where they are accessible for search and download through web search engines such as Google. In most cases, students submitting ETDs benefit from having their work available in the open access repository. In some special cases, however, students may want to delay making their work available for varying lengths of time. For this reason, UNM has implemented an embargo policy that enables students, with approval from their advisers and OGS, to delay public-wide access to their work in the LoboVault repository. While under embargo, the manuscript nonetheless remains available to the University of New Mexico academic community in order to satisfy requirements for the degree. Before submitting your thesis or dissertation, please consult with your committee chair and review the embargo restriction policy at the OGS website → OGS Forms → Manuscript Block to
determine whether or not you should release your work to open access or petition for an appropriate embargo option.

You must register at LoboVault digital repository but must notify OGS’ Manuscript Coordinator of the LoboVault registration (https://repository.unm.edu/). The OGS Coordinator must identify you as a user of the ETD collection at LoboVault before you can electronically submit to the repository. **Note:** No Binding Fee is required for Electronic submission to LoboVault.

**IMPORTANT:** You must submit your dissertation to OGS within (90) ninety days of your final dissertation defense or by the deadline for degree requirement, of the term in which you are graduating, whichever comes first.


Please submit the dissertation electronically as soon as all revisions are complete and approved by the dissertation committee. The dissertation must be submitted at two different electronic (ETD) sites: (1) LoboVault digital repository—UNM, and (2) ProQuest/UMI Administrator—UNM.

**CHECK WITH OGS REGARDING MANUSCRIPT REQUIREMENTS**

*Attending the OGS Dissertation Workshop is highly recommended to help you finish and upload your document. GRC has helpful workshop and events as well.*

**DEADLINES:** In order to graduate in a particular term, you must complete all your degree requirements, complete your defense, make all necessary revisions to your manuscript, submit all required forms, and have the dissertation accepted by OGS by the following dates:

- **Spring Graduation** — April 15
- **Summer Graduation** — July 15
- **Fall Graduation** — November 15

*Please note: The deadlines above are posted OGS deadlines. To meet these and all OGS deadlines, the Biology Department requires two weeks of preparation time. Please submit paperwork at least two weeks in advance of the posted deadlines.*

**NOTE:** If any of the deadlines occur on a weekend or a holiday for which UNM is closed, the deadline will be moved to the next business day.

**EVALUATION OF PROGRESS**

Your Committee on Studies is responsible for the evaluation of your progress toward a degree. A normal, timely completion of program course work and research (along with completion of the various Graduate School requirements) is considered satisfactory progress. *The Committee on Studies must meet at least once a year and it must enter a brief progress report (form available from the department Graduate Program Coordinator’s office) into the student’s departmental file. The coordinator will keep track to ensure compliance; if there is an issue the student and the committee chair will be contacted; if this task is still not completed, the Department Chair and the Chair of the Graduate Policy committee will be contacted and funding may not be granted for a semester and until the committee meets and a form submitted.*

**LEAVE OF ABSENCE**

Students may find themselves in circumstances that require them to withdraw temporarily from their graduate program. Under such circumstances, the student should request, in a carefully justified letter to
the departmental chairperson, a leave of absence. This request must be handed into the Biology Graduate Program Coordinator for appropriate distribution. The written request, together with a memo of support from the chairperson or designee of the graduate unit, is forwarded to the Dean of Graduate Studies, who will make the final decision. Per UNM policy, a leave of absence is generally limited to a maximum of one calendar year. The time spent in a leave of absence will not count against a student’s eligibility for departmental support or against the time limit to complete the degree.

If a formal leave of absence is not requested and/or approved, a student who does not enroll for classes for three consecutive semesters (including summer sessions) will be dropped from current student status at the University of New Mexico. Once the three semesters have passed, a student who wishes to return must reapply for admission to UNM and to the Biology Department. If a student is re-admitted in such a situation, the time during which the student was not enrolled will count against the time limit for degree completion.

Students should not take a leave of absence to undertake research work related to their degree. For example, it is not permissible to take a leave of absence to work on a research grant related in any way to your degree program. Students who have started enrollment in Biology 599 (Thesis) or Biology 699 (Dissertation) hours must maintain continuous enrollment in this course in order to remain in good standing.

In cases where the leave of absence becomes prolonged, and there is little hope of a student returning to finish his/her degree program, the chairperson may, in consultation with the student’s Committee on Studies, terminate the student’s relationship with the department.

PETITION PROCEDURES

Any policy of the Biology Department applying to graduate students that is not also a policy of the College of Arts & Sciences or other institutional body is open to petition for waiver or modification. Such a petition, however, should be made only under exceptional circumstances. The petition must be made by the advisor, must have been approved by the Committee of Studies, and must be made prior to admission to candidacy. In the case of core requirements, the petition must demonstrate that none of the core courses offered during the relevant two-year period was appropriate and that the suggested substitution is. Granting the petition is solely at the discretion of the Graduate Policy Committee. Petitions will be entertained twice an academic year: once during the Fall semester and once during the Spring semester.

In the event of a disagreement between the Graduate Policy Committee and a student and/or the student’s Advisor or Committee on Studies on the interpretation or implementation of departmental graduate policies, a decision may be appealed to the Chairperson of the Biology Department. The appeal should indicate the nature of the problem and the justification for the appeal. If either party involved wishes to dispute the Chairperson’s decision, the disagreement may be appealed to a meeting of the Biology Department Faculty. Subsequent appeals must follow standard university procedures. University policy for the petition process is described in the Graduate Program section of the UNM Catalog.

POLICY ON TERMINATION

A student may be terminated from graduate status for the following reasons:

1) receiving three grades of NC and/or F;

2) having a cumulative GPA of less than 3.0 for two consecutive, or three cumulative, enrollment periods (semesters); or

3) failure to meet program requirements.

If, in the opinion of the Biology Department, a student shows little promise of completing the degree program, the Department will notify the Dean of Graduate Studies in writing that the student is suspended from further work in that program. This can occur for the following reasons:

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(a) twice failing the Master’s, Ph.D. Comprehensive, or Ph.D. Dissertation Defense. (Note: the Committee on Studies may choose not to grant a second try after a failure, in which case termination would occur after a single failure.);

(b) failure to complete various degree requirements within a reasonable length of time (e.g., program course, teaching requirement, foreign language and non-biological skill requirement, or Dissertation); or

(c) in the event that a graduate student no longer has a Major Advisor (see p. 3),

4) Termination will be by personal conference with the student.

FINANCIAL AID

Application

Students seeking advanced degrees may apply for financial aid in the form of service awards (assistantships) and non-service awards (fellowships). Non-service awards are available only in limited numbers. All persons receiving financial aid are rigorously evaluated by the entire faculty each spring with regard to their academic progress and job performance.

Assistants who are not legal residents of the state of New Mexico are encouraged to apply for such status toward the end of their first year at UNM. For details regarding residency application process, please consult with the Registrar’s Office http://registrar.unm.edu/residency/index.html

Assistantships and Fellowships

The Biology department offers Teaching, Graduate or Research assistantships and occasionally Project assistantships opportunities. To ensure that students are meeting with their committee annually, the Assistantship Request form will be used to certify compliance. All students must meet with their committee at least once a year prior to Fall break.

Fellowships are awarded from various funding sources. It is important that all Students complete a FAFSA and file with UNM. Many fellowships are based on financial need; the FAFSA is used to determine eligibility.

All Students with or without financial support will be required to meet with their advisor and/or committee annually to insure the student is progressing satisfactorily. Student compliance will be verified in the Spring Semester by Fall break using the assistantship form. The following general principles and regulations apply to Assistantships and Fellowships of various kinds.

1) Assistantships and Fellowships are primarily grants-in-aid given in recognition of the academic promise of the student and to enable the student to earn a graduate degree. Financial need also may be considered.

2) These awards are made only to students currently enrolled, or about to be enrolled, in graduate study. Students completing their degree or in the last semester of their degree may not be eligible for some awards.

3) To be eligible for an appointment or re-appointment as an assistant or a fellow, the student must be in good standing in the Department and the Office of Graduate Studies. “Good standing” includes a cumulative GPA of at least 3.0 in graduate course work making progress towards their degree.

4) For graduate assistants and teaching assistants:

(a) appointments are made for an academic year, a semester, or a summer session. Assistants are expected to be available for service one week before each semester of appointment. Assistants should be provided with a clear understanding of their major responsibilities as assistants;
(b) normally, an assistant’s academic program and assistantship responsibilities should constitute a full-time commitment. Assistantship appointments usually are made for FTE = 0.50 (20 hours of service/week, on the average), or for an FTE of 0.25 or 0.17; in exceptional cases, other fraction appointments may be made. T.A.s and G.A.s generally receive the same stipend; differential stipends are received by pre-master and post-master assistants;

(c) assistants are eligible for a tuition waiver of up to 12 hours/semester that meet specific degree requirements when the FTE = 0.50). Unused hours of waived tuition will not be carried over into future semesters. An assistant paying for hours beyond the tuition waiver is eligible for the resident tuition rate, provided his or her FTE is 0.25 or higher.

Please note: that the department will pay only for Biology related credits that are needed for progress toward the comprehensive exam, thesis, dissertation, or required credit hours;

(d) the assistant must be enrolled in at least six (6) hours of graduate credit each semester (excluding summers) to be eligible for an Assistantship, and is highly encouraged to take at least 12 hours of graduate credit/semester, with 15 hours being the upper limit;

(e) University regulations and applicable federal laws limit graduate student employment (combination of all jobs) as follows:

- Domestic students: no more than 0.75 FTE (30 hours per week) during academic year, no more than 1.0 FTE (40 hours per week) during summer session.
- International students: no more than 0.50 FTE (20 hours per week) during academic years, no more than 1.0 FTE (40 hours per week) during summer session.

If you have or have had additional or other employment at UNM, you must inform the Graduate Program Coordinator and your total combined FTE must not exceed the limits listed above. When a contract does not comply with this policy, it will be returned by OGS, delaying pay.

(f) Summer T.A. or G.A. appointments are optional and competitive. Students interested in a summer appointment must complete a request form. Assistants are not required to be enrolled during the summer session in order to hold an assistantship; however, those who do not enroll in at least three (3) credit hours will be subject to FICA withholding;

(g) assistants are eligible for student health insurance if their assistantship is at the minimum of 0.25 FTE for the Fall and Spring semesters. The Spring student health insurance includes coverage for the Summer. If the assistant did not have student health insurance for the Spring semester, they will be required to enroll for a minimum of three (3) credit hours in order to obtain student health insurance for the summer;

(h) the assistant wishing to resign his/her appointment must inform the Department Chairperson in writing and, if possible, allow enough time for a replacement to be found. See “Declining a Teaching Assistantship,” page 35.

5) Research Assistants:

(a) assist in research work that is relevant to and ultimately may be used for the candidate’s thesis, dissertation, or other requirements for the graduate degree;

(b) are employed for a period not less than one academic semester or the summer period between semesters;

(c) may or may not receive a tuition waiver at the discretion of the Principal Investigator, but are eligible for the resident tuition rate, provided his/her FTE is 0.25 or higher; and

(d) are usually employed for 20 hours/week. An R.A. who has advanced to candidacy may be employed more than half time with the approval of his or her Major Advisor, the Department Chairperson, and the Dean of Graduate Studies. Furthermore, a research assistant may be
employed up to a maximum of 40 hours/week during the period between the Fall and Spring semesters and during the Summer Session.

Assistantship Selection Process

Each semester, students will receive an Assistantship Request form in their mailbox. It is expected that ALL students will complete this form. This aids the department in determining its commitment for Teaching Assistantships for the semester. Additionally, these forms are used to help make course assignments. While it is our intent to assign the student their desired class or subject area, this is not always possible.

Duration of Financial Support

The department will make every effort to ensure that all doctoral students, who are making satisfactory progress toward their degrees, are offered support for their first five years (10 semesters) of graduate study at UNM. At the time of admission, the department will offer a Teaching Assistantship to doctoral applicants who meet the standards for admission and are accepted into the doctoral program with financial support. The department will continue to offer these students Teaching Assistantships for their first five years, contingent on availability of funds.

In rare cases, applicants may be admitted to the Ph.D. program without a guarantee of departmental support. Such students will have stated in writing to the department that they have access to funds from other sources and have no expectation of receiving departmental financial support. Students accepted without support must fulfill all criteria for admissions required of other applicants to the doctoral program.

In any year students may elect to decline the offered Teaching Assistantships in favor of other support, such as Research Assistantships, graduate fellowships or private funds (see guidelines below regarding Declining a Teaching Assistantship). However, the departmental commitment of teaching assistant support is only for the five years or 10 semesters of graduate study from the date a student begins the program, regardless of what other means of support that student may elect to use during that time. For example, if a student secures their own financial support from a grant for their first two years of their Ph.D. program, they are not then entitled to an additional two years of departmental teaching assistantship support; rather, they would be eligible for three years of departmental financial support. The department recognizes a responsibility to ensure financial support to all doctoral students who are in good standing and in their first five years of study before admitting new students. (See also relevant comments in “Leave of Absence,” p. 30.)

Students whose qualifications are as great as those admitted to the Doctoral program, but who apply to the Master’s program, will be offered Teaching Assistantships for their first two years (four semesters) of graduate study, provided they continue to make satisfactory progress in the Master’s program. Students who qualify for the Master’s program, but do not have credentials equal to those of students accepted for the Doctoral program, may be admitted, but without any guarantee of support. Students who apply and are accepted for transfer from the Master’s to the Doctoral program will be entitled to the same commitment of support as Doctoral students; i.e., they will be offered Teaching Assistantships during their first five years of graduate study in the Department including the time they have been enrolled in the Master’s program.

Students who have earned their Master’s degree in the UNM Biology Department and who have received departmental financial support in the process may later choose to seek admission to the Ph.D. program. If admitted, such students will be guaranteed no more than six years (12 semesters) of departmental support for their entire graduate program. As always, this offer is contingent upon the student making satisfactory progress and on the availability of funds.

Teaching Assistantships that become available after new students have been admitted and after all eligible Doctoral and Master’s students have been supported (and normally several such vacancies occur each year) will be offered to Doctoral students who have exceeded their five years of eligibility and/or to

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unsupported Master’s students. Each semester, the graduate program staff will provide a funding request form so students can be considered for such an assistantship. All graduate students must fill out this form and return it to the Graduate Program Coordinator each semester. Students who do not submit this form by the deadline are in jeopardy of losing their support for the semester. Assignments will be determined by the quality of the student’s work and the Department’s need for teaching expertise. The Associate Chair of the department, in consultation with the Graduate Program Coordinator, is responsible for making these decisions. Although it is desirable to match assignments with students’ interests, it is sometimes necessary to assign students to a course they did not express interest in teaching.

The department has agreed to support students in their sixth (6th) year (12 semesters). These students will be placed in a bonus pool if they request funding by the deadline and are making satisfactory progress. The department agrees to select students from this pool first if additional teaching assistants are required and funds are available. Additionally, the department will pay for dissertation hours. Once a Biology student has begun their seventh (7th) year of study and meets the normal requirements, the student will be placed in the T.A. pool. Students in the T.A. pool who are offered a teaching position will receive a stipend and health insurance (if the assignment is 0.25 FTE or more). Tuition will not be paid by the department.

Declining a Teaching Assistantship

A serious problem for the department can arise if students who have signed a teaching assistantship contract change their plans. We may, for example, be left without a qualified instructor for a scheduled laboratory section. To minimize this potential problem, we request that students notify the Graduate Program Coordinator of any change in plans by no later than June 15 for the following Fall semester or by November 15 for the following Spring semester. The department cannot guarantee that desired changes in plans made after these dates can be accommodated. If you do not notify the department of your intent to decline a teaching assistantship before the specified date, the department has the right to, and may decide to, withdraw any commitment of future support. Although we work to fulfill students’ teaching wishes, the assignments are based on the needs of the department and on providing a teaching experience for its students.

Please note that when a student declines an assistantship, the award will not be extended. All award periods begin the semester the student starts the program and continue for the applicable guaranteed funding time. An exception may be made to this policy if a student takes an approved leave of absence.

Loans and Other Funding Offered at UNM

The University has a number of loan options for graduate students. For more information, please visit the Office of Graduate Studies website http://ogs.unm.edu/funding/index.html.

Additionally, UNM provides a variety of other funding options including, but not limited to scholarships, fellowships, grants and work-study or student employment. For further information, see Funding Resources at http://ogs.unm.edu/funding/index.html.

Student Employment

Students desiring part-time employment on or off campus will find open positions at the Student Employment Office website at http://www.unm.edu/~wsestudy/. Note some of these positions require students to be work-study qualified.

The University maintains a Career Services Center to assist undergraduates, graduate students and alumni in finding suitable employment. Career Services is located in the University Advisement and Enrichment Center, second floor room 220 in Mesa Vista Hall. They can be contacted at 505/277-2531. The Career Services office is open various times during the week, be sure to visit their website at http://career.unm.edu.
SOURCES OF RESEARCH FUNDS

Research usually costs money; you should not hesitate to explore the limited sources of funding available to graduate students. The following are some suggestions of funding sources available from the Biology Department, the University, and nationally. Additionally, the Biology Graduate Student Association BGSA website has a list of funding resources; this list is updated and maintained by students in the Biology Program. Funding leads are forwarded to the Biology Graduate Student Listserv (BGSA-l), by other students as well as the Graduate Program Office Coordinator. Students are encouraged to share funding leads with other Biology students.

Departmental

Graduate Research Allocations Committee (GRAC)

The GRAC is a five-member committee composed of graduate students from the Biology Department. Both travel and research grants are evaluated. Three committee members read and score each proposal. The committee convenes once all proposals have been evaluated. The committee discusses each proposal and ranks them according to scores and outcomes of discussions. Grants are funded fully, partially, or not at all.

GRAC will not fund food, motel, registration, or publication costs. Travel awards are given only to those who will be presenting their research at a conference. Although requests for funding of a project previously funded that academic year are allowed, they will receive funding only if adequate proof of progress in the study and of attempts to obtain additional sources of funding is demonstrated. The lifetime limit in research grants is $1,000 for Master’s students and $1,500 for Ph.D. students. Applications are limited to two per academic year with the understanding that second applications will be considered only if sufficient funds are available.

Students may apply for both a travel and research grant within the same semester. An application must be made to Student Research Allocations Committee (SRAC; see below) that same semester for that particular activity, or proof of SRAC ineligibility must be given. See further information below: Complete applications should contain a cover page (research or travel grant application cover page), SRAC cover page, a two-page proposal outlining the activity to be funded, and a one-page outline of the budget, detailing items to be funded by GRAC. These funds are available in the Fall and Spring only; no Summer GRAC funds are available.

Grove Scholarships

Three types of the Alvin R. and Carolyn G. Grove Scholarships are available based on funds. (1) Doctoral scholarships provide doctoral students with release time from a Teaching or Research Assistantship so they can concentrate on scholarly pursuits, such as research or writing; (2) Summer scholarships provide graduate students with financial support to pursue their research; (3) Research scholarships provide graduate students with resources to initiate or continue research projects, and/or to attend conferences to present papers or poster on their research.

Funding period for the Alvin R. and Caroline G. Grove Scholarships is once a year, during the Spring semester. Applications will be reviewed by a Departmental Scholarship Committee. Applications can be obtained from the department’s Graduate Program Coordinator (UNM Biology Department, MSC03 2020, 1 University of New Mexico, Albuquerque, NM 87131-0001) and on the BGSA and Biology Department websites.

University

GPSA Project Funds (PB)

The Graduate and Professional Student Association (GPSA) Projects Committee funds events that promote graduate and professional student involvement at UNM and other endeavors that benefit the
professional growth of students. This includes, but is not limited to lectures, workshops, symposia and cultural events.

Proposals are accepted continuously throughout the year. Students may apply at any time during the semester. Each application must include a completed application form, budget, letters of support, and acknowledgment of GPSA support.

Projects funding will not cover salaries, class or course projects, capital acquisitions, including equipment, party-affiliated political or religious groups, or ongoing events previously funded two times by the Projects Committee. The committee will fund refreshments only if the organization has secured funding of all other expenses from additional sources. The Projects Committee may fund applications up to $500, awards more than this amount must be referred to the GPSA Council for approval.

For more information regarding these funds, please see the following website:

http://ogs.unm.edu/funding/index.html

**Student Research Allocations Committee (SRAC)**

The Student Research Allocations Committee (SRAC) grants are the most well-known of Graduate and Professional Student Association (GPSA) funding sources. SRAC funds research related to the completion of a degree as well as other research relevant to the applicant’s field. SRAC also funds travel to conferences to present research.

The SRAC Committee has three funding cycles a year. The deadlines for SRAC are the fifth Friday of Fall and Spring semesters and the first Friday of Summer term. Packets must be received in the GPSA office by noon. Applications will be considered for research or travel during the current semester, as well as one semester retroactively. Students may receive up to $500 per academic year through SRAC (beginning with the summer funding cycle).

Additionally, students may apply for travel funds through the BGSA. Complete applications should contain a cover page (research or travel grant application cover page), SRAC cover page, a two-page proposal outlining the activity to be funded, and a one-page outline of the budget, detailing items to be funded by GRAC. These funds are available in the Fall and Spring only; no Summer GRAC funds are available.

Submit applications to the GPSA office, Room 1021, Student Union Building, UNM, by noon of the due date and/or to the Biology Graduate Student Association per instructions list on the website. For more information, call the GPSA office (505/277-3808). For further information, please refer to http://ogs.unm.edu/funding/index.html

**Specialized Travel (ST)**

The Specialized Travel (ST) fund, organized by the GPSA Specialized Travel Committee, was created in 1998 to help graduate and professional students with travel expenses for events other than conferences and not covered under the SRAC grants. This includes travel to interviews, clinicals, and anything that is not classified as a conference (or an event with a registration fee). Students may now receive $300 per academic year through the Specialized Travel fund. Academic years begin with Summer (June 1 to August 14), then Fall (August 15 to December 31) and end Spring (January 1 to May 31).

All applications are to be presented at the BGSA office, Room 1021, Student Union Building, UNM, by noon of the due date. For more information, call the GPSA office (505/277-3808) or visit http://www.unm.edu/~gpsa/GPSA/HOME.html.

**Graduate Research and Development (GRD) Funding**

The Graduate Research and Development (GRD) Committee is a standing committee in the GPSA. It was created around the funding that was allocated to the GPSA by the New Mexico State Legislature in 2000. This funding source for graduate and professional students is designed to assist larger projects
that require substantial funding, and is aimed at encouraging UNM students to work on research with state agencies, or in areas that directly benefit the state of New Mexico. The purpose of these funds is to promote graduate and professional research projects that have a direct impact on New Mexico’s communities. See [http://www.unm.edu/~gpsa/GPSA/GRD.html](http://www.unm.edu/~gpsa/GPSA/GRD.html) for more information.

National

Information on other research funds (e.g., NSF, NIH, Sigma Xi) is available from the office of the Vice President of Research website or by using the MIDAS Database. For further information, see: [http://research.unm.edu/](http://research.unm.edu/) The Graduate Resource Center offers assistance in looking for funding including a workshop titled “Hands-on Funding” (see the GRC website).

**DEPARTMENTAL SEMINARS**

Visiting Speakers

The Biology Department sponsors a seminar series of visiting speakers. These seminars provide an important opportunity to obtain first-hand knowledge of work that is going on in your discipline at other institutions and to meet some of the leading scientists in these disciplines.

The seminars also offer you the opportunity to learn about diverse areas of biology in a pleasant and effortless way. They are usually excellent and can be a good way to socialize with your peers.

All graduate students are expected to attend all departmental seminars.

Informal Seminars

Informal seminar series are offered in ecology/evolution and in cell/molecular biology. They are designed primarily for graduate students. You are expected to participate actively in these seminars, either by attending or presenting your work. If you are presenting your work, you should sign up for one-credit ST/Ecology Seminar (Biol. 502) or ST/Molecular Seminar (Biol. 502) during that semester. These seminars provide an excellent forum to discuss new ideas and obtain feedback on research in progress, or even on research that is still in the planning stage. Each student is expected to present at least one informal seminar (M.S.) or two seminars (Ph.D.) during his/her graduate career.

New Graduate Student Seminar (Orientation)

All new graduate students in the Biology Department are required to register for and attend Biol. 500 during their first Fall semester in the program. This seminar provides an opportunity for you to find out how the Department is organized, what facilities are available for your use on campus, and what various members of the Biology Faculty are interested in and doing. It’s a good way to get an overview of the Department and its programs and to have your questions answered as you’re just getting started. This seminar meets one or two days the week before school begins each Fall semester.

Scientific Integrity course

Additionally, incoming students must register for and attend the Scientific Integrity course, which is held the week before the Fall semester begins. This course discusses research ethics and students are awarded a certificate at the end of the two half-day course. NIH and other grant funding agencies expect students to have taken this course before they are eligible to participate in research funded by these agencies.
FACILITIES AND SERVICES

Office and Laboratory Space

Every graduate student with a Teaching Assistantship receives office space, assuming space is available. This space is for your own work and a place to help your own students. Office space is assigned by a BGSA elected official in consultation with the appropriate Associate Chairperson and/or the Chairperson of the department’s Space Committee. Assignment is usually a matter of availability at the moment. Should you be dissatisfied with the assigned space, the option is open for trading with another graduate student. Please remember to inform the BGSA official of any changes. It is possible, but not certain, that office space may be available for students who have been awarded Research Assistantships or working on their dissertation. It is more likely that they will find space in the lab of their Principal Investigator.

In all cases, laboratory space is under the control of the Department Chair, the Department’s Space Committee and the Biology Faculty. If your research requires laboratory space, you should consult with your Major Advisor about your space needs.

Classroom Reservations

Castetter Hall classrooms may be reserved for committee meetings, presentations, dissertation defenses, review sessions, etc. To reserve space, contact the Biology Graduate Program Coordinator. They will need the room desired, date, starting time, ending time, number of people in attendance, and the purpose of the meeting. Certain rooms may be confirmed immediately, while others must be reserved through the UNM Scheduling office by Biology staff. Please request at least five (5) days in advance. Staff will work with you to schedule a room for your need; however, some flexibility may be required.

BGSA Computer Pod

There is a computer pod (lab) in Room 40 in Castetter Hall basement. This facility was initiated by members of the BGSA for use by its Biology graduate student members. A part-time T.A. maintains the pod Fall and Spring semesters and is available to provide assistance in case of difficulties encountered with either the hardware or software. The T.A. is assigned by the Biology Graduate Program Coordinator and the Associate Chair each semester. The name of the Computer Pod TA will be listed on the BGSA’s website. For further information please contact the BGSA (http://biology.unm.edu/BGSA/).

The pod has a few computers, a desktop printer, a scanner and a large (poster size) printer. Printer supplies and paper are provided by the BGSA, but you have to provide your own external storage device (e.g., USB drive). Macintosh and PC software with manuals are also available. Please observe all copyright laws. Do not copy software from or onto the pod computers. The pod TA is not responsible for personal files copied onto the hard disk; these will be deleted when necessary.

Every user is required to observe the UNM “Acceptable Computer Use” policy and the BGSA rules displayed. These rules are to ensure that each and every user has equal usage of the hardware and software. All users are asked to be considerate when using the pod, i.e., be tidy, do not remove software or manuals from the pod, use the laser printer only for final copies, check for virus infections, etc. Please remember that the usage of the pod facilities is a privilege and not a right. Please report all hardware failures or software difficulties to the pod T.A.

The desktop computers are connected to the UNM network. Through these computers, it is possible to access e-mail and the World Wide Web. Instructions for obtaining a UNM Net ID or other computer-related information can be obtained from Information Technologies (IT), which is responsible for the computer facilities in general at UNM. IT also provides several computer pods on campus for student use; laser printers are available. Check the IT website for more information and for the hours of specific pods. Their Help Desk is located in the IT Building; their phone number is 505/277-5757 or you can create a Help Ticket at Help.unm.edu (which requires a UNM Net ID).
Equipment Use and Availability

This is a gray area with few defined rules. Tradition and personal contact are major determinants of who gets what. Obviously, equipment belonging to your Major Advisor and amenable committee members is most readily accessible.

Material purchased by a faculty member’s grant is under control of that individual. Negotiations should be undertaken with that person for use of their equipment or facilities. It is a general departmental policy to maximize the use of equipment, and financial reality does not permit duplication of many items. The Building Coordinator and the Storekeeper are best informed as to what equipment is in the department and who controls it. They also keep track of surplus material at Sandia Labs, which can often be obtained for minimal cost.

Some equipment such as data projectors, dollies, etc. is available from the Storekeeper for check-out on a first-come, first-served basis. Any item checked out of the Storeroom becomes the responsibility of the person who signs for it; if the item is stolen, damaged or lost, it will be replaced at the expense of the person who checked it out.

Main Office Support and Supplies

It is important to establish a good working relationship with the Biology staff. Bear in mind that they are often overworked and have very busy schedules that may cause some delays in their responses to your requests.

General office supplies are kept in the Storeroom and are monitored by the Storekeeper. If you are asked to obtain supplies from the Storekeeper, ask the faculty member in charge of the class or departmental unit for an index number.

Photocopying

A copy machine is located in the room adjoining the Biology Main Office; it is to be used as little as possible with most copying needs being sent to the UNM Copy Center. A departmental copier account code is required to make copies on the departmental copier, which is assigned a monthly limit. Please maintain security of the copier account code by keeping this number confidential. Lengthy copying jobs will need a Purchase Requisition and must be sent to the UNM Copy Centers; the course instructor can provide instructions for this.

Fax Machine

A fax machine is available in the Main Office for business use. The Main Office Front Desk staff will fax your documents for you. All long-distance fax transmissions must be recorded on a fax log that provides the purpose of the fax and the index number to be charged.

Keys

To receive keys for access to classrooms and offices, Biology students are required to obtain and complete a Key Request form. These forms are located outside the Storekeeper’s office. The major professor, class instructor, or the Graduate Program Coordinator must sign the form authorizing the keys to be issued. The Key Request form is then taken to the Biology Storekeeper, who will issue a Key Card. The Key Card is taken to the UNM Lock Shop to pick up the keys. (Please note: the Lock Shop will not issue keys without a current LoboCard, and is closed on Fridays). The lock shop is located north of Lomas Blvd. behind the New Mexico Educator Federal Credit Union. When no longer needed, keys are to be returned to the Lock Shop. The voided, stamped card received from the Lock Shop is to be taken back to the Biology Storekeeper to update the Department key list. The Lock Shop may charge for any lost keys as well as require a police report (see the UNM Lock Shop website for more information).
Office Hours

Teaching Assistants must post an office-hours schedule on their office doors and submit a copy of these hours to the Front Desk in the Main Office by the second week of classes each semester. At the beginning of the semester, Main Office staff will place two office-hour cards in TA mailboxes to be completed. Return one card to the Main Office staff and post the other card to your office door. If you do not receive cards, please request a set. If you receive a set in error, please return to the Front Desk to be given to another person.

Textbooks

Students teaching courses may obtain a textbook from the instructor of the course or lab coordinator to be used during the semester. The bookstore carries required course textbooks.

Teaching Assistant Resource Center (TARC)

The Teaching Assistant Resource Center (TARC) was developed to provide resources and training to graduate students at UNM for their teaching assistantships. TARC is a center on campus that provides a variety of resources and training to Teaching Assistants and International Teaching Assistants on the UNM campus. TARC is located in the Communication and Journalism Building, Room 158. Their phone number is 505/277-3341. All Biology T.A.s are encouraged to visit the Center for resources, workshops and classes.

Student Homework Assignments

Depending on the course you are teaching, Teaching Assistants may allow their students to turn in homework and/or late assignments at the Main office Front Desk. Anyone using this service is expected to log in their documents, providing class number with section number and the T.A.’s name. The documents will be date/time stamped and placed in the instructor’s box. All papers will be accepted during normal business hours. It is the responsibility of the T.A. to determine if the documents were turned in on time.

Mailboxes

All Biology graduate students are provided a mailbox in the main office for business and campus mail. You may be assigned a mailbox with another student or with your major professor.

Mail Services

The Main Office receives United States Postal Service (USPS) business-related mail and campus mail twice a day, around 8:30 a.m. and around 1:00 p.m. Anyone in the department may send business mail in UNM Dept. of Biology envelopes and stamped, personal mail by placing the item in the appropriate slot in the copy room (located next to the Main Office; however, the University Mailing Services will not deliver personal mail). Anything larger than an envelope being sent for business purposes must be checked in at the Front Desk, where it will be logged by the staff. It is necessary to put the name of the sender on the package/box and the index code for its postage; the package will not be sent if it does not have the index code, which will likely delay its mailing.

The USPS business mailing address for the Biology department is University of New Mexico, MSC03 2020, Biology, Albuquerque, NM 87131.

Incoming Business Packages are accepted via courier, such as UPS or FedEx, and are normally handled by the Storekeeper and sometimes by the Main Office staff. If you are expecting a package, please inform the Storekeeper and ask for the appropriate address to use.
Greenhouses

Two greenhouses are under the jurisdiction of the Biology Department. One is located near the main entrance to the building and is used for public display, events and research. The second greenhouse, located on the roof of the south side of the building, is devoted to research.

Telephones

The University of New Mexico maintains its own telephone system. When calling within the UNM campus, dial the last five digits of the number. Dial a “9” when making a local call.

Museums

The Museum of Southwestern Biology (MSB) and United States Geological Survey (USGS) are located northeast of the Department of Biology in the CERIA Building. The following divisions are housed in MSB with the name of the respective curator: MSB Director (Dr. Joseph Cook); Amphibians and Reptiles (Dr. Howard Snell); Arthropods (Dr. Kelly Miller); Genomic Resources (Dr. Joseph Cook); Birds (Dr. Christopher Witt); Fishes (Dr. Tom Turner); Mammals (Dr. Joseph Cook); UNM Herbarium (Dr. Tim Lowrey); Parasitology (Dr. Eric Loker); and USGS–Biological Survey Collection (Dr. Michael Bogan).

Animal Care

There is a lab animal facility (Biology Animal Research Facility [BARF]) located in the basement, which is under the direction of the Biology Dept. Lab Animal Technician and the Main Campus veterinarian. Anyone keeping or proposing to keep animals in the building must contact these people. The technician can be very helpful in locating quarters for whatever animal you will be working with. NOTE: Use of vertebrate animals in departmental research projects requires the submission of, and approval of, a formal animal-use protocol by the Main Campus Animal Care and Use Committee (MCACUC); see the campus veterinarian for details. In addition, all people involved in the use and care of animals must receive a MCACUC-sponsored training; this is necessary in order to remain in compliance with federal regulations.

Library

The library should be a key resource for every graduate student. To realize the benefits associated with using the University Libraries, you should become familiar with its organization and facilities. Not all the collections are housed in the same building. The Science, Engineering and Map collections, which will be of special interest to you, are located in the Centennial Science & Engineering Library, west of Castetter Hall. Should you wish to arrange a tour of the facility, please contact the Reference staff at the library and they can arrange one for you.

Additionally, there are five other libraries located at UNM: Zimmerman, Parish Memorial, Fine Arts & Design, Law, and Health Sciences. Students are encouraged to use the electronic library resources and the Interlibrary Loan program if you are unable to locate the materials you need.

Housing

Most graduate students live off-campus. To find a place to live, you may visit the off-campus housing webpage [http://och.unm.edu](http://och.unm.edu), talk with other graduate students about good places to live or possible roommate situations, or visit UNM’s campus living website at [http://housing.unm.edu](http://housing.unm.edu). Because many graduate students are temporary residents of the Albuquerque area and, frequently, new residents in New Mexico, they also may have specific questions regarding renters’ rights and responsibilities in New Mexico and Albuquerque. The office of New Mexico Attorney General (NMAG) has a special section on their webpage for students ranging from auto accidents to a Renter’s Guide to Scams and student loans [http://www.nmag.gov/consumer/for-students](http://www.nmag.gov/consumer/for-students).
STUDENT GOVERNMENT

Graduate and Professional Student Association (GPSA)

The GPSA is a graduate student run organization that represents students and student issues. GPSA members serve on various University committees. This association is important to all graduate students as they represent the student body and voice their concerns. Additionally, the GPSA funds student research and travel. For more information, see their website at http://www.unm.edu/~gpsa.

Biology Graduate Student Association (BGSA)

The Biology Graduate Student Association provides a variety of opportunities for graduate students to contribute to the planning, management and development of the Department of Biology. Whether you are planning academic, governmental or commercial/industrial careers, experience in the internal affairs and government of our department will contribute to your graduate education. Every graduate student is strongly encouraged to participate in, and contribute to the efforts of, the BGSA. In addition, graduate students may sit on a number of university-wide committees. The following lists of Biology committees and University committees indicate the scope of opportunity available for graduate student involvement.

Biology Department Committees

Commencement                  Research Day
Computer                       Scholarship
Faculty Search                 Space/Building
Graduate Student Selection    Undergraduate Policy
Graduate Policy                Wednesday Brown Bag
Greenhouses                   Others to be determined as needed

University Committees

The following list contains some of the university-wide committees upon which graduate students may sit or to which they may contribute in other ways. Applications to serve on these committees are available at the GPSA office located in the Student Union Building (SUB).

Academic Calendar            Economic Impact Task Force
Administrative Committees    Faculty Ethics
Admissions & Registration Committee    Faculty Senate
Affirmative Action Policy    Gifts to Libraries Committee
Arts & Sciences Graduate Committee    Graduate Programs & Standards Committee
Athletic Council            Greater UNM Allocations Committee
Building Committee         Health Center
Campus Planning             Honorary Degrees
Campus Safety               Housing Committee
Committee Computer Use Committee    International Affairs Committee
Community Education         Intramural & Recreation Board
Cultural Programs Committee    Library Committee
Curricula Committee         National Science Foundation Committee
<table>
<thead>
<tr>
<th>New Mexico Union Board</th>
<th>Speakers Committee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Popejoy Hall Board</td>
<td>Student Publications Board</td>
</tr>
<tr>
<td>Radio Advisory</td>
<td>Student Radio Board</td>
</tr>
<tr>
<td>Radiological Safety Committee</td>
<td>Student Standards &amp; Grievance Committee</td>
</tr>
<tr>
<td>Research Policy Committee</td>
<td>United Fund Committee</td>
</tr>
<tr>
<td>Restricted Gifts Committee</td>
<td>University College Board of Deans</td>
</tr>
<tr>
<td>Scholarships, Prizes &amp; Loans Committee</td>
<td>University Committee on Human Subjects</td>
</tr>
<tr>
<td>Sexual Harassment</td>
<td></td>
</tr>
</tbody>
</table>
FREQUENTLY ASKED QUESTIONS

Q: Where can I obtain required forms for the degree?
A: Most forms (or links) are located on the Biology website (biology.unm.edu) or the BGSA website (biology.unm.edu/bgsa/) or on the Office of Graduate forms page (http://ogs.unm.edu/resources/ogs-forms/index.html) or may be picked up from the Biology Graduate Program office.

Q: When do I need to setup my Committee on Studies (COS)?
A: Both Master and PhD students must setup and meet with their COS, by the end of their Second semester. Meet with your major advisor as soon as possible to discuss classes and your committee.

Q: When should I notify my committee about the comprehensive exam?
A: A student should be communicating with their chair and committee the 3rd semester they are in the program about preparing for the Doctoral comprehensive exam. The student should expect to take the exam in the 4th but no later than their 5th semester, excluding summers. Details of the exam should be discussed the date, place and format should begin the semester prior to the exam (at least a month in advance).

Q: Do I need all new committee members for the Dissertation committee?
A: No, this committee can be similar or vary from your Committee on Studies (CoS). This committee may be the same as your Committee on Studies with an additional approved member or may have some of the committee members or may be completely new. As the student progresses through the program, they may find their interests have changed and may discover that the faculty on their CoS will not be able to assist them with their research and dissertation. The student however must discuss their plans their current committee before moving to the new committee.

Q: I am completing the Program of Studies (POS) or the Application for Candidacy (AC) form. It is asking for a major and major code, and a minor or concentration choices, what do I fill in?
A: The Major is Biology. The Major Code is BIOL. Biology does not have a minor or concentration, please leave this blank.

Q: Regarding transfer credits: the graduate handbook states that it is my studies committee that "recommends transfer of credits from other institutions". Is there a particular form or online process that I need to follow?
A: Transfer credits are on the Application for Candidacy which is usually submitted around the time you take your comprehensive exam and the Program of Studies which is submitted the semester before you graduate or about 2 years whichever comes first. Just remember you can only transfer 24 or 12 credits respectively.

Q: I have more than the required number of credits, should I list them all?
A: No, only list the number (or within 3 or 4 credits) required for the degree. 24 for Master’s Plan I; 32 for Master’s Plan II and 48 for PhD of Biology Related Graduate Course and toolskills if they were taken at graduate level. Please note: students may not count more than ½ of their requirements credits with one instructor (12 or 16 for MS and 24 for PhD.

Q: I listed a course on the POS or AC that will not be taught this semester, what do I do?
A: The Program of Studies (POS) and the Application for Candidacy (AC) are contracts between the University and the Student, therefore when changes are necessary, a new form may be necessary. A student changing from a M.S. Plan I to a Plan II will require a new form, however if there are a few minor edits (changes in classes) only a memo is required. This memo will need signatures from your Committee Chair indicating their approval. This memo can be addressed to the Graduate Program.
Coordinator, the Biology Department or the Office of Graduate Studies, but must be submitted to the Graduate Program Coordinator for additional signature and to be delivered to OGS.

Q: I heard that the Biology Department has a listserv, how do I sign-up for it?
A: The Biology Department has two listservs that all students are asked to join to insure they hear all the communications: BGSA-L and UNMBIO-L. To sign up, go to https://list.unm.edu/cgi-bin/wa. You may find others that may also be helpful or of interest like GPSA-L.

Q: If the advisor and I are not communicating well, may I change advisors?
A: Yes, you may change advisors, if that is what is best for your program. You must let your current advisor and the Graduate Program Coordinator know that you are changing and you must find a new advisor within 60 days informing the Graduate Program Coordinator and complete a new Committee on Studies form.

Q: Do I formally submit my thesis to my committee on the day of my defense or sometime before that?
A: Each committee member should be getting drafts as you go along. The committee should have a final draft at the defense – do not expect them to keep copies – provide them a completed final draft. Each committee and faculty expectations are different; they may want a paper or electronic copy. Please be sure to ask which works best for them. Once you have defended and the committee approves your document, you will need to upload it to the OGS site in LoboVault by the semester deadline. Finally you need to give a copy to the Graduate Program Coordinator; either a PDF on a CD or a Paper copy is acceptable to keep on file in the department. You should ask the committee if they want a copy of the final document.
Plan for Assessment of Student Learning Outcomes
The University of New Mexico

A. **College, Department and Date**

1. College: Arts and Sciences
2. Department: Biology
3. Date: 24 Feb 2015

B. **Academic Program of Study**
   UNM General Education Core Curriculum Courses
   BIOL110, BIOL112L, BIOL123 and BIOL124L.

C. **Contact Person(s) for the Assessment Plan**
   Marcy Litvak, Associate Professor and Associate Chair, Biology

D. **Broad Program Goals & Measurable Student Learning Outcomes**

1. **Broad Program Learning Goals for these courses**
   A.
   B.

2. **List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program**
   A.1. Students will be able to explain the basic mechanisms of inheritance.
   B.1. Students will be able to integrate information regarding cell structure and function, and critically evaluate a scenario in which a cellular process is disrupted

E. **Assessment of Student Learning Three-Year Plan**
   Described below is the plan for the next three years of assessment of program-level student learning outcomes.

1. **Student Learning Outcomes**

<table>
<thead>
<tr>
<th>University of New Mexico Student Learning Goals</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program SLOs</strong></td>
</tr>
<tr>
<td>------------------</td>
</tr>
<tr>
<td>A.1. Students will be able to explain the basic mechanisms of</td>
</tr>
</tbody>
</table>

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*Adapted from Kansas State University Office of Assessment*
B.1. Students will be able to integrate information regarding cell structure and function, and critically evaluate a scenario in which a cellular process is disrupted.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

2. How will learning outcomes be assessed?

A. What:

i. Each spring and fall semester, each instructor teaching one of these courses will be responsible for conducting one assessment as indicated in the attached assessment plans. For the lab courses, the assessments will be conducted concurrently with the designated laboratory assignments. **SLO A.1.** will be assessed during fall semester and **SLO B.1.** during spring semester. For the lecture courses, **SLO A.1.** will be assessed each fall after students have completed all units on inheritance and protein synthesis; **SLO B.1.** will be assessed each spring after students have studied biological membranes, cell structure, and cellular respiration.

ii. For each SLO, we will set an initial target of 60% of students demonstrating an acceptable or better performance as judged by exam scores or rubrics that evaluate more qualitative criteria. Rubrics will be generated by the faculty once this plan is adopted and will then posted on the Biology website as they become available.

B. Who: State explicitly whether the program’s assessment will include evidence from all students in the program or a sample. Address the validity of any proposed sample of students.

**SLO A.1., B.1.** will be assessed based on test questions given to all students taking 110, 112, 123L, 124L.

3. When will learning outcomes be assessed? When and in what forum will the results of the assessment be discussed?

[Briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. For example, provide a layout of the semesters or years (e.g., 2008-2009, 2009-2010, and 2010-2011), list which outcomes will be assessed, and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.).]

<table>
<thead>
<tr>
<th>SLO to be assessed</th>
<th>2014-2015</th>
<th>2015-2016</th>
<th>2016-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>
### A.1. Exam questions

Exam questions will be selected by the faculty and administered in the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester.

### B.1. Assignments to assess this SLO

Assignments to assess this SLO will be made during the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester.

### 4. What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?

*Briefly describe:*

*Adapted from Kansas State University Office of Assessment*
1. \textit{who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations).}

The gathering of evidence will be conducted as described in the table above. Final analysis and interpretation of the data will be carried out by the departmental Undergraduate Policy Committee, who will also present the data to the faculty at an annual SLO assessment meeting to be held each Fall.

2. \textit{the process for consideration of the implications of assessment for change:}
   a. to assessment mechanisms themselves,
   b. to curriculum design,
   c. to pedagogy

   \textit{...in the interest of improving student learning.}

Recommendations for change made by the Undergraduate Policy Committee will be considered by the entire Biology faculty, with significant input coming from the faculty involved in teaching the Biology core. Ramifications for curriculum design and changes to be implemented in pedagogy will also be considered by the entire Biology faculty in the general interest of improving student learning.

3. \textit{How, when, and to whom will recommendations be communicated?}

Following discussion at the annual Assessment meeting of the faculty each Fall, and drawing upon continued electronic input via the Biology listserve, the Undergraduate Policy Committee will draft its summary recommendations that will be transmitted to the Chair, who can communicate these further to the Dean and/or the Associate Dean for Curriculum.
Plan for Assessment of Student Learning Outcomes
The University of New Mexico

A. **College, Department and Date**

1. College: Arts and Sciences  
2. Department: Biology  
3. Date: 20 May 2015

B. **Academic Program of Study**

B.A. Biology

C. **Contact Person(s) for the Assessment Plan**

Marcy Litvak, Associate Professor and Associate Chair, Biology

D. **Broad Program Goals & Measurable Student Learning Outcomes**

1. **Broad Program Learning Goals for this Degree/Certificate Program**

A. To understand a wide range of basic principles in modern Biology  
B. To comprehend the scientific method and its application to problems in Biology  
C. To learn how to interpret and present biological data in written and oral formats

2. **List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program**

A.1. Students will demonstrate an understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization  
B.1. Students will able to design, test, and evaluate scientific hypotheses  
C.1. Students will be able to summarize and interpret key findings of research papers  
C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and oral presentations

E. **Assessment of Student Learning Three-Year Plan**

Described below is the plan for the next three years of assessment of program-level student learning outcomes.

1. **Student Learning Outcomes**

"University of New Mexico Student Learning Goals"
<table>
<thead>
<tr>
<th><strong>Program SLOs</strong></th>
<th>Knowledge</th>
<th>Skills</th>
<th>Responsibility</th>
<th>Program SLO is conceptually different from university goals.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1. Students will demonstrate an understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>B.1. Students will able to design, test, and evaluate scientific hypotheses</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>C.1. Students will be able to summarize and interpret key findings of research papers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and/or oral presentations</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

2. **How will learning outcomes be assessed?**
   
   A. **What:**
      
      i. This assessment focuses mainly on our core sequence since the core plays a key role in providing the intellectual foundation needed for more advanced courses in Biology. Moreover, as opposed to a highly diverse selection of post-core courses that students may take while completing our program with distinctly different emphases, the core is the only set of classes with a standardized curriculum that all majors must take. As
described further below, assessments of core SLOs will be used to assess program SLOs A.1-C.2.

To assess SLO A.1., B.1. and C.1., a list of appropriate questions for evaluating student knowledge of fundamental biological principles will be generated by faculty in each of our four core courses (Biol. 201-204). One to several questions will be selected to assess A.1 and B.1 for 201 in year 1, and A.1, B.1, and C.1 in 202, 203 in year 2 and 204 in year 3, in order to test both core-related SLOs and an overall breadth of knowledge that is to be evaluated for this program SLO. For SLO C.2., assessment of writing skills and/or oral presentations, combined with a familiarity with the scientific method will be made based on assignments in Biol. 203 and 204.

ii. Assessment of SLOs A.1.-C.2. will be via direct measurements;

iii. For each SLO, we will set an initial target of 60% of students demonstrating an acceptable or better performance as judged by exam scores or rubrics that evaluate more qualitative criteria. Rubrics will be generated by the faculty once this plan is adopted and will then posted on the Biology website as they become available.

iv. Every three years, we will give our 204 students an exit survey designed to evaluate how well we are doing with our 3 broad program goals stated in section D1 above via an indirect measurement.

B. Who: State explicitly whether the program’s assessment will include evidence from all students in the program or a sample. Address the validity of any proposed sample of students.

SLO A.1., B.1. and C.1 will be assessed based on test questions given to all students taking the four Biology core courses (i.e. formally declared majors, “pre-majors” who will eventually become Biology majors, and non-majors), because early in the core sequence, it can be difficult to differentiate unambiguously those three populations of students. By contrast, assessments of SLO C.2. will include data for only declared Biology majors in Biol. 203 and 204. Given the large number of Biology majors (>1200), assessments of conceptual, writing, and oratory skills (i.e. SLO C.2) will be evaluated only once every three years.

3. When will learning outcomes be assessed? When and in what forum will the results of the assessment be discussed?

[Briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. For example, provide a layout of the semesters or years (e.g., 2008-2009, 2009-2010, and 2010-2011), list which outcomes will be assessed, and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.)]

<table>
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<th>Year 1</th>
<th>Year 2</th>
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</tr>
</thead>
<tbody>
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<td>A.1. Students will demonstrate an</td>
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</tr>
</tbody>
</table>

Adapted from Kansas State University Office of Assessment
<table>
<thead>
<tr>
<th>understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization</th>
<th>administered in Biol. 201 the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester</th>
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<tbody>
<tr>
<td>B.1. Students will be able to design, test, and evaluate scientific hypotheses</td>
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</tr>
<tr>
<td>C.1. Students will be able to summarize and interpret key findings of research papers</td>
<td>Assignments to assess this SLO will be made in Biol. 202, 203 during the Fall; data will be compiled by teaching assistants</td>
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</tr>
</tbody>
</table>
C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and oral presentations (not whole class – select random ~10 of final papers or assignment in one of the labs – maybe Cara Lea helps with this – collecting these data)

Assignments to assess this SLO will be made in Biol. 203 during the Spring; data will be compiled and graphed by teaching assistants by the end of the semester; results for this and other SLO assessments will discussed as a whole at a faculty meeting the following Fall semester

Assignments to assess this SLO will be made in Biol. 204 during the Spring; data will be compiled and graphed by teaching assistants by the end of the semester; results for this and other SLO assessments will discussed as a whole at a faculty meeting the following Fall semester

4. What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?
   
   Briefly describe:
   
   1. who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations).
      
      The gathering of evidence will be conducted as described in the table above. Final analysis and interpretation of the data, in addition to the exit survey, will be carried out by the instructor of the course being evaluated, who will also present the data to the Undergraduate Policy Committee and faculty at an annual SLO assessment meeting to be held each Fall.

   2. the process for consideration of the implications of assessment for change:
      a. to assessment mechanisms themselves,
      b. to curriculum design,
c. to pedagogy
...in the interest of improving student learning.
Recommendations for change made by the instructor and Undergraduate Policy Committee will be considered by the entire Biology faculty, with significant input coming from the faculty involved in teaching the Biology core. Ramifications for curriculum design and changes to be implemented in pedagogy will also be considered by the entire Biology faculty in the general interest of improving student learning.

3. How, when, and to whom will recommendations be communicated?
Following discussion at the annual Assessment meeting of the faculty each Fall, and drawing upon continued electronic input via the Biology listserv, the Undergraduate Policy Committee will draft its summary recommendations that will be transmitted to the Chair, who can communicate these further to the Dean and/or the Associate Dean for Curriculum.
Plan for Assessment of Student Learning Outcomes
The University of New Mexico

A. **College, Department and Date**

1. College: Arts and Sciences
2. Department: Biology
3. Date: 20 May 2015

B. **Academic Program of Study**

B.S. Biology

C. **Contact Person(s) for the Assessment Plan**

Marcy Litvak, Associate Professor and Associate Chair, Biology

D. **Broad Program Goals & Measurable Student Learning Outcomes**

1. **Broad Program Learning Goals for this Degree/Certificate Program**

   A. To understand a wide range of basic principles in modern Biology
   B. To comprehend the scientific method and its application to problems in Biology
   C. To learn how to interpret and present biological data in written and oral formats

2. **List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program**

   A.1. Students will demonstrate an understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization
   B.1. Students will able to design, test, and evaluate scientific hypotheses
   C.1. Students will be able to summarize and interpret key findings of research papers
   C.2. Students will demonstrate a capacity for analyzing biological data and for producing coherent written and oral presentations

E. **Assessment of Student Learning Three-Year Plan**

Described below is the plan for the next three years of assessment of program-level student learning outcomes.

1. **Student Learning Outcomes**

   University of New Mexico Student Learning Goals
<table>
<thead>
<tr>
<th>Program SLOs</th>
<th>Knowledge</th>
<th>Skills</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1. Students will demonstrate an understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization</td>
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2. How will learning outcomes be assessed?

A. What:
   i. This assessment focuses mainly on our core sequence since the core plays a key role in providing the intellectual foundation needed for more advanced courses in Biology. Moreover, as opposed to a highly diverse selection of post-core courses that students may take while completing our program with distinctly different emphases, the core is the only set of classes with a standardized curriculum that all majors must take. As
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To assess SLO A.1., B.1. and C.1., a list of appropriate questions for evaluating student knowledge of fundamental biological principles will be generated by faculty in each of our four core courses (Biol. 201-204). One to several questions will be selected to assess A.1 and B.1 for 201 in year 1, and A.1, B.1, and C.1 in 202, 203 in year 2 and 204 in year 3, in order to test both core-related SLOs and an overall breadth of knowledge that is to be evaluated for this program SLO. For SLO C.2., assessment of writing skills and/or oral presentations, combined with a familiarity with the scientific method will be made based on assignments in Biol. 203 and 204.

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iii. For each SLO, we will set an initial target of 60\% of students demonstrating an acceptable or better performance as judged by exam scores or rubrics that evaluate more qualitative criteria. Rubrics will be generated by the faculty once this plan is adopted and will then posted on the Biology website as they become available.

iv. Every three years, we will give our 204 students an exit survey designed to evaluate how well we are doing with our 3 broad program goals stated in section D1 above via an indirect measurement.

B. Who: State explicitly whether the program’s assessment will include evidence from all students in the program or a sample. Address the validity of any proposed sample of students.

SLO A.1., B.1. and C.1 will be assessed based on test questions given to all students taking the four Biology core courses (i.e. formally declared majors, “pre-majors” who will eventually become Biology majors, and non-majors), because early in the core sequence, it can be difficult to differentiate unambiguously those three populations of students. By contrast, assessments of SLO C.2. will include data for only declared Biology majors in Biol. 203 and 204. Given the large number of Biology majors (>1200), assessments of conceptual, writing, and oratory skills (i.e. SLO C.2) will be evaluated only once every three years.

3. When will learning outcomes be assessed? When and in what forum will the results of the assessment be discussed?

[Briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. For example, provide a layout of the semesters or years (e.g., 2008-2009, 2009-2010, and 2010-2011), list which outcomes will be assessed, and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.).]

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Adapted from Kansas State University Office of Assessment
understanding of key principles in various biological sub-disciplines that span molecular to ecosystem levels of organization

| B.1. Students will be able to design, test, and evaluate scientific hypotheses |
|---|---|---|
| Exam questions will be selected to assess this SLO in **Biol. 201** during the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester | Assignments to assess this SLO will be made in **Biol. 202, 203** during the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester | Assignments to assess this SLO will be made in **Biol. 204** during the Fall; data will be compiled by teaching assistants by the end of the semester; results will be graphed along with data for other SLO assessments by the end of the Spring semester and discussed as a whole at a faculty meeting the following Fall semester |

| C.1. Students will be able to summarize and interpret key findings of research papers |
|---|---|---|
| Assignments to assess this SLO will be made in **Biol. 202, 203** during the Fall; data will be compiled by teaching assistants | Assignments to assess this SLO will be made in **Biol. 204** during the Fall; data will be compiled by teaching assistants |
### 4. What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?

**Briefly describe:**

1. **who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations).**

   The gathering of evidence will be conducted as described in the table above. Final analysis and interpretation of the data, in addition to the exit survey, will be carried out by the instructor of the course being evaluated, who will also present the data to the Undergraduate Policy Committee and faculty at an annual SLO assessment meeting to be held each Fall.

2. **the process for consideration of the implications of assessment for change:**
   - a. to assessment mechanisms themselves,
   - b. to curriculum design,
c. to pedagogy
...in the interest of improving student learning.
Recommendations for change made by the instructor and Undergraduate Policy Committee will be considered by the entire Biology faculty, with significant input coming from the faculty involved in teaching the Biology core. Ramifications for curriculum design and changes to be implemented in pedagogy will also be considered by the entire Biology faculty in the general interest of improving student learning.

3. How, when, and to whom will recommendations be communicated?
Following discussion at the annual Assessment meeting of the faculty each Fall, and drawing upon continued electronic input via the Biology listserv, the Undergraduate Policy Committee will draft its summary recommendations that will be transmitted to the Chair, who can communicate these further to the Dean and/or the Associate Dean for Curriculum.
A. College, Department and Date

1. College: Arts & Sciences
2. Department: Biology
3. Date: February 27, 2017

B. Academic Program of Study*

M.S., Biology, Plan I

C. Contact Person(s) for the Assessment Plan

Lee Taylor, Associate Professor and Associate Chair, fflt@unm.edu

D. Broad Program Goals & Measurable Student Learning Outcomes

[Attach Cover Sheet for Student Learning Outcomes and associated materials.]

OR

[List below:]

1. Broad Program Learning Goals for this Degree/Certificate Program
   A. A significant knowledge of biological theories, questions and approaches
   B. Capacity to conduct and communicate original, ethical research

2. List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program [Your program should have at least 3 and these should be aligned with the program Goals (as indicated by A, B, C, etc.) and UNM’s broad learning goals]
   A.1. Graduates will demonstrate knowledge of theories, questions and approaches across major areas of biology by discussing questions posed by committee members during the thesis defense at a level expected of a professional biologist or academic colleague.

   UNM Goals ( _√_ Knowledge _ √_ Skills ___ Responsibility)
A.2. Demonstrate understandings of the conceptual framework, major advances and important methodological approaches within their chosen discipline by discussing questions posed by committee members during the thesis defense at a level expected of a professional biologist or academic colleague.

UNM Goals ( _√_ Knowledge _√_ Skills ___ Responsibility)

B.1. Demonstrate the capacity to design and carry out research to address knowledge gaps.

UNM Goals ( _√_ Knowledge _√_ Skills ___ Responsibility)

B.2. Graduates will demonstrate understandings of ethical issues that intersect with scientific research by passing the evaluation at the required graduate ethics training and carrying out research that follows IRB/OACC and/or other relevant guidelines.

UNM Goals ( _√_ Knowledge ___ Skills _√_ Responsibility)

B.3. Exhibit scientific oral and written communication that is clear, logical, and effective.

UNM Goals ( _√_ Knowledge _√_ Skills ___ Responsibility)

B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.

UNM Goals ( _√_ Knowledge _√_ Skills _√_ Responsibility)

E. Assessment of Student Learning Three-Year Plan

All programs are expected to measure some outcomes and report annually and to measure all program outcomes at least once over a three-year review cycle.

1. Timeline for Assessment

*In the table below, briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. List when outcomes will be assessed and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.)*

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Assessment Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 1, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop. Implement evaluative questions for oral presentation, defense and written thesis.</td>
</tr>
<tr>
<td>Year 1, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLOs A.1. and A.2.</td>
</tr>
<tr>
<td>Year 2, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
</tbody>
</table>
2. **How will learning outcomes be assessed?**

Three instruments will be used in assessment of our SLOs. 1) We carry out an online annual survey of graduate students. 2 & 3) We have added questions and associated rubrics to the OGS Report of Examination and Report on Thesis that will be filled out by the thesis/dissertation committee. The tools utilized to assess our SLOs are summarized in the table below.

<table>
<thead>
<tr>
<th>Year</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year 2, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLOs B.1. and B.2.</td>
</tr>
<tr>
<td>Year 3, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
<tr>
<td>Student Learning Outcome</td>
<td>Evaluation of Oral Presentation</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>A.1. Obtain familiarity with theories, questions and approaches across major areas of biology.</td>
<td></td>
</tr>
<tr>
<td>A.2. Achieve understanding of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.</td>
<td>√</td>
</tr>
<tr>
<td>B.1. Demonstrate the capacity to design and carry out research to address knowledge gaps.</td>
<td>√</td>
</tr>
<tr>
<td>B.2. Awareness of ethical issues that intersect with scientific research.</td>
<td></td>
</tr>
<tr>
<td>B.3. Evidence scientific communication that is clear, logical, and effective.</td>
<td>√</td>
</tr>
<tr>
<td>B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.</td>
<td>√</td>
</tr>
</tbody>
</table>

A. What: A.1. Obtain familiarity with theories, questions and approaches across major areas of biology.

i. Oral Examination (Defense)
We assess students’ appreciation of the breadth of biological research during the oral portion of the defense. The Biology Department’s supplement to the OGS Report of Examination includes a question that assesses this component of a student’s knowledge (see Appendix 1A.1). A rubric (Appendix 1) aids examiners in grading the student using a 5 point scale: poor, fair, acceptable, good, superior. This question is not a primary determinant of a pass or fail outcome.

ii. This measure is direct.
iii. Success in helping students develop a general appreciation of the breadth of biological research will be defined as a rating of acceptable or better in 70% of oral exams.

What: A.2. Achieve understanding of the conceptual framework, major advances and important methodological approaches within their chosen discipline.
i. **Oral Examination (Defense)**
We will assess students’ knowledge of their chosen discipline within biology during the oral portion of the examination. The Biology Department’s supplement to the OGS thesis defense form evaluates depth of knowledge in the specific discipline (Appendix 1A.2).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

i. **Evaluation of Written Thesis**
We expect students to demonstrate depth of knowledge in their chosen subdiscipline in their written theses. The thesis should demonstrate not only understanding of their subdiscipline but ability to analyze, criticize and compare their work with the body of literature relevant to their subdiscipline. The Biology Department’s supplement to the OGS Report on Thesis will be filled out by each member of the student’s thesis committee (Appendix 1B.1).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

**What:** B.1. Demonstrate the capacity to design and carry out research to address knowledge gaps.

i. **Evaluation of Written Thesis**
We will evaluate each students’ ability to create original research, implement it and interpret it as demonstrated by their written thesis. The Biology Department’s supplement to the OGS Report on Thesis will be filled out by each member of the student’s thesis committee (Appendix 1B.2).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

i. **Annual Student Survey – Publications**
We will tabulate data from the Annual Graduate Survey (Appendix 2) to determine whether students are publishing their research in peer-reviewed journals, as a measure of capacity to design and carry out research to address knowledge gaps.

ii. These measures are direct.

iii. Criteria for success are that 50% of students publish at least one manuscript based on their thesis project to a peer-reviewed scientific journal. Note that publication of their thesis research after leaving UNM would also contribute to meeting this objective. Such publications will be tracked via student Google Scholar profiles.
What: B.2. Awareness of ethical issues that intersect with scientific research.

i. Ethics training and testing
All Biology graduate students are expected to complete the tutorial Overview of Responsible Conduct of Research available at http://grad.unm.edu/aire/ and complete the Scientific Integrity course by William Gannon that is part of our graduate orientation. At the end of this short-course, students will complete an examination.

ii. These measures are direct.

iii. Criteria for success are that 80% of students exhibit a strong ethical framework with respect to biological research as assessed in the examination described above.

What: B.3. Exhibit scientific oral and written communication that is clear, logical, and effective.

i. Oral Communication - Thesis Presentation
As part of their defense, MS I students give a formal public presentation of their research that is attended by all committee members, after which the defense examination takes place. A question on the Biology Department’s supplement to the OGS thesis defense form specifically evaluates communication skills (Appendix 1A.4).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the oral communication assessment.

i. Written Communication – Evaluation of Written Thesis
All MS I students turn in a written thesis describing their research that must be approved by all committee members. Student skills in written scientific communication will be evaluated by using the supplemental question on the OGS Report on Thesis filled out by each member of the student’s thesis committee (Appendix 1B.3).

ii. This measure is direct.

iii. Success will be defined as a rating of acceptable or better in 70% of thesis evaluations.

i. Written Communication - Publications
Acceptance of a research publication after peer-review is one indicator of effective scientific communication. We will track student publication of their research using the Annual Graduate Survey (Appendix 2) and verified using services such as the Web of Science and/or Google Scholar. Setting up a Google Scholar account is a requirement for incoming graduate students and will be part of the orientation workshop that the students attend at the beginning of their graduate program.

ii. These measures are direct.

iii. Criteria for success are that 50% of our MS I students publish one peer-reviewed paper as a result of their tenure at UNM.

What: B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.
i. **Oral Communication - Thesis Presentation**
All MS I students give an oral presentation of their thesis research. Their thesis committee will evaluate the degree to which their presentation communicates the importance/impact of their work in a way that can be understood by scientists from other disciplines and the public.

ii. These measures are direct.

iii. Criteria for success are that 70% of students score are deemed successful in communicating the importance and impact of their work.

3. **What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?**

_Briefly describe:_

1. *who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations)._)

SLOs and assessment plans will be placed on the Biology web site and incoming students will be alerted to these important documents during orientation, the week before Fall classes. The Graduate Coordinator and Department Data Manager will work with the Graduate Policy Committee (GPC) to administer the online annual survey and to disseminate and instruct faculty in the use of the new evaluative questions connected to the thesis defense. All faculty who serve on graduate committees will participate in applying the new evaluative questions. The data will be summarized using bar charts and other standard graphics and summary statistics such as means and standard deviations.

2. *the process for consideration of the implications of assessment for change:*
   a. to assessment mechanisms themselves,
   b. to curriculum design,
   c. to pedagogy
   ...*in the interest of improving student learning._

The GPC will meet to review and discuss the assessment data after each yearly assessment and will evaluate the effectiveness of our graduate program in light of our agreed upon student learning outcomes. The committee will then draft recommendations for how the department might address areas of concern (e.g. if the publication rate is perceived as too low, how can we modify our graduate curriculum to improve writing skills and motivate publication?). Additional faculty input will be requested by email and in the annual spring faculty meeting focused on our graduate programs. If certain areas appear particularly problematic, new faculty committees will be composed to attempt to address these issues. Note that nearly all Biology faculty committees include a graduate student member.

Nearly all our students take our Graduate Ecology and Graduate Evolution courses, so these classes will be a focus for pedagogical efforts. However, other areas may
best be addressed outside the classroom, e.g. by changes in the incentives or requirements of our graduate program.

3. *How, when, and to whom will recommendations be communicated?*

A summary of the meeting will be generated, and will be distributed on Biofac, our Biology Faculty listserv. We will also discuss some of the findings of our assessment efforts annually at a meeting of the Biology Graduate Student Association (BGSA).
ATTACHMENTS.

Appendix 1: New evaluative questions added to OGS forms

Appendix 2: Graduate annual survey
Appendix 1: New evaluative questions added to OGS forms

A. Addendum to OGS Report of Examination

To be filled out by each committee member at the end of the closed-door post-presentation oral exam. The rubric for evaluating performance on these components is as follows:

1 = Poor. Demonstrates limited knowledge or skills that fall below those expected for this graduate degree in biology.
2 = Fair. Demonstrates areas of knowledge and/or skills, but also exhibits significant gaps relative to what is expected for this graduate degree in Biology.
3 = Acceptable. Demonstrates a typical level of expected skills and/or knowledge appropriate to carry out academic and/or professional activities requiring this graduate degree in Biology.
4 = Good. Demonstrates considerable skills and/or knowledge in this dimension, beyond that required to function professionally as a holder of this graduate degree in Biology.
5 = Superior. Demonstrates advanced skills and/or knowledge in this dimension that far exceed those of a typical student who has completed this graduate degree in Biology.

1. In the oral presentation and examination, to what extent did the student demonstrate knowledge and understandings of important theories, questions and approaches across major areas of biology?

Circle one: 1 2 3 4 5

Comments:

2. In the oral presentation and examination, to what extent did the student demonstrate a firm grasp of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.

Circle one: 1 2 3 4 5

Comments:

3. In the oral presentation and examination, to what extent did the student demonstrate the capacity to effectively design and carry out research to address knowledge gaps.

Circle one: 1 2 3 4 5

Comments:

4. In the oral presentation, to what extent did the student demonstrate scientific communication that is clear, logical, and effective.

Circle one: 1 2 3 4 5
B. Addendum to OGS Report on Thesis or Dissertation

To be filled out by each committee member once the thesis or dissertation has been approved. The rubric for evaluating performance on these components is as follows:
1 = Poor. Demonstrates limited knowledge or skills that fall below those expected for this graduate degree in biology.
2 = Fair. Demonstrates areas of knowledge and/or skills, but also exhibits significant gaps relative to what is expected for this graduate degree in Biology.
3 = Acceptable. Demonstrates a typical level of expected skills and/or knowledge appropriate to carry out academic and/or professional activities requiring this graduate degree in Biology.
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5 = Superior. Demonstrates advanced skills and/or knowledge in this dimension that far exceed those of a typical student who has completed this graduate degree in Biology.

1. In the written thesis/dissertation, to what extent did the student demonstrate a firm understanding of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.

Circle one:  1  2  3  4  5

Comments:

2. In the written thesis/dissertation, to what extent did the student demonstrate the capacity to design and carry out research to address knowledge gaps.

Circle one:  1  2  3  4  5

Comments:

3. In the written thesis/dissertation, to what extent did the student demonstrate scientific communication that is clear, logical, and effective.

Circle one:  1  2  3  4  5

Comments:
**Academic Program**

**Plan for Assessment of Student Learning Outcomes**

**College of Arts and Sciences**

**The University of New Mexico**

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**A. College, Department and Date**

1. College: *Arts & Sciences*
2. Department: *Biology*
3. Date: *February 27, 2017*

**B. Academic Program of Study***

*M.S., Biology, Plan II (non-thesis)*

**C. Contact Person(s) for the Assessment Plan**

*Lee Taylor, Associate Professor and Associate Chair, fflt@unm.edu*

**D. Broad Program Goals & Measurable Student Learning Outcomes**

☐ [Attach Cover Sheet for Student Learning Outcomes and associated materials.]

OR

[List below:]

1. **Broad Program Learning Goals for this Degree/Certificate Program**

   A. Knowledge of fundamental facts and theories across biology.
   B. Familiarity with ongoing areas of research in biology.
   C. An appreciation of the need for an ethical framework in biology.

2. **List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program [Your program should have at least 3 and these should be aligned with the program Goals (as indicated by A, B, C, etc.) and UNM’s broad learning goals]**

   A.1. Graduates will demonstrate knowledge of theories, questions and approaches across major areas of biology by discussing questions posed by committee members during the oral exam at a level expected of a professional biologist or academic colleague.
   
   UNM Goals ( __√__ Knowledge __√__ Skills ___ Responsibility)

---

* * Academic Program of Study is defined as an approved course of study leading to a certificate or degree reflected on a UNM transcript. A graduate-level program of study typically includes a capstone experience (e.g. thesis, dissertation, professional paper or project, comprehensive exam, etc.).

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University of New Mexico – Assessment

Page 1 of 6
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Appendix 3-5 1
A.2. Ability to connect current outstanding questions in biology to appropriate methods of inquiry and analysis.

UNM Goals ( _√__ Knowledge _√__ Skills ___ Responsibility)

B.1. Ability to list and explain the importance of cutting-edge research topics in a chosen subdiscipline of biology.

UNM Goals ( _√__ Knowledge _√__ Skills ___ Responsibility)

C.1. Graduates will demonstrate understandings of ethical issues that intersect with scientific research by passing the evaluation at the required graduate ethics training.

UNM Goals ( _√__ Knowledge___ Skills _√__ Responsibility)

E. Assessment of Student Learning Three-Year Plan

All programs are expected to measure some outcomes and report annually and to measure all program outcomes at least once over a three-year review cycle.

1. Timeline for Assessment

In the table below, briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. List when outcomes will be assessed and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.)

<table>
<thead>
<tr>
<th>Year/Semester</th>
<th>Assessment Activities</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Administer Annual Graduate Survey. Test outcome of ethics workshop. Implement evaluative questions for oral presentation, defense and written thesis.</td>
</tr>
<tr>
<td>Year 1, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLOs A.1. and A.2.</td>
</tr>
<tr>
<td>Year 2, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
<tr>
<td>Year 2, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLO B.1.</td>
</tr>
<tr>
<td>Year 3, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
<tr>
<td>Year 3, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLO C.1.</td>
</tr>
</tbody>
</table>

2. How will learning outcomes be assessed?

i. **Oral Examination**
We assess students’ appreciation of the breadth of knowledge during the oral examination. The Biology Department’s supplement to the OGS Report of Examination includes a question that assesses this component of a student’s knowledge (see Appendix 1A.1). A rubric (Appendix 1) aids examiners in grading the student using a 5 point scale: poor, fair, acceptable, good, superior. This question is not a primary determinant of a pass or fail outcome.

ii. This measure is direct.

iii. Success will be defined as a rating of acceptable or better in 70% of oral exams.

**What:** A.2. Ability to connect current outstanding questions in biology to appropriate methods of inquiry and analysis.

ii. **Oral Examination**
We will assess students’ ability to connect current outstanding questions in biology to appropriate methods of inquiry and analysis during the oral examination.

iii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

**What:** B.1. Ability to list and explain the importance of cutting-edge research topics in a chosen subdiscipline of biology.

i. **Oral Examination**
We will assess students’ ability to list and explain the importance of cutting-edge research topics in a chosen subdiscipline of biology during the oral examination.

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

**What:** B.2. Awareness of ethical issues that intersect with scientific research

i. **Ethics training and testing**
All Biology graduate students are expected to complete the tutorial Overview of Responsible Conduct of Research available at http://grad.unm.edu/aire/ and complete the Scientific Integrity course by William Gannon that is part of our graduate orientation. At the end of this short-course, students will complete an examination.

ii. These measures are direct.

iii. Criteria for success are that 80% of students exhibit a strong ethical framework with respect to biological research as assessed in the examination described above.

3. **What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?**

*Briefly describe:*
1. who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations).

SLOs and assessment plans will be placed on the Biology web site and incoming students will be alerted to these important documents during orientation, the week before Fall classes. The Graduate Coordinator and Department Data Manager will work with the Graduate Policy Committee (GPC) to administer the online annual survey and to disseminate and instruct faculty in the use of the new evaluative questions connected to the thesis defense. All faculty who serve on graduate committees will participate in applying the new evaluative questions. The data will be summarized using bar charts and other standard graphics and summary statistics such as means and standard deviations.

2. the process for consideration of the implications of assessment for change:
   a. to assessment mechanisms themselves,
   b. to curriculum design,
   c. to pedagogy
   ...in the interest of improving student learning.

The GPC will meet to review and discuss the assessment data after each yearly assessment and will evaluate the effectiveness of our graduate program in light of our agreed upon student learning outcomes. The committee will then draft recommendations for how the department might address areas of concern. Additional faculty input will be requested by email and in the annual spring faculty meeting focused on our graduate programs. If certain areas appear particularly problematic, new faculty committees will be composed to attempt to address these issues. Note that nearly all Biology faculty committees include a graduate student member.

Nearly all our students take our Graduate Ecology and Graduate Evolution courses, so these classes will be a focus for pedagogical efforts. However, other areas may best be addressed outside the classroom, e.g. by changes in the incentives or requirements of our graduate program.

3. How, when, and to whom will recommendations be communicated?

A summary of the meeting will be generated, and will be distributed on Biofac, our Biology Faculty listserve. We will also discuss some of the findings of our assessment efforts annually at a meeting of the Biology Graduate Student Association (BGSA).
ATTACHMENTS.

Appendix 1: New evaluative questions added to OGS forms

Appendix 2: Graduate annual survey
Appendix 1: New evaluative questions added to OGS forms

A. Addendum to OGS Report of Examination

To be filled out by each committee member at the end of the closed-door post-presentation oral exam. The rubric for evaluating performance on these components is as follows:

1 = Poor. Demonstrates limited knowledge or skills that fall below those expected for this graduate degree in biology.
2 = Fair. Demonstrates areas of knowledge and/or skills, but also exhibits significant gaps relative to what is expected for this graduate degree in Biology.
3 = Acceptable. Demonstrates a typical level of expected skills and/or knowledge appropriate to carry out academic and/or professional activities requiring this graduate degree in Biology.
4 = Good. Demonstrates considerable skills and/or knowledge in this dimension, beyond that required to function professionally as a holder of this graduate degree in Biology.
5 = Superior. Demonstrates advanced skills and/or knowledge in this dimension that far exceed those of a typical student who has completed this graduate degree in Biology.

1. In the oral examination, to what extent did the student demonstrate a capacity to explain fundamental facts and major theories in genetics, molecular-cell biology, ecology, evolution, and development?

Circle one: 1 2 3 4 5

Comments:

2. In the oral examination, to what extent did the student demonstrate an ability to connect current outstanding questions in biology to appropriate methods of inquiry and analysis.

Circle one: 1 2 3 4 5

Comments:

3. In the oral examination, to what extent did the student demonstrate an ability to list and explain the importance of cutting-edge research topics in a chosen subdiscipline of biology.

Circle one: 1 2 3 4 5

Comments:
A. College, Department and Date

1. College: Arts & Sciences
2. Department: Biology
3. Date: February 27, 2017

B. Academic Program of Study*

Ph.D. in Biology

C. Contact Person(s) for the Assessment Plan

Lee Taylor, Associate Professor and Associate Chair, fflt@unm.edu

D. Broad Program Goals & Measurable Student Learning Outcomes

OR

[List below:]

1. Broad Program Learning Goals for this Degree/Certificate Program

A. A deep understanding of biological theories, questions and approaches
B. Capacity to build upon existing knowledge to create new knowledge and insight into biology through original, ethical research

2. List of Student Learning Outcomes (SLOs) for this Degree/Certificate Program [Your program should have at least 3 and these should be aligned with the program Goals (as indicated by A, B, C, etc.) and UNM’s broad learning goals]

A.1. Graduates will explain, compare and critique theories, questions and approaches across major areas of biology by answering questions posed by committee members during the dissertation defense at a level expected of a PhD-level biologist or academic colleague.

UNM Goals ( __√__ Knowledge __√__ Skills ___ Responsibility)
A.2. Graduates will demonstrate an ability to defend or revise the conceptual framework and important methodological approaches within their chosen discipline by carrying out original research that passes the bar of peer-review and by answering questions posed by committee members during the dissertation defense at a level expected of a PhD-level biologist or academic colleague.

UNM Goals ( _\checkmark__ Knowledge _\checkmark__ Skills ___ Responsibility)

B.1. Demonstrate the capacity to independently design and carry out novel research to address important knowledge gaps.

UNM Goals ( _\checkmark__ Knowledge _\checkmark__ Skills ___ Responsibility)

B.2. Capacity to evaluate and respond appropriately to ethical issues that intersect with scientific research by passing the evaluation at the required ethics training and carrying out research that follows IRB/OACC and/or other relevant guidelines.

UNM Goals ( _\checkmark__ Knowledge ___ Skills _\checkmark__ Responsibility)

B.3. Demonstrate scientific oral and written communication that is clear, logical, and compelling.

UNM Goals ( _\checkmark__ Knowledge _\checkmark__ Skills ___ Responsibility)

B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.

UNM Goals ( _\checkmark__ Knowledge _\checkmark__ Skills _\checkmark__ Responsibility)

E. Assessment of Student Learning Three-Year Plan

All programs are expected to measure some outcomes and report annually and to measure all program outcomes at least once over a three-year review cycle.

1. Timeline for Assessment

In the table below, briefly describe the timeframe over which your unit will conduct the assessment of learning outcomes selected for the three-year plan. List when outcomes will be assessed and which semester/year the results will be discussed and used to improve student learning (e.g., discussed with program faculty, interdepartmental faculty, advisory boards, students, etc.)

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</tr>
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<td>Year 1, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and</td>
</tr>
<tr>
<td>Year 2, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------------------------------------------</td>
</tr>
<tr>
<td>Year 2, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLOs A.1. and A.2.</td>
</tr>
<tr>
<td>Year 3, Fall</td>
<td>Administer Annual Graduate Survey. Test outcome of ethics workshop.</td>
</tr>
<tr>
<td>Year 3, Spring</td>
<td>Implement evaluative questions for oral presentation, defense and written thesis. Collate and analyze data for SLOs B.1. and B.2.</td>
</tr>
</tbody>
</table>

### 2. How will learning outcomes be assessed?

Three instruments will be used in assessment of our SLOs. 1) We carry out an online annual survey of graduate students. 2 & 3) We have added questions and associated rubrics to the OGS Report of Examination and Report on Thesis that will be filled out by the thesis/dissertation committee. The tools utilized to assess our SLOs are summarized in the table below.

<table>
<thead>
<tr>
<th>Student Learning Outcome</th>
<th>Evaluation of Oral Presentation</th>
<th>Evaluation of Oral Examination</th>
<th>Evaluation of Written Thesis</th>
<th>Student Annual Survey</th>
<th>Ethics Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1. Obtain familiarity with theories, questions and approaches across major areas of biology.</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A.2. Achieve understanding of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.</td>
<td>√</td>
<td>√</td>
<td>√</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.1. Demonstrate the capacity to design and carry out research to address knowledge gaps.</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B.2. Awareness of ethical issues that intersect with scientific research.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>B.3. Evidence scientific communication that is clear, logical, and effective.</td>
<td>√</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.</td>
<td></td>
<td>√</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
A. **What**: A.1. Capacity to explain, compare and critique theories, questions and approaches across major areas of biology.

i. **Oral Examinations**
We assess students’ capacity to explain, compare and critique theories, questions and approaches across major areas of biology during the oral portion of the comprehensive exam, and again during the dissertation defense. The Biology Department’s supplement to the OGS Report of Examination includes a question that assesses this component of a student’s knowledge (see Appendix 1A.1). A rubric (Appendix 1) aids examiners in grading the student using a 5 point scale: poor, fair, acceptable, good, superior. This question is not a primary determinant of a pass or fail outcome.

ii. This measure is direct.

iii. Success in helping students develop a general appreciation of the breadth of biological research will be defined as a rating of acceptable or better in 70% of oral exams.

i. **Evaluation of Written Thesis**
We expect students to demonstrate novel insight into biological theories and research approaches in their written dissertation. The Biology Department’s supplement to the OGS Report on Dissertation will be filled out by each member of the student’s thesis committee (Appendix 1B.1).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

**What**: A.2. Ability to defend or revise the conceptual framework and important methodological approaches within their chosen discipline.

i. **Oral Examinations**
We will assess students’ capacity to challenge or support existing paradigms in their chosen subdiscipline within biology during the oral portion of both the comprehensive exam and the defense. The Biology Department’s supplement to the OGS thesis defense form evaluates depth of knowledge in the specific discipline (Appendix 1A.2).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

i. **Evaluation of Written Thesis**
We expect students to demonstrate the capacity to challenge or support existing paradigms in their chosen subdiscipline in their written dissertation. The Biology Department’s supplement to the OGS Report on Thesis will be filled out by each member of the student’s thesis committee (Appendix 1B.1).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.
What: B.1. Demonstrate the capacity to independently design and carry out novel research to address important knowledge gaps.

i. Evaluation of Written Thesis
We will evaluate each students’ ability to create original research, implement it and interpret it as demonstrated by their written thesis. The Biology Department’s supplement to the OGS Report on Thesis will be filled out by each member of the student’s thesis committee (Appendix 1B.2).

ii. These measures are direct.
iii. Criteria for success are that 70% of students score acceptable or above on the depth of knowledge assessment.

i. Annual Student Survey – Publications
We will tabulate data from the Annual Graduate Survey (Appendix 2) to determine whether students are publishing their research in peer-reviewed journals, as a measure of capacity to design and carry out research to address knowledge gaps.

ii. These measures are direct.
iii. Criteria for success are that 50% of students publish at least one manuscript based on their thesis project to a peer-reviewed scientific journal. Note that publication of their thesis research after leaving UNM would also contribute to meeting this objective. Such publications will be tracked via student Google Scholar profiles.

What: B.2. Capacity to evaluate and respond appropriately to ethical issues that intersect with their area of biological research.

i. Ethics training and testing
All Biology graduate students are expected to complete the tutorial Overview of Responsible Conduct of Research available at http://grad.unm.edu/aire/ and complete the Scientific Integrity course by William Gannon that is part of our graduate orientation. At the end of this short-course, students will complete an examination.

ii. These measures are direct.
iii. Criteria for success are that 80% of students exhibit a strong ethical framework with respect to biological research as assessed in the examination described above.

i. Oral Examination (defense)
Upon concluding their research, PhD students should be able to identify and evaluate key ethical issues that intersect with their area of research. This capacity will be evaluated through committee questioning during the oral defense.

ii. These measures are direct.
iii. Criteria for success are that 70% of students score acceptable or above on this ethics assessment.

What: B.3. Demonstrate scientific oral and written communication that is clear, logical, and compelling.
i. **Oral Communication – Dissertation Presentation**
As part of their defense, PhD students give a formal public presentation of their research that is attended by all committee members, after which the defense examination takes place. A question on the Biology Department’s supplement to the OGS dissertation defense form specifically evaluates communication skills (Appendix 1A.4).

ii. These measures are direct.

iii. Criteria for success are that 70% of students score acceptable or above on the oral communication assessment.

i. **Written Communication – Evaluation of Written Dissertation**
All PhD students turn in a written dissertation describing their research that must be approved by all committee members. Student skills in written scientific communication will be evaluated by using the supplemental question on the OGS Report on Dissertation filled out by each member of the student’s thesis committee (Appendix 1B.3).

ii. This measure is direct.

iii. Success will be defined as a rating of acceptable or better in 70% of thesis evaluations.

i. **Written Communication - Publications**
Acceptance of a research publication after peer-review is one indicator of effective scientific communication. We will track student publication of their research using the Annual Graduate Survey (Appendix 2) and verified using services such as the Web of Science and/or Google Scholar. Setting up a Google Scholar account is a requirement for incoming graduate students and will be part of the orientation workshop that the students attend at the beginning of their graduate program.

ii. These measures are direct.

iii. Criteria for success are that 80% of our PhD students publish at least one peer-reviewed paper as a result of their tenure at UNM.

**What:** B.4. Demonstrate an ability to convincingly explain the importance and impact of his/her research in lay terms to scientists from other disciplines and the public.

i. **Oral Communication - Thesis Presentation**
All PhD students give several oral presentations of their dissertation research. Their dissertation committee will evaluate the degree to which their presentation communicates the importance/impact of their work in a way that can be understood by scientists from other disciplines and the public.

ii. These measures are direct.

iii. Criteria for success are that 70% of students score are deemed successful in communicating the importance and impact of their work.

### 3. What is the unit’s process to analyze/interpret assessment data and use results to improve student learning?

**Briefly describe:**
1. who will participate in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations).

SLOs and assessment plans will be placed on the Biology web site and incoming students will be alerted to these important documents during orientation, the week before Fall classes. The Graduate Coordinator and Department Data Manager will work with the Graduate Policy Committee (GPC) to administer the online annual survey and to disseminate and instruct faculty in the use of the new evaluative questions connected to the thesis defense. All faculty who serve on graduate committees will participate in applying the new evaluative questions. The data will be summarized using bar charts and other standard graphics and summary statistics such as means and standard deviations.

2. the process for consideration of the implications of assessment for change:
   a. to assessment mechanisms themselves,
   b. to curriculum design,
   c. to pedagogy
   ...in the interest of improving student learning.

The GPC will meet to review and discuss the assessment data after each yearly assessment and will evaluate the effectiveness of our graduate program in light of our agreed upon student learning outcomes. The committee will then draft recommendations for how the department might address areas of concern (e.g. if the publication rate is perceived as too low, how can we modify our graduate curriculum to improve writing skills and motivate publication?). Additional faculty input will be requested by email and in the annual spring faculty meeting focused on our graduate programs. If certain areas appear particularly problematic, new faculty committees will be composed to attempt to address these issues. Note that nearly all Biology faculty committees include a graduate student member.

Nearly all our students take our Graduate Ecology and Graduate Evolution courses, so these classes will be a focus for pedagogical efforts. However, other areas may best be addressed outside the classroom, e.g. by changes in the incentives or requirements of our graduate program.

3. How, when, and to whom will recommendations be communicated?

A summary of the meeting will be generated, and will be distributed on Biofac, our Biology Faculty listserv. We will also discuss some of the findings of our assessment efforts annually at a meeting of the Biology Graduate Student Association (BGSA).
ATTACHMENTS.

Appendix 1: New evaluative questions added to OGS forms

Appendix 2: Graduate annual survey
Appendix 1: New evaluative questions added to OGS forms

A. Addendum to OGS Report of Examination

To be filled out by each committee member at the end of the closed-door post-presentation oral exam. The rubric for evaluating performance on these components is as follows:

1 = Poor. Demonstrates limited knowledge or skills that fall below those expected for this graduate degree in biology.
2 = Fair. Demonstrates areas of knowledge and/or skills, but also exhibits significant gaps relative to what is expected for this graduate degree in Biology.
3 = Acceptable. Demonstrates a typical level of expected skills and/or knowledge appropriate to carry out academic and/or professional activities requiring this graduate degree in Biology.
4 = Good. Demonstrates considerable skills and/or knowledge in this dimension, beyond that required to function professionally as a holder of this graduate degree in Biology.
5 = Superior. Demonstrates advanced skills and/or knowledge in this dimension that far exceed those of a typical student who has completed this graduate degree in Biology.

1. In the oral presentation and examination, to what extent did the student demonstrate knowledge and understandings of important theories, questions and approaches across major areas of biology?

Circle one: 1 2 3 4 5

Comments:

2. In the oral presentation and examination, to what extent did the student demonstrate a firm grasp of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.

Circle one: 1 2 3 4 5

Comments:

3. In the oral presentation and examination, to what extent did the student demonstrate the capacity to effectively design and carry out research to address knowledge gaps.

Circle one: 1 2 3 4 5

Comments:

4. In the oral presentation, to what extent did the student demonstrate scientific communication that is clear, logical, and effective.

Circle one: 1 2 3 4 5
Comments:

**B. Addendum to OGS Report on Thesis or Dissertation**

To be filled out by each committee member once the thesis or dissertation has been approved. The rubric for evaluating performance on these components is as follows:

1 = Poor. Demonstrates limited knowledge or skills that fall below those expected for this graduate degree in biology.
2 = Fair. Demonstrates areas of knowledge and/or skills, but also exhibits significant gaps relative to what is expected for this graduate degree in Biology.
3 = Acceptable. Demonstrates a typical level of expected skills and/or knowledge appropriate to carry out academic and/or professional activities requiring this graduate degree in Biology.
4 = Good. Demonstrates considerable skills and/or knowledge in this dimension, beyond that required to function professionally as a holder of this graduate degree in Biology.
5 = Superior. Demonstrates advanced skills and/or knowledge in this dimension that far exceed those of a typical student who has completed this graduate degree in Biology.

1. In the written thesis/dissertation, to what extent did the student demonstrate a firm understanding of the conceptual framework, major advances and important methodological approaches within their chosen subdiscipline.

Circle one: 1 2 3 4 5

Comments:

2. In the written thesis/dissertation, to what extent did the student demonstrate the capacity to design and carry out research to address knowledge gaps.

Circle one: 1 2 3 4 5

Comments:

3. In the written thesis/dissertation, to what extent did the student demonstrate scientific communication that is clear, logical, and effective.

Circle one: 1 2 3 4 5

Comments:
Biographical Sketch

Coenraad M Adema (PhD)
Associate Professor
Biology MSC03 2020, University of New Mexico
505 277 2743
coenadem@unm.edu

(a) Professional Preparation:
Universiteit van Amsterdam Netherlands Medical Biology BS 1984.
Universiteit van Amsterdam Netherlands Parasitology MS cum laude 1987.
Vrije Universiteit Amsterdam Netherlands Comp.Immunology/ PhD 1992.
Parasitology,
University of New Mexico USA Comp Immunology/ Postdoc 1993-1998.
Parasitology.

(b) Appointments:
2012- Associate Professor Biology with Tenure, University of New Mexico.
2010-2012 Associate Professor Biology, University of New Mexico.
2006-2009 Lecturer, Biology, University of New Mexico.
2004-2009 Research Associate Professor Biology, University of New Mexico.
1999-2003 Research Assistant Professor Biology, University of New Mexico.

(c) Products
(i) 5 publications most closely related to proposal:

(ii) 5 other significant publications (of 60 total publications, H-index 30, I-10-index 48; https://scholar.google.com/citations?user=XYcdRNwAAAAJ&hl=en):
1) Adema CM, 166 co-authors (2017) Whole genome analysis of a schistosomiasis-transmitting freshwater snail. Revised manuscript under consideration at Nature Communications.
snail/schistosome interactions: from field to theory to molecular mechanisms. Developmental and
Comparative Immunology 37, 1-8. PMID 21945832
somaically diversified lectin in resistance of an invertebrate to parasite infection. Proceedings of
the National Academy of Science USA, 107:21087-21092. PMC3000291
4) Qiu S, Adema CM, Lane T (2005) A computational study of off-target effects of RNA-
in an invertebrate. Science 305:251-254. PMID 15247481

(d) Synergistic Activities
1) International Collaboration: Founding member of international Biomphalaria glabrata
genome initiative, Chair of steering committee, coordinating project from initial sequencing to
annotation, interacting with NIH, McDonell Sequencing Center (Washington University St. Louis
MO), VectorBase and over 100 international investigators for annotation (2001-current). The
manuscript (listed above ii.1) has been revised and is under consideration at Nature
Communications.
2) Reviewing: I review research grant proposals, both locally and nationally for state, federal,
and international organizations in ad-hoc and panel member capacities. These include Minority
proposals (2003-current), Vector Biology (VB) study section NIH NIAID (member 2003-2005;
ad-hoc 2006, 2010). Innovative Research Incentives Scheme, Netherlands Organization for
Scientific Research (ad-hoc Reviewer, 2013), Large-Scale DNA Sequencing Projects, France
Institut de Génomique CEA/DSV (ad-hoc Reviewer, 2013), Tropical Medicine Research Centers
(TMRC), NIH NIAID (member 2016).
3) Broadening participation: I serve as mentor at UNM for undergraduate students in the
Minority Biomedical Research Support (MBRS); Access to Research Careers (MARC); Initiative
for Minority Student Development (IMSD); and Alliance for Minority Participation (AMP)
programs, and for Post-baccalaureate Research and Education Program (PREP) scholars. Students
perform research projects in the lab, several have been included as authors on research
publications, students regularly participate in annual meetings of Society for Advancement of
Chicanos and Native Americans in Science (SACNAS).
4) Innovation in Teaching: My lecture/lab class Laboratory Methods for Molecular Biology
(undergraduate and graduate levels) incorporates research projects without predictable outcomes
to give students a sense of real research. Lab activities include skill development from reading
instructions, critical understanding of molar and concentration calculations to prepare reagents,
fine motor skills to combine reagents and keeping track of research progress to social interactions
with lab partners and instructors. I require students to study literature and contribute an oral
presentation in class, and prepare a report in the format of a paper submission. Experimental
sequence data are accessioned in Genbank and attributed to the students. In 2016, I obtained
support from UNM and the Biology department and included hands-on student training in
Illumina genome sequencing and computational annotation (mitochondrial genome) using locally
collected field samples.
Biographical Sketch
Michael J. Andersen
Department of Biology and Museum of Southwestern Biology
University of New Mexico, Albuquerque, NM 87131
e-mail: mjandersen@unm.edu

(a) Professional Preparation

Cornell University Ithaca, NY Natural Resources BS, 2004
University of Kansas Lawrence, KS Ecol. & Evol. Biology PhD, 2013

(b) Appointments

2015– Assistant Professor and Associate Curator of Birds, Department of Biology and Museum of Southwestern Biology, University of New Mexico.
2014–2015 Chapman Postdoctoral Fellow, Department of Ornithology, American Museum of Natural History.
2008– Lab Associate, Macaulay Library, Cornell Lab of Ornithology, Cornell University.

Products

(ci) Products Related to the Proposed Project


(cii) Other Significant Products


(d) Synergistic Activities

1. *Graduate student mentorship* – Academic advisor for two Master’s students and graduate advisory committee member for one PhD student and three Master’s students at the University of New Mexico.

2. *Training and outreach* – Field and museum curatorial training of personnel from wildlife and forestry departments, museums, universities, and NGOs in Argentina, Democratic Republic of Congo, Fiji, Peru, Sierra Leone, and Vanuatu. Training has consisted of techniques in field ornithology including bird observation, specimen acquisition with firearms and mist nets, specimen preparation, data collection, and field curation. Trained numerous undergraduate and graduate students at KU, AMNH, and UNM in molecular lab techniques, including RAD-seq and UCE library preparation, bioinformatics, and phylogenetic analyses.

3. *Bird song recording and training* – Field and classroom training in field audio recording techniques to >100 graduate students, field biologists, museum curators, and teachers. This work was conducted in California, Mexico, and Cuba in collaboration with the Macaulay Library at the Cornell Lab of Ornithology (CLO). Training included co-teaching hands-on courses at biological field stations, lecture-based workshops at professional ornithological meetings (North American Ornithological Conference IV, Veracruz, Mexico), and one-on-one training for visiting researchers at the CLO.

4. *Museum and database accessions* – Eleven foreign specimen collecting expeditions in six countries since 2005; resulted in >2,500 avian research specimens. Specimens are deposited and curated in museums in Argentina, Fiji, Peru, Vanuatu, and multiple US institutions. Deposited 1,934 audio recordings of birds in the Macaulay Library from field work in Argentina, Chile, Democratic Republic of Congo, Fiji, Mexico, Peru, Sierra Leone, Vanuatu, and the following localities in the United States: Alaska, California, Florida, Kansas, Nebraska, New York, Oregon, and Puerto Rico. All bird specimens are searchable online via VertNet <http://portal.verbnet.org> and all recordings are available online via <http://macaulaylibrary.org>. Submitted 6,938 personal bird checklists from 17 countries to eBird <http://ebird.org/>, an NSF-funded, citizen-science database for reporting bird observations from around the world.

5. *Editorial and review service* – Manuscript peer review for 14 professional journals and book reviews written for *Quarterly Review of Biology* and *Birding*.

(e) Collaborators & Other Affiliations

See attached spreadsheet.
Professional Preparation:
B.A. 1975 Biology Wittenberg University, Springfield OH
M.S. 1977 Botany Miami University, Oxford OH
Ph.D. 1981 Botany University of Oklahoma, Norman, OK

Appointments:
2016- Distinguished Professor, University of New Mexico
2012- Regents' Professor and Loren Potter Chair of Plant Ecology
2003- Professor, Department of Biology, University of New Mexico
2003-2014 PI, Sevilleta LTER
2001- Professor, Arizona State University
1992-2003 Program Director, National Science Foundation
1985-1994 Assistant and Associate Professor of Botany, University of Oklahoma.
1984 Postdoctoral Fellow, Dr. Ralph E. Good, Rutgers University.
1981-1983 Visiting Assistant Professor of Botany, University of Oklahoma.

Publications:


Synergistic Activities:
Editor-in-Chief BioScience (2016-present)
President – Ecological Society of America (2012-2013)
Vice President for Public Affairs – Ecological Society of America (2014-2015)
Chair (elected) – LTER Science Council and Executive Board (2011-2014)
Advisor – UNM SEEDS Chapter (2005-present)
Biographical Sketch---Joseph Anthony Cook

a. Professional Preparation:
   Western New Mexico University, Silver City, BS, Biology 1980
   University of New Mexico, Albuquerque, M.S. 1982 Zoology; Ph.D. Biology, 1990

b. Appointments:
   Present  Professor, Biology Department, University of New Mexico
            Director, Museum Southwestern Biology (2011-)
            Curator of Mammals (2003-) and Genomic Resources (2008-)
   2013    Scientist in Residence, Sitka Sound Science Center, Alaska
   2000-2003 Chair and Professor of Biology
            Biological Sciences, Idaho State University
   1990-2001: Curator of Mammals, University of Alaska Museum
            Assistant/Associate/Full Professor of Biology, University of Alaska
            Member, Biochemistry and Molecular Biology Program
   1997:    Faculty Adjunct, Universidad Gabriel Rene Moreno, Santa Cruz, Bolivia
   1993-1996: Faculty Adjunct, Universidad de la Republica, Montevideo, Uruguay
   1993:    J. William Fulbright Fellowship (Uruguay)

c. Products:
   Dunnum, J. L., R. Yanagihara, K. M. Johnson, B. Armien, N. Batsaikhan, L. Morgan, and J. A.
   Cook. 2017. Biospecimen repositories and integrated databases as critical infrastructure for pathogen
   Sawyer, Y. E. and J. A. Cook. 2016. Phylogeographic structure in long-tailed voles (Rodentia:
   Arvicolinae) belies the complex Pleistocene history of isolation, divergence and recolonization of
   rodent (Clethrionomys rutilus): Testing high-latitude biogeographic hypotheses and the dynamics of
   Lessa, E. P., J. A. Cook, and J. L. Patton. 2003. Genetic footprints of demographic expansion in
   North America, but not Amazonia, following the Late Pleistocene. Proc. Nat. Acad. Sci. 100:10331-
   10334.

   Five other products (of 181 total pubs):
   Collections of Mammals and Associated Parasites Reveal Novel Perspectives on Evolutionary and
   Esselstyn, K. Galbreath, J. Hawdon, H. Hoekstra, S. Kutz, J. Light, L. Olson, B. D. Patterson, J. L. Patton,
   principles for NEON sampling of mammalian parasites and pathogens: a response to Springer and
   Cook, J.A., B.S. McLean, D.J. Jackson, J.P. Colella, S. E. Greiman, V.V. Tkach, T.S. Jung, J.L.
   Dunnum. 2016. First Record of the Holarctic Least Shrew (Sorex minutissimus) and Associated

d. Synergistic Activities

1) Natural History Museum Activities: Curation of the University of Alaska Museum Mammal Collection until 2001 (>400% increase in size to 79,000 specimens). Initiated and Curated the Alaska Frozen Tissue Collection until 2001 (>60,000 specimens----4th largest for wild mammals worldwide; average > 70 loans annually). Curation of the MSB Mammal Collection since 2003 and Division of Genomic Resources since 2007. Initiated web-based database (ARCTOS) at MSB and added 170,000 specimens to date (Mammal Collection 130% increase to 3rd largest worldwide; DGR now largest frozen mammal tissue worldwide). Initiated the Division of Parasitology at the Museum of Southwestern Biology with acquisition of Rausch Collection, 2009.

2) Program Development: Co-founded ISLES, BCP & CIIBA. ISLES is a federal agency-academic partnership focused on integrating conservation biogeography into the management of the Alexander Archipelago, Alaska. BCP (Beringian Coevolution Project) was a museum-based field project aimed at uncovering the history of the dynamic nexus between Asia and North America with significant international collaborative ties (Siberia, Mongolia, Canada, Finland). CIIBA (Collaborative Integrative Investigations of Arctic Biomes) is an extension of BCP that is exploring the biogeographic boundaries and history of Beringia. Specimens from these projects have produced >300 publications and graduate theses since 1991.

3) Student Training: Director, UNO (Undergraduate Opportunities) Program ($1M) at UNM that paired underrepresented students with graduate and faculty members and supported professional development (46 students; 2007-2013). Also, sponsored participation of 10 Native American students (3 masters, 2 senior honors project), numerous US Hispanic and African American, and 18 Latin American (Chile, Mexico, Paraguay, Bolivia, Uruguay, Ecuador) students in my research group (95 undergrad, 18 masters, 10 doctoral, and 10 postdoctoral associates completed).

4) Courses in Latin America: Taught in Uruguay, Paraguay, Bolivia, Costa Rica, Ecuador, and Panama on molecular and specimen-based approaches to evolution and conservation (since 1993).

5) Professional Service: Board of Directors and President, Natural Science Collections Alliance; Steering Committee, VertNet; Steering Committee, CollectionsWeb Research Coordinating Network; Chair, Steering Committee, AIM-UP!-PI, Research Coordinating Network in Undergraduate Biology Education (40 institutions 2010-2016); Steering Committee and Chair, ARCTOS; Convener and Lead, Genetic Resources (2008-2013), Arctic Biodiversity Assessment, Conservation of Arctic Fauna and Flora (CAFF); NIBA writing committee for implementation activities; Steering Committee, BCoN (Biodiversity Collections Network). American Society of Mammalogists---Board of Directors, (9 years); Associate Editor, Journal of Mammalogy; Chair of Conservation, Conservation Awards, & Latin American Awards committees.
Cara Lea Council-Garcia
Curriculum Vitae

UNM Department of Biology
MSC03-2020
1 University of New Mexico
Albuquerque, NM 87131-0001

Phone: 505-277-3645
Fax: 505-277-0304
Email: ccouncil@unm.edu
Office: 66 Castetter Hall

ACADEMIC POSITIONS

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
<th>Department of Biology, Location</th>
<th>Duties</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014 – current</td>
<td>Biology Majors Core Laboratory Coordinator/Principal Lecture II/Academic Advisor</td>
<td>University of New Mexico, Albuquerque, NM</td>
<td>Duties include the continued instruction and management of ~45 major introductory biology core labs each semester (~8 during summer), the supervision of graduate lab and teaching assistants, the development of new lab exercises, participation in the constant improvement of the biology core curriculum, and advisement of undergraduate biology majors.</td>
</tr>
<tr>
<td>2002 – 2013</td>
<td>Biology Laboratory Coordinator/Principal Lecture II (F12)/Academic Advisor</td>
<td>University of New Mexico, Albuquerque, NM</td>
<td>Duties include the instruction and management of ~70 major and non-major introductory biology labs each semester (~8 during summer), the supervision of graduate lab and teaching assistants, the development of new lab exercises, participation in the development of a new biology core curriculum, and advisement of undergraduate biology majors.</td>
</tr>
<tr>
<td>2001 – 2002</td>
<td>Instructor/Assistant Laboratory Coordinator</td>
<td>Department of Biology, Iowa State University, Ames, IA</td>
<td>Duties included the teaching of undergraduate biology major labs and the organization, preparation, and maintenance of teaching labs and experiments.</td>
</tr>
<tr>
<td>1998 – 2001</td>
<td>Graduate Research Assistant</td>
<td>Iowa State University, Ames, IA</td>
<td>Duties included the construction of an RFLP framework map for tetraploid alfalfa.</td>
</tr>
<tr>
<td>1998, 2001</td>
<td>Graduate Teaching Assistant</td>
<td>Iowa State University, Ames, IA</td>
<td>Duties included the teaching of undergraduate biology major labs.</td>
</tr>
<tr>
<td>1996 – 1998</td>
<td>Laboratory Technician/Research Assistant</td>
<td>New Mexico State University, Las Cruces, NM</td>
<td>Duties included the development of RAPDs and AFLPs in standard cotton lines, research on SCARs of RAPDs in NMSU cotton, organization and maintenance of research lab and experiments.</td>
</tr>
<tr>
<td>1995-1997</td>
<td>Research Assistant</td>
<td>New Mexico State University, Las Cruces, NM</td>
<td>Duties included the identification, mounting, and cataloging of plant specimens in NMSU Biology Herbarium.</td>
</tr>
</tbody>
</table>
EDUCATION
2001 M.S. in Genetics, Interdepartmental Genetics Program, Iowa State University, Ames, IA; Thesis Title: *Mapping Yield in Alfalfa* (Dr. E. Charles Brummer)

1997 B.S. in Biology, Department of Biology, New Mexico State University, Las Cruces, NM; Honors Thesis Title: *Characterization of RAPDs in NMSU Cotton Lines NM24022 and NM24011* (Dr. Roy G. Cantrell)

PUBLICATIONS


CONFERENCE PRESENTATIONS


Council, C.L. and R.C. Cantrell. 1997. SCARs of RAPDs in NMSU cotton lines NM24022 and NM24011. NMSU Undergraduate Research Symposium. 18 April. Las Cruces, NM. (presenter)
**Richard M. Cripps**
Department of Biology, University of New Mexico

### a. Professional Preparation

<table>
<thead>
<tr>
<th>Institution</th>
<th>Major</th>
<th>Degree</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of York, York, UK</td>
<td>Genetics</td>
<td>B.Sc. (Hons.)</td>
<td>1987</td>
</tr>
<tr>
<td>University of York, York, UK</td>
<td>Biology</td>
<td>D. Phil.</td>
<td>1990</td>
</tr>
<tr>
<td>San Diego State University, CA</td>
<td>Molecular Biology</td>
<td>Postdoctoral</td>
<td>1990-1996</td>
</tr>
<tr>
<td>University of Texas Southwestern, TX</td>
<td>Molecular Genetics</td>
<td>Postdoctoral</td>
<td>1996-1998</td>
</tr>
</tbody>
</table>

### b. Appointments

- 2009-present: Professor, Department of Biology, University of New Mexico, NM.
- 2009-2013: Professor and Chair, Department of Biology, University of New Mexico, NM.
- 2004-2009: Associate Professor, Department of Biology, University of New Mexico, NM.
- 1998-2004: Assistant Professor, Department of Biology, University of New Mexico, NM.
- 1996-1998: Instructor, The University of Texas Southwestern Medical Center at Dallas, TX.
- 1990-1996: Research Asst. Prof., Department of Biology, San Diego State University, CA.

### c. Publications

#### (i) PUBLICATIONS MOST CLOSELY RELATED


#### (ii) OTHER SIGNIFICANT PUBLICATIONS


2. LaBeau-DiMenna EM, Clark KA, Bauman KD, Parker DS, Cripps RM and Geisbrecht ER. (2012) Thin, a TRIM32 ortholog, is essential for myofibril stability and is required for the integrity of the costamere in Drosophila. *Proc Natl Acad Sci USA* 109: 17983-17988. PMCID: PMC3497806


### d. Synergistic activities

1. Review panels:
   - 2016: NAGMS Council, NIG/NIGMS.
2014  Mail review, NSF IOS grant application.
2015  Reviewer, special emphasis panel, Cardiovasc. Development Consortium grants.
2015  ad hoc member, CDD study section, NIH.
2014  Mail review, NSF IOS grant application.
2014  ad hoc, Skeletal Muscle Biology and Exercise Physiology study section, NIH.
2010-present American Heart Association, CVD1 review panel.
2008-2009 American Heart Association Western States review panel 3B.
2003-2009 Member, Skeletal Muscle Biology and Exercise Physiology study section, NIH.
2003  ad hoc member Cardiovascular A study section, NIH.
2002-2005 Member, Basic Cell & Molecular Biology 2 Study Section, AHA National Panel.

2. Manuscript reviews:
I usually review about 12 manuscripts per year, but am already up to 17 in 2016. Journals include Nature, eLife, PNAS, Current Biology, Cell Reports, Development, Developmental Biology, Genetics, and others.

3. Mentoring activities:
I have mentored 64 undergraduates of whom 26 were under-represented, and 13 graduate students (six Minorities). All of my graduate students successfully defended their MS or PhD. Of the 47 papers published since 1998, 50 co-authors were under-represented individuals. I am PI and Director of NIH-funded postbaccalaureate training programs (PREP and the FlyBase), where 8-13 recent BS graduates per year are placed in laboratories and assisted in their applications to PhD programs. These postbaccalaureate Scholars are predominantly individuals who are minorities, or disabled, or socioeconomically under-represented in the sciences. Approximately 75% of our postbaccalaureate Scholars are accepted into PhD programs.

4. Teaching recognition (to support proposed laboratory class):
I received the 2003 Gunter Starkey Award for excellence in teaching in the College of Arts & Sciences, and an award from the Mortar Board Honor Society in 2007. My student and peer teaching evaluations are strong.

5. Media:
Featured in UNM News Releases, including the description of our CRISPR laboratory class, and I have occasionally featured in the local media and student newspaper (The Daily Lobo). I was interviewed by a local TV news station concerning the Human Genome Project, and by Joe Palca (NPR's All Things Considered) regarding Hox genes and heart development.

e. Collaborators & other affiliations
1. Collaborators
Brian Black (UC San Francisco), Rolf Bodmer (Sanford-Burnham Institute, UCSD), Brian Gebelein (Cincinnati Children’s Hospital), Erika Geisbrecht (Kansas State University), Upendra Nongthomba (Indian Institute of Science, Bangalore), Ulrich Theopold (Stockholm University).

2. Graduate advisor
John Sparrow (PhD, emeritus, University of York, UK); Sanford Bernstein (postdoctoral, San Diego State University); Eric Olson (postdoctoral, UT Southwestern Medical Center).

3. Thesis advising
Total graduate students advised: 13 (5 MS and 8 PhD). Total postdoctoral fellows advised: 7
Graduate students in last five years: Ginny Morriss (PhD, postdoc, Baylor College of Medicine); Elisa LaBeau-DiMenna (PhD, part-time instructor, Central New Mexico Community College); TyAnna Lovato (PhD, still with me); Tonya Brunetti (PhD, postdoc University of Chicago); Sandy Oas (Duong) (MS, still with me); Ashley DeAguero (MS, research technician, University of Idaho); Elizabeth Clarke (MS, PhD student UNM Health Sciences Center).

Postdoctoral fellows in last five years: Anton Bryantsev (Assistant Professor, Kennesaw State University); Maria Chechenova (Laboratory Manager, Kennesaw State University [married to Dr Bryantsev]); TyAnna Lovato (still with me); Kathryn Ryan (currently unemployed); Gloriana Trujillo (Associate Director for STEM–VPTL, Stanford University).
BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2. Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

<table>
<thead>
<tr>
<th>NAME</th>
<th>POSITION TITLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Denkers, Eric Y.</td>
<td>Associate Professor</td>
</tr>
</tbody>
</table>

**eRA COMMONS USER NAME (credential, e.g., agency login)**

eyd1cornell

**EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)**

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE</th>
<th>MM/YY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of Washington, Seattle, WA</td>
<td>BS</td>
<td>05/1982</td>
<td>Biology</td>
</tr>
<tr>
<td>University of Wisconsin-Madison, Madison, WI</td>
<td>PhD</td>
<td>05/1990</td>
<td>Molecular Biology</td>
</tr>
<tr>
<td>National Institutes of Health, Bethesda, MD</td>
<td>Postdoctoral</td>
<td>08/1994</td>
<td>Parasitic Diseases</td>
</tr>
</tbody>
</table>

**A. Personal Statement**

The overarching goal of research in the Denkers lab is to understand the basis of functional and dysfunctional immunity during infection. I have 20 years of experience studying the immune response to *Toxoplasma*. After many years in the Department of Microbiology and Immunology at the Cornell University College of Veterinary Medicine, I relocated my lab in early 2016 to the University of New Mexico as a member of the Department of Biology and the Center of Evolutionary and Theoretical Immunology. Using mouse models of infection, I have led a productive laboratory that has investigated cellular and molecular responses in the immune system during *T. gondii* infection. We have published several major insights into how the parasite interacts with the host immune system. My laboratory has an ongoing interest in molecular mechanisms involved in immune recognition, as well as in discovering molecular interactions between the host and parasite that lead to immune-evasion. In addition to understanding the basis of immunity to *Toxoplasma*, I have a proven interest in investigating parasite-induced inflammation, in particular as related to emergence of pathology in the small intestine triggered by infection. We have made several novel discoveries regarding the cells and cytokines involved in parasite-triggered lesions in the intestine. During my career, I have successfully administered several NIH grants investigating immunity to *Toxoplasma*. In addition to overseeing a research laboratory, I am serving as the Director of the CETI Cell Biology Core. I have the proven expertise to lead a research laboratory, including administering complex budgets, training postdoctoral fellows, graduate and undergraduate students, and publishing research papers and reviews. I believe that my training and experience make me highly qualified to achieve the aims of this grant proposal.

B. Positions and Honors

**Professional Experience:**

<table>
<thead>
<tr>
<th>Year</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>1994-1995</td>
<td>Senior Staff Fellow, Laboratory of Parasitic Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda, MD.</td>
</tr>
<tr>
<td>1995-2001</td>
<td>Assistant Professor of Immunology, Dept. of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, Ithaca, NY.</td>
</tr>
<tr>
<td>2001-2006</td>
<td>Associate Professor of Immunology, Dept. of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, Ithaca, NY.</td>
</tr>
<tr>
<td>2007-2015</td>
<td>Professor of Immunology, Dept. of Microbiology and Immunology, College of Veterinary Medicine, Cornell University, Ithaca, NY.</td>
</tr>
<tr>
<td>2016</td>
<td>Associate Professor, Department of Biology, and Director, CETI Cell Biology Core, University of New Mexico, Albuquerque, NM.</td>
</tr>
</tbody>
</table>

**Other Experience and Professional Memberships:**

- Selected Editorial Board Membership
  - 1997-Present Editorial Board Member, *Infection and Immunity*
  - 2003-2007 Associate Editor, *The Journal of Immunology*
  - 2003-2014 Member, *Faculty of 1000*
  - 2003-Present Editorial Board Member, *Microbes and Infection*
  - 2008-2016 Editorial Board Member, *Parasite Immunology*
  - 2014-Present Section Editor, *The Journal of Immunology*
  - 2014-Present Associate Editor, *PLoS-Pathogens*

- Selected Other
  - 2004 NIAID Special Emphasis Panel. Reviewer for *Biodefense and Emerging Infectious Diseases Research Opportunities*.
  - 2007 NIH CSR Special Emphasis Review Panel ZRG1 BST-S (90) S.
  - 2011 Member, CSR Special Emphasis Panel, Fellowships: Infectious Diseases and Microbiology. Chicago, IL.
  - 2011 Member, Special Emphasis Panel for ZAI1-BB-M1 “Mouse models of host responses”. NIAID.
  - 2012 Member, Infectious Diseases and Microbiology IAM Study Section.
  - 2012 Member, Host Defense and Immunology Special Emphasis Panel
  - 2014 Member, Microbiology and Infectious Disease AREA Review Panel

D. Current Research Support

<table>
<thead>
<tr>
<th>Project ID</th>
<th>Title</th>
<th>Duration</th>
<th>Agency</th>
<th>Role</th>
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<tbody>
<tr>
<td>1 R21 AI119708-01</td>
<td>Role of MyD88-independent Th1 immunity during Toxoplasma infection</td>
<td>04/01/16-03/31/18</td>
<td>NIH NIAID</td>
<td>Investigator</td>
</tr>
<tr>
<td>P30GM110907</td>
<td></td>
<td>$275,000</td>
<td>NIH NIGMS</td>
<td>Investigator</td>
</tr>
<tr>
<td>COBRE: Center for Evolutionary and Theoretical Immunology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The primary of this project is to establish a self-sustaining research center at the University of New Mexico in Evolutionary and Theoretical Immunology.</td>
<td>1.2 calendar months</td>
<td>$1.1M</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MICHELLE RENEE FACETTE – BIOGRAPHICAL SKETCH

EXPERTISE
Michelle Facette’s technical expertise is in the areas of confocal microscopy, molecular biology and biochemistry, genetics, proteomics, and large-scale data analysis. She has extensive experience using both maize and Arabidopsis thaliana as model systems.

PROFESSIONAL PREPARATION

<table>
<thead>
<tr>
<th>University</th>
<th>Location</th>
<th>School Name</th>
<th>Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carleton University</td>
<td>Ottawa, Canada</td>
<td>Biological Sciences</td>
<td>B.Sc. 1998</td>
</tr>
<tr>
<td>Stanford University</td>
<td>Stanford, California</td>
<td>Biological Sciences</td>
<td>Ph.D. 2008</td>
</tr>
<tr>
<td>University of Alberta</td>
<td>Edmonton, Canada</td>
<td>Postdoctoral: Plant Biology</td>
<td>2008-2009</td>
</tr>
<tr>
<td>University of California, San Diego</td>
<td>La Jolla, California</td>
<td>Postdoctoral: Plant Biology</td>
<td>2009-2013</td>
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</tbody>
</table>

APPOINTMENTS

<table>
<thead>
<tr>
<th>University</th>
<th>Position</th>
<th>Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of New Mexico</td>
<td>Assistant Professor</td>
<td>08/2016-presenter</td>
</tr>
<tr>
<td>University of California, San Diego</td>
<td>Assistant Specialist</td>
<td>09/2013-08/2016</td>
</tr>
</tbody>
</table>

PUBLICATIONS

Most significant:


Other publications:


**SYNERGISTIC ACTIVITIES**

1. Served as a reviewer for 10 different journals in the areas of plant biology and/or proteomics within the last 4 years.
2. Served as a judge in the Annual Greater San Diego Science and Engineering Fair (San Diego, 2013, 2014, 2015, 2016) and at the Alice King Community School (Albuquerque, 2016) for K-12 students.
3. Participated in the “Nifty Fifty” program which brings together scientists and K-12 students. I visited Mrs. Howard’s 1st grade class at Magnolia Elementary in 2012 and Mrs. Cuevas’ 4th grade class at Emerson/Bandini Elementary School. Both schools have a large percentage of Hispanic, black and socioeconomically disadvantaged students (as determined by California DOE).
4. Participated in the “Ask me, I’m a Scientist/Engineer!” booth at the San Diego Science Festival Expo in 2011 and 2012.
5. Participated in the Salk Mobile Lab at Memorial Preparatory Academy, which targets 7th and 8th grade students, and the Plant Genomics Module* at Roosevelt Middle School, San Diego, which targets 7th grade students. Both programs introduce scientists to middle school children, and have them participate in DNA extractions from plants and the subsequent analysis.

*The Plant Genomics Module is part of the Broader Impacts of IOS-1147265, Polarization of Plant Cell Division by Receptor-Like Proteins.
BIOGRAPHICAL SKETCH

Ben Hanelt
Center for Evolutionary and Theoretical Immunology
Biology Department
University of New Mexico
Albuquerque, NM  87131

a. Professional Preparation

University of New Mexico  Biology and Anthropology  B.S., 1995
University of New Mexico  Biological Sciences  M.S., 1997
University of Nebraska-Lincoln  Biological Sciences  Ph.D., 2002
University of New Mexico  Biological Sciences  Post-doc, 2003

b. Appointments

2015- Lecturer III, Biology Department, University of New Mexico
2014-2015 Visiting Lecturer III, Biology Department, University of New Mexico
2006-2015 Research Assistant Professor, Biology Department, University of New Mexico
2002-2003 Instructor, School of Biological Sciences, Louisiana State University
2002 Visiting Instructor, School of Biological Sciences, University of Nebraska-Lincoln
1997-2002 Graduate Teaching Assistant, Biology Department, University of Nebraska-Lincoln
1995-1997 Graduate Research Assistant, Biology Department, University of New Mexico

c. Products

(i) Five products most closely related to proposal project


Biosketch Hanelt - 1
(ii) Five other significant products


d. Synergistic Activities


Mentoring: 15 undergraduate students (1999-2015) including students in the Undergraduate Opportunities (UnO) Program at UNM and Native American and African American students (2010-2012), and 2 PHD and 3 MS graduate students (2002-2015).


Outreach activities: Provided interviews and video footage for television shows (Discovery Channel: ‘Outrageous Acts of Science’, National Geographic Wild, Educational Broadcasting System (EBS) of South Korea), provided interviews leading to popular magazine articles (Wired Magazine, National Geographic Magazine, A Way to Garden), presented school-aged children with information about parasites and biology (Coronado Elementary Bosque Club, Albuquerque, NM; University High School, Albuquerque, NM), acted as informal scientific advisor for several popular fiction and science fiction authors (Author Roundtable, Santa Fe, NM), maintenance, development and interaction with the public on the hairworm website (www.nematomorpha.net).

Workshop organizer: co-organized the 2012 International Nematomorpha Symposium in Richmond Virginia. The symposium involved hairworm experts from: the United States of America, Germany, Japan, Taiwan, Argentina, and Georgia.
Curriculum vitae-Bruce Hofkin

Education: Bachelor of Arts, Biology. 1976
University of California, San Diego, CA

Master of Science, Biology. 1978
University of Oregon, Eugene, OR
Research in plant-pollinator co-evolution.

University of New Mexico, Albuquerque, NM
Dissertation research on the biological control of schistosomiasis.

Relevant recent professional experience:

Lecturer III. University of New Mexico. 2000-2012. Promoted to Principal Lecturer, 2012.


Relevant publications:


Textbooks


Parasitology: a conceptual approach. Eric S. Loker and Bruce V. Hofkin. Garland Science NY, NY. 560 pp. Information about this text can be found at http://garlandscience.com
Kelly Howe, PhD.  
University of New Mexico  
Department of Biology  
khowe@unm.edu

Educational History:

**Ph.D** in Biology, 2004, University of New Mexico, Albuquerque, New Mexico  

**M.S.** in Biology, 1997, University of New Mexico, Albuquerque, New Mexico  

**B.A.** in Biology, 1993, Cornell College, Mount Vernon, Iowa

Employment History:

**Senior Lecturer III**, Spring 2012-present, University of New Mexico, Albuquerque, New Mexico  
**Lecturer III**, Fall 2004-Fall 2012, University of New Mexico, Albuquerque, New Mexico  
**Assistant Professor of Biology**, Fall 2002-Spring 2004, University of New Mexico – Valencia Campus, Los Lunas, New Mexico

Professional Recognition:

**UNM Lecturer of the Year Award Nomination** in recognition of excellent teaching, University of New Mexico (Spring 2016)

**Recipient of Weber Teaching Award** in recognition of teaching excellence in science or math, College of Arts and Sciences, University of New Mexico (Spring 2014)

**Outstanding Online Teacher of the Year Nomination** in recognition of excellence in online teaching, University of New Mexico (Spring 2014)

**BA/MD Special Lecturer** in recognition of outstanding teaching of undergraduates, University of New Mexico (2012-present)

**Teaching Excellence Award Nomination** in recognition of outstanding teaching, University of New Mexico Valencia Campus (Spring 2003)

Teaching Experience:

Biology for Non-Majors; 110  
Cell and Molecular Biology 201  
Molecular Genetics 425  
Principles of Gene Expression 497

Biology for Non-Majors 123  
Genetics 202  
Advanced Cell and Molecular Biology; 429

Curriculum Development:

**STEM Gateway Course Redesign Project**, UNM STEM Gateway Program, Fall 2014

**CAT (Critical Thinking Assessment Test) Training**, Training to use and score the Tennessee Tech CAT instrument, Spring 2014

**Start Where You Are: Moving From Lecture to Active Learning**, UNM OSET Spring, 2014
Active Learning, Student-Centered Teaching and Departmental Change Workshop, UNM Office of Support for Effective Teaching (OSET), Fall 2013
Course Re-Design Workshop, UNM OSET, Fall 2012
Gateway Science and Math Course Reform, UNM OSET, Fall 2012

Departmental Service

Coordinator, Biology Department Program Assessment, University of New Mexico, Department of Biology (Spring 2016-present)
Co-Chair, Biology Department Graduation Committee, University of New Mexico, Department of Biology (2015-2016)
Committee Member, Undergraduate Policy Committee, University of New Mexico, Department of Biology (2015-present)
Search Committee Chair, Lecturer II/III Search Committee, University of New Mexico, Department of Biology (Fall 2013)
Committee Member, Biology Department Research Day Planning, University of New Mexico, Department of Biology (2011-2015)
Committee Member, Biology Department Graduation Committee, University of New Mexico, Department of Biology (2010-2012)
Chair, Biology Department of Biology Research Day Planning, University of New Mexico, Department of Biology (2008-2011)
Co-Chair, Biology Department of Biology Research Day Planning, University of New Mexico, Department of Biology (2007)
Search Committee Co-chair, Lecturer III Search Committee, University of New Mexico, Department of Biology (Spring/Summer 2006)
Search Committee Co-chair, Lecturer III Search Committee, University of New Mexico, Department of Biology (Fall 2005)
Undergraduate Advisor, University of New Mexico, Department of Biology (2004-2006)

University Service

Committee Member, Arts and Sciences Curriculum Assessment Review Committee (CARC), University of New Mexico (2015-present)
Committee Member, BA/MD Curriculum and Advisement Committee, University of New Mexico (2011-present)
Committee Member, BA/MD Basic Sciences Assessment Committee, University of New Mexico (2011-present)
Committee Member, Peer Learning Facilitators Advisement Committee, University of New Mexico (2014-present)
BIOGRAPHICAL SKETCH OF MATTHEW HURTEAU

(a) Professional Preparation

<table>
<thead>
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<th>Location</th>
<th>Field</th>
<th>Degree</th>
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</tr>
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<tbody>
<tr>
<td>Northern Arizona University</td>
<td>Flagstaff, AZ</td>
<td>Forestry</td>
<td>B.S.</td>
<td>May 2001</td>
</tr>
<tr>
<td>University of California, Davis</td>
<td>Davis, CA</td>
<td>Ecology</td>
<td>Ph.D.</td>
<td>June 2007</td>
</tr>
<tr>
<td>Northern Arizona University</td>
<td>Flagstaff, AZ</td>
<td>Postdoc</td>
<td></td>
<td>2007-2010</td>
</tr>
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</table>

(b) Appointments

- 2015-present: Assistant Professor, Biology Department, University of New Mexico
- 2011-2015: Assistant Professor, Department of Ecosystem Science and Management, Pennsylvania State University
- 2010-2011: Assistant Research Professor, Department of Biological Sciences, Northern Arizona University
- 2007-2010: Post-doctoral research associate, Northern Arizona University, National Institute for Climatic Change Research, Western Region
- 2002-2007: Graduate Research Assistant, University of California, Davis, Teakettle Ecosystem Experiment

(c) Publications

(i) Five most closely related to the proposed project


(ii) Five other publications


Environmental Science and Technology, 48:2298-2304.

(d) Synergistic Activities
Stabilizing carbon in a flammable forest, Keynote address, Sierra Nevada Watershed Improvement Program Summit: The Forest Carbon Story, March 3, 2016
Adaptation and restoration to promote carbon stability, Presented at USDA Pacific Northwest Climate Hub, Adaptation and Mitigation for Working Forestlands: Challenges and Solutions in the Face of Climate Change, December 3, 2015
Climate change, fire, and forests, Presented to the Bureau of Indian Affairs, Southwest Region Foresters Meeting, October 21, 2015
Ecological Society of America, Rapid Response Team, 2012-present
Capitol Hill visit – climate change and wildfire, Sept 19, 2013
Capitol Hill visit – Climate Science Day, Feb 10, 2016
The Conversation – We set the fuel for the Rim fire, climate change lit the match, August 30, 2013
NAME: Johnston, Christopher A.

eRA COMMONS USER NAME (credential, e.g., agency login): JOHNSTON09

POSITION TITLE: Assistant Professor of Biology

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE (if applicable)</th>
<th>Completion Date MM/YYYY</th>
<th>FIELD OF STUDY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purdue University</td>
<td>PharmD</td>
<td>05/2003</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>University of North Carolina, Chapel Hill</td>
<td>PhD</td>
<td>08/2007</td>
<td>Pharmacology</td>
</tr>
<tr>
<td>University of Oregon</td>
<td>Postdoctoral</td>
<td>09/2012</td>
<td>Molecular Biology</td>
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A. Personal Statement

The overarching goal of my research program is to identify the molecular mechanisms through which mitotic spindle orientation is controlled during cell division. Defects in this process are associated with numerous developmental disorders as well as several cancers; therefore, understanding its molecular underpinnings has important implications to human health. Since beginning my independent research lab in 2012, I have focused on the role of crosstalk between microtubules and the actin cytoskeleton in spindle positioning. Other recent efforts have begun to explore the link between signaling pathways controlling cell proliferation and oriented cell division. My research program combines methodologies spanning in vitro biochemistry to in vivo genetics using *Drosophila melanogaster* as a model organism, all of which I have extensive training and expertise. Bridging the gap between these diverse approaches is a novel ‘induced polarity’ assay in cultured cells that I developed during my postdoctoral training. My research program is currently funded through an independent R01 from NIH (sole PI). Currently, I am training two graduate students and a postdoctoral fellow. To date, I have trained ~10 undergraduate students and one postbaccalaureate, many of whom have made significant contributions to published work and have matriculated to diverse graduate and professional programs. Overall, at each stage of my career, I have conducted extramurally-funded research projects and demonstrated a track-record of productive research in my field. I believe I am capable of providing excellent mentorship and that my research program is well-positioned to provide a productive environment for success for trainees at any career stage:

B. Positions and Honors

Positions and Employment
2012-   Assistant Professor, Department of Biology, University of New Mexico, Albuquerque, NM

Honors
2000   Merck/AACP Undergraduate Research Scholar
2001   Pfizer Undergraduate Research Scholar
2003   Merck Scholar Award
2003   Eli Lilly and Co. Achievement Award
2005   American Heart Association Graduate Research Fellow
2006   NIH Rush Kirschstein NRSA Fellow
2008   Damon Runyon Cancer Research Foundation Postdoctoral Fellowship
          (Dennis and Marsha Dammerman Scholar)

C. Contribution to Science

1. Early in my scientific career, during my PharmD training, I conducted research that aimed to understand the molecular mechanisms that influence signaling of dopamine receptors, specifically the D2 family. In particular, my research focused on identifying adaptive changes occurring at the cellular level following chronic administration of D2-receptor agonists. Taking an *in vitro* cell culture approach, my work was designed to mimic the effects that might occur *in vivo* as part of the pathogenesis of dopamine-elevating disorders such as schizophrenia, or those following long-term administration of drugs of abuse known to chronically upregulate dopamine signaling such as cocaine. My work identified a role for the cAMP-activated protein kinase (PKA) as well as alterations in cellular expression levels of specific adenylate cyclase isoforms as prominent contributors to the sensitization of D2-receptor signaling.


2. During my doctoral thesis, my research focused primarily on elucidating the molecular basis for activation of heterotrimeric G-proteins. This work was conducted when our understanding of G-protein activation was rather primitive and prior to that of Kobilka, *et al.* describing the structure of a receptor:G-protein complex. Using nucleotide-specific phage peptides, my work described structural changes that lead to enhanced nucleotide exchange on specific Gα proteins in isolation. Additional work on a fast-exchanging Gα from *Arabidopsis* further contributed to our understanding of the activation pathway. As part of an additional project, I participated in some of the initial studies addressing the novel role of Gα proteins in asymmetric cell division. I conducted *in vitro* enzymatic analyses of the Gα-binding protein, RIC-8, demonstrating its direct nucleotide exchange activity. Together, my work during this time provided new insights into Gα activation processes, as well as its then emerging role as a regulator of mitosis.


3. To follow my initial contributions to the field of asymmetric cell division and the then nascent role of Gα, I expanded my interest in the regulation of mitotic orientation during my postdoctoral training. Using a multidisciplinary approach encompassing biochemistry, structural biology, cell biology, and *Drosophila* genetics, I identified Pins as a direct substrate of the mitotic kinase, Aurora-A. My work demonstrated that Pins phosphorylation is necessary for association with the microtubule kinesin motor, Khc73, through direct binding to the polarity protein Dlg. Structural work described the atomic details of the Pins/Dlg interaction and initiated further exploration of the underlying evolutionary mechanism for this interaction. I developed a novel cellular reconstitution assay that several independent labs have employed in studies of cell polarity and asymmetric division. Transitioning into my independent research career, I have extended my focus on asymmetric cell division and have begun to elucidate new mechanisms involving cytoskeletal crosstalk between actin filaments and spindle microtubules. My work will continue to explore the essential yet complex process of asymmetric cell division with the goal of defining its mechanisms at molecular level.


**Complete List of Published Work in MyBibliography:**
D. Research Support

**Ongoing Research Support:**
R01 GM108756  Johnston (PI)  09/30/14 - 08/31/19
Cytoskeletal-mediated regulation of mitotic spindle orientation

Total direct costs: $950,000
Total indirect costs: $473,000

The goal of this study is to identify the molecular mechanisms through which the actin and microtubule cytoskeletons coordinate function to achieve proper orientation of cell division.
Role: PI

**Completed Research Support:**
Tom Kennedy  
Lecturer III  
Department of Biology  
University of New Mexico (UNM)  
167 Castetter Hall  
Albuquerque, NM 87131  
Phone: (505) 277-1447  
Email: tkennedy@unm.edu

(a) Professional Preparation

A list of the individual’s undergraduate and graduate education and postdoctoral training (including location) as indicated below:

<table>
<thead>
<tr>
<th>Institution</th>
<th>Location</th>
<th>Degree</th>
<th>Year</th>
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</thead>
<tbody>
<tr>
<td>Florida State University</td>
<td>Tallahassee, FL</td>
<td>BS: Biology</td>
<td>1997</td>
</tr>
<tr>
<td>University of Virginia</td>
<td>Charlottesville, VA</td>
<td>MS: Environmental Science</td>
<td>2004</td>
</tr>
<tr>
<td>University of New Mexico</td>
<td>Albuquerque, NM</td>
<td>PhD: Biology</td>
<td>2009</td>
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(b) Appointments

2014-present Lecturer III, University of New Mexico

2010 - 2014 Full Time Biology Instructor, Central New Mexico Community College, Albuquerque, NM.

2013 Education Specialist, University of New Mexico, Albuquerque, NM.

2010 - 2013 Independent Contractor for Pearson Benjamin Cummings.

2009- 2013 Environmental Consultant for Santa Ana Pueblo, NM.

2009-2010 Biology Instructor, Georgia Highlands College, Cartersville, GA.

2009 Biology Instructor, University of New Mexico, Albuquerque, NM.

(c) Publications


(d) Synergistic Activities

- Education Specialist at the University of New Mexico
  - Worked with UNM faculty to improve the course curricula for the major’s class and laboratory for Plant Form and Function Bio 204.
  - Developed and improved teaching methods in the lecture class to create a more active learning environment to improve student performance.
- Developed the assessment plan for Bio 123.
- Training with OSET for improved teaching.
Marcy Litvak
U.S. Citizen

(a) Professional Preparation

<table>
<thead>
<tr>
<th>Institution</th>
<th>Field</th>
<th>Degree</th>
<th>Year</th>
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<tbody>
<tr>
<td>Colorado College</td>
<td>Biology</td>
<td>B.A.</td>
<td>1989</td>
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<tr>
<td>University of CO</td>
<td>Plant physiological ecology</td>
<td>Ph.D.</td>
<td>1999</td>
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<tr>
<td>UC, Irvine</td>
<td>Ecosystem Ecology</td>
<td>Postdoc</td>
<td>1999-2002</td>
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(b) Appointments

<table>
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<th>Year</th>
<th>Position</th>
<th>Institution</th>
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<tr>
<td>2011-present</td>
<td>Associate Professor, Biology</td>
<td>University of New Mexico, Albuquerque, NM</td>
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<tr>
<td>2006-2011</td>
<td>Assistant Professor, Biology</td>
<td>University of New Mexico, Albuquerque, NM</td>
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<tr>
<td>2005-present</td>
<td>Adjunct Assistant Professor, Integrative</td>
<td>University of Texas, Austin, TX</td>
</tr>
<tr>
<td>2002-2005</td>
<td>Assistant Professor, Integrative Biology</td>
<td>University of Texas, Austin, TX</td>
</tr>
</tbody>
</table>

(c) (i) Five Closely Related Products (*NSF product)


(c) (ii) Five Other Significant Products (*NSF product)


(d) Synergistic Activities

1. Ameriflux Network: Ameriflux is a community-based network of scientists operating eddy covariance towers across the U.S. Litvak operates 9 eddy covariance towers in New Mexico, together they form the New Mexico Elevation Gradient. Litvak is co-chair of the Steering Committee, and an active participant, and data from NMEG have been submitted since 2007 to this database.

2. Instructor (1 day) for a 2-week short-course on Flux Measurements & Advanced Modeling in July 2008- 2016; Univ of Colorado Mountain Research Station. Organizers = Russ Monson and Dave Moore. Lecture and hands-on exercise topics: Ecological questions answered using eddy covariance towers.

3. Regional Synthesis: Litvak is part of group of scientists that are establishing a well-coordinated, multidisciplinary research effort to understand biotic and abiotic controls over carbon, water and energy fluxes in semi-arid biomes throughout the Southwestern U.S. and N. Mexico that will lead to regional synthesis.

4. NEON activities: Litvak has been Invited Participant for several NEON workshops: Global Change Experiment Design Team, 2007; NEON FIU vendor solicitation activities 2008, 2011; NEON scaling workshop 2012.

5. Sevilleta National Wildlife Refuge LTER: Litvak has been co-PI from 2007-present.

Collaborators & Other Affiliations

- Collaborators & co-editors: Anderegg, W. (Princeton U); Barron-Gafford, G, (U of Arizona); Koch, G. (Northern Arizona U); Wolf, A. (Princeton U); Erin Berryman (CSU); Georgeanne Moore (TAMU); Susan Schwinning (TSU); Rodrigo Vargas (University of Delaware); James Heilman, (TAMU); Kevin McInnes (TAMU); Paolo D’Orico, (University of Virginia); Jose Fuentes (Penn State); Paul Brooks (U of Utah), Nathan McDowell (LANL); Noah Molotch, (University of Colorado.); Jan Eitel (U Idaho); Lee Vierling (U Idaho); Jon Chorover (UA); Sebastien Wolf (Berkeley); Margaret Torn (LBL); Adrian Harpold (University of Colorado); Kathleen Lohse (Idaho State Univ); David Breshears (Arizona State University);Russ Scott (USDA), Joel Biederman (USDA)

- Thesis advisor & post-doc sponsor: Russ Monson (University of Arizona), Michael Goulden (UC-Irvine) Graduate students (total = 9): Current: Amanda Liebricht (UNM), Alesia Hallmark (UNM); Amanda Sacks (UNM); Past: Amy Bennett (UNM); Michelle Nuanez (UNM); Daniel Krofcheck (primary advisor, UNM); Ann Thijs (primary advisor, UT-Austin), Tamara Basham (primary advisor, UT-Austin); M. Shawn Brumbaugh (primary advisor, UT-Austin); Daniel Brese (UNM) ; committee member: Sally Koerner (UNM); Jennifer Plaut (UNM); Margaret Bachelor (UT-Austin); Bethany Gibbard (UT-Austin); Beth Davis (UT-Austin), Daniel Breecker (UNM); Mel Strong (UNM); Nico Hauwert (UT-Austin); Mary Jamieson (UT-Austin), Sandra White (UNM), Matt Petrie (UNM, committee); Dan Breecker (UNM, committee); Post-docs (total = 6): Cheng-Wei Huang (UNM); Daniel Krofcheck (UNM); Krista Teixera-Anderson (Smithsonian); Laura Morillas Gonzales (UBC); Greg Maurer (UC-Berkeley); Rob Pangle (UNM); Andy Fox (UA)
BIOGRAPHICAL SKETCH
Provide the following information for the Senior/key personnel and other significant contributors.
Follow this format for each person. DO NOT EXCEED FIVE PAGES.

NAME: Eric S. Loker

eRA COMMONS USER NAME (credential, e.g., agency login): esloker

POSITION TITLE: Distinguished Professor

EDUCATION/TRAINING (Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)

<table>
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<th>INSTITUTION AND LOCATION</th>
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<th>FIELD OF STUDY</th>
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<tr>
<td>Cornell University, Ithaca, NY</td>
<td>B.S.</td>
<td>1972</td>
<td></td>
<td>Biology</td>
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<tr>
<td>University Michigan, Ann Arbor, MI</td>
<td>M.S.</td>
<td>1974</td>
<td></td>
<td>Zoology</td>
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<tr>
<td>Iowa State University, Ames, IA</td>
<td>Ph.D.</td>
<td>1979</td>
<td></td>
<td>Immunobiology</td>
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<tr>
<td>Oregon State University, Corvallis, Oregon</td>
<td>Postdoc</td>
<td>1979-1983</td>
<td></td>
<td>Immunology (Zoology)</td>
</tr>
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A. Personal Statement

I have a long-standing interest in digenetic trematodes, especially those involved in causing schistosomiasis, with a particular focus on those aspects of the digenean life cycle occurring in the obligatory molluscan first intermediate host. I have pursued studies of schistosome-snail interactions and schistosomiasis in the field, first in Tanzania and over the last 27 years, in Kenya. My interests in schistosome biology have also taken me to Brazil, the Caribbean region, Egypt, Sri Lanka and Nepal. The collaboration that has been most enduring is with Dr. Gerald Mkoji and his colleagues at the Kenya Medical Research Institute (KEMRI) in Nairobi. We have collaborated on studies as diverse as: surveying the distribution of freshwater snails in Kenya; exploring the phylogenetic relationships of schistosomes and schistosome-transmitting snails in both Kenya and globally; undertaking molecular epidemiological studies of schistosome transmission in Kenya including the impact of control programs. Dr. Mkoji and I have provided much-needed graduate level training in malacology and in parasitological studies of trematode infections in snails, for both Kenyan and U.S. students, and we have worked to provide needed research infrastructure development for KEMRI. A significant part of my research has also been oriented towards lab studies of snail-digenean interactions, and among the topics explored are the roles of hyperdiverse fibrinogen-related proteins (FREPs), first identified in my laboratory, in the snail immune response. We have also used microarrays and NextGen sequencing approaches to learn how digeneans interfere with snail defense responses, and how resistance is associated with particular snail genes. I served as a chair of a large, interactive Biology Department at UNM for 6 years, and for 13 years as founding Director of an NIH Centers of Biomedical Research Excellence grant funding a Center for Evolutionary and Theoretical Immunology here at UNM, the latter a post I still hold.

B. Positions and Honors

Positions
Graduate Teaching Assistant, Department of Zoology, University of Michigan, 1972-1974
Graduate Teaching Assistant, Department of Zoology, Iowa State University, 1974-78
Lecturer, Department of Zoology, Iowa State University, 1978
Instructor, Department of Zoology, Oregon State University, 1979-1982
Postdoctoral Research Associate, Department of Zoology, Oregon State University, 1982-1983
Assistant Professor, Department of Biology, Virginia Commonwealth University, 1983-85
Assistant Professor, Department of Biology, The University of New Mexico, 1985-1990
Associate Professor, Department of Biology, The University of New Mexico, 1990 -1996
Regent's Lecturer, University of New Mexico, 1994-1997
Honors
Fulbright Scholarship, Tanzania, 1978-1979
Fogarty Senior International Fellow, University of Glasgow, Jan-July 1992
Member, NIH study section on Tropical Medicine Research Centers, 1995, 2000, 2001, 2011
Chairman, NIH Special Emphasis Panel, Schistosomiasis Reagent Resource Center Proposal, 2002
NIH Study Section, IDeA Program, 2010, 2011, 2014
NIH Postdoctoral F32 Review, 2015
NIH U.S China Collaborative Program Review, 2016
Temporary Advisor, World Health Organization Scientific Working Group on Schistosomiasis, 2005
Participant, Gates Foundation SCORE (Schistosomiasis Consortium for Operational Research and Evaluation) program, 2010-present
President (elected, 2012-2013), American Society of Parasitologists, 2013
Clark P. Read Mentoring Award, American Society of Parasitologists, 2015

C. Contributions to Science

1. Global Diversity of Schistosome Parasites: A long-term goal of my research has been to use molecular phylogenetics methods applied to samples of schistosomes that have been collected by myself and colleagues, especially with Dr. Sara Brant most recently, over a span of many years on all continents except Antarctica, to define the full diversity inherent in the digenean family Schistosomatidae. This group of parasites is of considerable veterinary and medical significance (>240 million people are still infected with the great neglected disease of schistosomiasis). We have provided new insights to define the limits of the family, and new hypotheses for how medically important species of *Schistosoma* are related to one another, including new scenarios for their origin. We have also identified many new lineages of avian schistosomes that are responsible for causing cercarial dermatitis around the world, and worked to develop new ways to detect them in water samples.


2. Control of Human Schistosomiasis: The WHO has called for the elimination of human schistosomiasis by 2025, and my lab is working to develop innovative new approaches for controlling the snails that are essential to transmission of this neglected tropical disease. We have explored the use of competitor snails, snail
predators like crayfish, and most recently other digenean species that compete with and consume larval schistosomes in snails. Our hope is to provide useful ways to complement chemotherapy to assist in the global elimination effort.

Procambarus clarkii on Schistosoma haematobium transmission in Kenya. American Journal of Tropical Medicine and Hygiene 61: 751-759. PMID: 10586907

Loker, E.S. 2013. This de-wormed world? J. Parasitol. 99: 933-942. PMID: 24032609 PMCID: PMC4359168


3. Invertebrate (Molluscan) Immune Systems: Beginning with observations that I first made and that were followed up in collaboration with colleagues who were supported by my grants, we identified a group of snail immune molecules called FREPs comprised of immunoglobulin and fibrinogen domains that are a major component of the response of snails to infection with schistosomes and other trematodes. This lead to further studies showing FREPs were diversified somatically by gene conversion and point mutations. Knockdown of FREPS was also shown to abrogate resistance of snails to schistosome infections. This line of work lead to a paradigm shift of sorts, a greater realization that invertebrate immune responses were more complex than previously envisioned and capable of generating diverse receptors. It highlighted that different invertebrate lineages have very different immune capacities, and also lead to important ideas that immune system diversification in response to distinct groups of parasites is a factor that contributes to the overall diversity of animal life.


4. Building Scientific Infrastructure in New Mexico: New Mexico has traditionally been underfunded with respect to both NSF and especially NIH funding. Through the NIH IDeA program, I have served as the PI and founding director for an NIH Centers of Biomedical Research Excellence grant to fund the Center for Evolutionary and Theoretical Immunology. Our center has made several faculty hires to increase our critical
mass, supports junior investigators by providing mentoring and aiding grant submission, and has developed and supported key core facilities for molecular and cell biology work that are widely used by the UNM community. The IDeA program has provided an outstanding opportunity for New Mexico investigators to become more competitive in research, and I am proud to have played a role in this important program.

5. Supporting Education Pertaining to Parasitology: I mark as one of my contributions to science the development of curricula and teaching materials for parasitology, including the following recently published textbook:


Complete List of Published Work:


D. Current and Pending Support

R01 AI101438 (Loker) 07/01/2012 – 06/30/2017
NIH/NIAID Snail-Related Studies of Transmission and Control of Schistosomiasis in Kenya, Direct costs $1,250,000.

The goals of this work are to 1) define compatibility between S. mansoni and B. pfeifferi; 2) identify and manipulate determinants of compatibility snails; 3) build a framework for identifying and testing natural enemies as control agents of schistosomes; and 4) reveal aspects of the biology of the naturally-infected snails.

P30 GM110907 (Loker) 6/1/2014 – 3/31/2019
NIH/NCRR COBRE: Center for Evolutionary and Theoretical Immunology

The primary of this project is to establish a self-sustaining research center at the University of New Mexico in Evolutionary and Theoretical Immunology.

Gates-funded Schistosomiasis Consortium for Operational Research and Evaluation (SCORE) Subaward to Loker from the University of Georgia (Colley, PI)
Why are There Persistent Hot Spots for Schistosoma mansoni Transmission in Western Kenya? An Assessment Based on Three Different Measures of the Force of Transmission RR374-092/492186, 12/01/2013 - 11/30/2014, $26,462

Pending Proposals

R01 AI101438 (Loker) 07/01/2017 – 06/30/2022
NIH/NIAID Snail-Related Studies of Transmission and Control of Schistosomiasis in Kenya, Direct costs $1,250,000.

The goals of this continuation grant are 1) To reveal and dissect the roles of different Biomphalaria taxa with marked biological differences in the transmission of Schistosoma mansoni in six representative transmission sites in the Lake Victoria basin; 2) To define and exploit the biodiversity of nonchistosome digeneans in the Lake Victoria basin, to compete with and suppress S. mansoni infections within Biomphalaria; and 3) To develop novel approaches for snail or larval schistosome control scalable to vast transmission sites like Lake Victoria.
EDUCATIONAL HISTORY:
Ph.D Botany, 1981, University of California, Berkeley.
M.S. Biology, 1977 Utah State University, Logan, Utah.
B.S. Botany 1974, Utah State University, Logan, Utah.

ACADEMIC EMPLOYMENT HISTORY:
Professor of Biology, 2006-present, University of New Mexico
Associate Professor of Biology, 1994-2006, University of New Mexico
Assistant Professor of Biology, 1990-1994, University of New Mexico
Senior Lecturer in Botany, 1989-1990, National University of Singapore, Kent Ridge, Republic of Singapore.
Senior Lecturer in Botany and Curator, C.E. Moss Herbarium, 1987, University of the Witwatersrand, Johannesburg, South Africa.
Postdoctoral Fellow, 1981-1982, Dept. of Botany, Ohio State University, Columbus, Ohio- Postdoctoral Advisor: Dr. Tod Stuessy

ADMINISTRATIVE POSITIONS HELD-UNM:
Associate Dean, Graduate Studies, 1 April 2013 to present.
Curator of the UNM Herbarium, 1990-present, University of New Mexico
Interim Co-Director, 2012-2013, Museum Studies Program, University of New Mexico
Vice-Chair, Faculty Committee on Governance, 2011-present
Associate Chair and Coordinator, Graduate Program, Department of Biology. 1997-98, 2009-2011
Chair, UNM Academic Freedom and Tenure Committee, 2007-2008
Director, Museum of Southwestern Biology. 1997-2002
Acting Chair, Department of Biology- Summer Semesters 1998, 2001

VISITING AND/OR RESEARCH APPOINTMENTS:
Research Fellow, School of Biological Sciences, University of New South Wales, Sydney, Australia. 1996.
Research Associate, Missouri Botanical Garden, St. Louis, MO. 1985-present.

PROFESSIONAL RECOGNITIONS AND HONORS:
UNM Regent’s Lecturer. 2003-2006
SCHOLARLY PUBLICATIONS—5 recent publications.

Professional Service:
Board Member (elected), Flora North America Editorial Committee, 2009-2015
Member, Collections Committee, American Society of Plant Taxonomists –2007-2008
Chair, Collections Committee, American Society of Plant Taxonomists, 2006
Co-organizer of UNM Research Museums Consortium, 2000
Chair, Collection Committee, American Society of Plant Taxonomists 1997
Elected, Council Member-at-Large, American Society of Plant Taxonomists- 3 year term. 1995-1997
Committee Member, Collections Committee, American Society of Plant Taxonomy. 1993-1994
Secy.-Treasurer, Mid-Continent Section of the Botanical Society of America. 1993-1994
Elected Chairperson, Systematics Section of Botanical Society of America. 1991-93
Co-organizer, South African Association of Botanists Congress workshop on pollination biology. Umtata, Transkei. 1986
Organizer and Chairman, AETFAT Symposium on Pollination and Breeding Systems, Missouri Botanical Garden, St. Louis, MO. 1985

Graduate Student Advisement:
Ph.D.: 7 students graduated.
M.S. : 10 students graduated.
Diane L. Marshall

A. Professional Preparation

Northwestern University
Northwestern University
University of Texas
University of California, Riverside

Biological Science
Biological Science
Biological Science (Plant Ecology)

B.A. 1976
M.S. 1977
Ph.D. 1982

B. Appointments

Academic Positions
1997-Present  Professor of Biology, University of New Mexico
1991-1997    Associate Professor of Biology, University of New Mexico
1985-1991    Assistant Professor of Biology, University of New Mexico

Recent Administrative Positions
2012-Present  Associate Dean for Curriculum and Instruction, College of Arts and Sciences
2011-present  Program Director, MARC Program
2009-2011     Advisor and Curriculum Coordinator, IMSD Program

C. Recent publications


D. Synergistic Activities

I have a strong record of mentoring undergraduates in my research program on plant mating systems. Of the 77 undergraduates that have worked in my program, 61 were women, 18 were hispanic, 2 were asian, and two were African American. These undergraduates have entered graduate programs in biology, philosophy, medicine and veterinary medicine. I have supported 20 graduate students including 9 women, three of whom are hispanic. Ten of these students have finished their Ph.D.’s; 4 teach at a community college, and 3 teach at universities. I also director the MARC U*STAR program at UNM which has broadened my experience with introducing students to a broad range of research topics and preparing them for graduate school admissions.

E. Recent funding


Functional relationships between levels of sorting among mates in wild radish: effects on patterns of seed paternity. UNM Research Allocations Committee, 10/15/04 – 7/31/05. $2,540. PI, D.L. Marshall.

Demography, genetics and mating system structure of an invasive mustard, Isatis tinctoria. USDA, 8/1/05 – 7/31/07, $75,000, PI D.L. Marshall, Co-PI, Heather Simpson

F. Current graduate students

Brian Alfaro, PhD expected May, 2018
Julietta Bettenelli, PhD expected August, 2017
Noelle Martinez (co-advisor), PhD expected August, 2018

G. Teaching responsibilities

General Botany
Plant and Animal Form and Function
Evolutionary Plant Ecology
Biographical Sketch

Donald O. Natvig
Professor
Department of Biology
University of New Mexico
Albuquerque, NM 87131
Phone: 505-363-1911
Email: dnatvig@gmail.com

(a) Professional Preparation

<table>
<thead>
<tr>
<th>Degree</th>
<th>Year</th>
<th>Field</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.A.</td>
<td>1974</td>
<td>Botany</td>
<td>University of Montana</td>
</tr>
<tr>
<td>M.A.</td>
<td>1976</td>
<td>Botany</td>
<td>University of Montana</td>
</tr>
<tr>
<td>Ph.D.</td>
<td>1981</td>
<td>Botany</td>
<td>University of California, Berkeley</td>
</tr>
</tbody>
</table>

(b) Positions Held

- 2016-present: Research Fellow, National Center for Genome Resources
- 1998-present: Professor, Department of Biology, University of New Mexico
  (Director, UNM Sevilleta Field Station 2003-present)
- 1989-1998: Associate Professor, Department of Biology, UNM
- 1983-1989: Assistant Professor, Department of Biology, UNM
- 1982: Post doctoral associate and lecturer, Department of Botany, University of California, Berkeley

(c) Publications


**(d) Synergistic Activities**

2003-present Director, UNM Sevilleta Field Station
William T. Pockman

Biology, MSC03 2020
1 University of New Mexico
Albuquerque, NM 87131-0001
Phone: 505-277-2724, FAX: 505-277-0304
Email: pockman@unm.edu
http://www.unm.edu/~pockman/

Professional Preparation
• B.A. with honors, 1988 Oberlin College, Oberlin, OH. Major field: Biology.
  Thesis Title: Carbon recycling in the fruits of the epiphytic orchid, Encyclia tampensis.
• Ph.D., 1996, University of Utah, Salt Lake City UT. Major field: Biology.
  Dissertation title: Xylem cavitation and the distribution of Sonoran desert vegetation.

Positions Held
Department of Biology, University of New Mexico, 2000-present
• Professor, 2012 – present,
• Chair, 2015 - present.
• Regents’ Lecturer, College of Arts and Sciences, 2010.
• Associate Chair, 2009 – 2013.
• Assistant/Associate Professor, 2000 – 2012

Postdoctoral Training
1999 Dept. of Botany, Duke University, Durham, NC.
1997-1998, Dept. of Botany, University of Texas - Austin, Austin, TX.


Selected Publications (total: 68, citations: 9957 Google Scholar, 1/18/2017,
*student/postdoc)


**Synergistic Activities**

- Member, LTER Executive Board (2013-2016) and LTER Network Information System Advisory Committee (2007-2011, Co-Chair 2009-2011)
- Chair, Physiological Ecology Section, Ecological Society of America, 2011-2012.
EDUCATION

UNIVERSITY OF TEXAS AT AUSTIN
Advisors: David Cannatella and David Hillis
Ph.D. 2000

HARVARD UNIVERSITY
Advisor: Ernest Williams
A. B. with Honors in biology, 1993

RESEARCH AND TEACHING POSITIONS

UNIVERSITY OF NEW MEXICO
Associate Professor, Department of Biology 2008-present
Assistant Professor, Department of Biology 2002-2008
Associate Curator, Division of Amphibians and Reptiles, Museum of Southwestern Biology 2002-present

UNIVERSITY OF CALIFORNIA, BERKELEY
Postdoctoral Fellow, Miller Institute for Basic Research in Science Fall 2000-Fall 2002
Advisors: David Wake and Marvalee Wake.

NATIONAL MUSEUM OF NATURAL HISTORY, SMITHSONIAN INSTITUTION
Advisors: Kevin de Queiroz and David Swofford

HARVARD MUSEUM OF COMPARATIVE ZOOLOGY DEPARTMENT OF HERPETOLOGY
Research Assistant June-Dec. 1993, April-June 1994
Advisor: Ernest Williams

GRADUATE STUDENTS ADVISED

Eric Schaad, M.S. student, graduated summer 2013; Erik Hulebak, M.S. student, graduated summer 2008; Brad Truett, M.S. student, graduated Fall 2014; Mason Ryan, Ph.D. student, graduated Spring 2015; Ian Latella, M.S. student, graduated Spring 2016; Levi Gray, Ph.D. student, admitted Fall 2009; Chris Anderson, Ph.D. student, admitted Fall 2015.
PUBLICATIONS (2014-present; 50 total)


Biographical Sketch - Rudgers

Jennifer A. Rudgers
Associate Professor of Biology
University of New Mexico
505-277-6185
jrudgers@unm.edu
http://biology.unm.edu/WhitneyRudgers/index.html

(a) Professional Preparation

Denison University    Granville, OH    Environmental Science  B.S. 1996
University of California    Davis, CA    Population Biology  Ph.D. 2002
Indiana University    Bloomington, IN    Microbial Ecology  2002-2005

(b) Appointments

Associate Professor of Biology, University of New Mexico  2012 – present
Wiess Career Development Chair, Rice University  2011 – 2012
Associate Professor, Rice University  2011 – 2012
James H. Godwin Assistant Professor, Rice University  2005 – 2011
Visiting Lecturer, Indiana University  2002 – 2004
Research Associate, Indiana University  2002 – 2005

(c) Publications (of 88 total)

(d) Synergistic Activities

(i) Service to the scientific community: Associate Editor Oikos 2008-2012; Board of Advisors New Phytologist (2012-current). Board of Trustees Rocky Mountain Biological Laboratory, Gothic, CO (2011-current).

(ii) Scholarly achievements: H-index: 33; i10 index: 59.

(iii) Innovations in teaching and training: UNM STEM Gateway Course Redesign, National Academies CURE Summer Institute.

(iii) Broadening participation of underrepresented groups in STEM: “Women and Biology" course; NSF ADVANCE Committee (Rice Univ); >80 undergraduate student mentees with 30 undergraduate students as co-authors.
Biographical Sketch Irene Salinas

Expertise: Dr. Salinas is an evolutionary immunologist working on early vertebrates including teleost fish and lungfish. Her research focuses on the evolution of mucosal immunity in vertebrates.

(a) Professional Preparation

Undergraduate Institution: University of Alicante, Spain. Biology Major. 2002


Postdoctoral institutions: 1. Veterinary Medicine, University of Pennsylvania 2009

(b) Appointments

August 2011-current: Assistant Professor, Biology Department, University of New Mexico.

April-August 2011: Visiting scientist at the Malaghan Institute of Medical Research.


2008-2009: Postdoctoral researcher, University of Pennsylvania, USA.

2003-2007: Fundacion Seneca PhD fellowship, University of Murcia, Spain

2002-2003: British Council Scholar, University of Plymouth, UK

(c) Products

(i) 5 publications most closely related to the proposed project:


(ii) 5 other significant publications


(d) Synergistic Activities International networks: The PI has been engaged in multiple international collaborations. In 2006 and 2007 she worked as the International Student Officer in Biology, University of Murcia, Spain. In 2006, the PI was selected to participate in the EU initiative called Aqualabs. The PI is currently an external evaluator in two different fish immunology grants funded by the Norwegian Research Council and I have served as a reviewer for the Italian, Dutch and EU grant panels and member of three different editorial boards in international peer-reviewed journals. Outreach education activities: the PI was part of the STOP (Science and Technology Opportunity Project) project at the University of Plymouth, UK for two summers. This project consisted of one-day visits to middle and high schools where scientific labs were set up. The overall goal of the program was to bring science to schools and open up students to the multiple and exciting career options within science. In New Mexico, 2011-2014, the PI has been hosting regular comparative fish anatomy and physiology days for primary and middle schools from the states of New Mexico and Colorado. Member of the Latin American and Iberian Institute at UNM. Mentoring: over the past 7 years I have mentored 15 undergraduate students, 4 graduate students and 3 postdocs. I recruit minority students through the programs IMSD, McNair and MARC. Development of new curricular materials: Microscopy and Histology for Bioengineers in Bergen, Norway (2005). New courses at UNM: Biology Internships in Spain and Advanced Immunology. Workshop organizer: organizer of the first New Zealand and Australia Fish Immunology Workshop, held in Wellington in March 2011. Organizer of the 5th North American Comparative Immunology (NACI) Workshop, Albuquerque, June 2014.
College of Arts and Sciences
Lecturer Vitae

Dorothy C. Scholl  Biology Dept.  01/10/2017

Educational History:

Doctor of Philosophy, 12/2009, Tulane University School of Public Health and Tropical Medicine, New Orleans LA, Parasitology (Tropical Medicine/Vector-Borne Infectious Disease), Thesis title: Immunomodulatory effects of *Ixodes scapularis* saliva on dermal cells exposed to *Borrelia burgdorferi*, the agent of Lyme disease. Advisors: Dr. Mario T. Philipp and Dr. Dawn M. Wesson

Masters of Science, 12/1999, Southeastern Louisiana University, Hammond, LA, Biological Sciences (concentration in Microbiology), Thesis title: Heat shock protein expression in *Escherichia coli* under extreme environmental conditions, Advisor: Dr. Mary White

Bachelor of Arts, with honors, 05/1990, University of New Mexico, Albuquerque, New Mexico, Anthropology, honors thesis title: Plains-Pueblo interactions at Paa-ko Pueblo, Advisor: Dr. Wirt Wills

Employment History

Lecturer III, Fall 2015-present, Biology Department, University of New Mexico, MSCO3 2020, Albuquerque, NM 87131-2020

Full-time Instructor, Fall 2008- June 2015, Biological Sciences Department, University of New Orleans, 2000 Lakeshore Drive, New Orleans, LA 70148

Adjunct Instructor, Spring 2008- 2014, Health Sciences Division, Nunez Community College, 3710 Paris Road, Chalmette, LA 70043

Guest Lecturer, Spring 2007/Spring 2008, Tulane University School of Public Health and Tropical Medicine1440 Canal Street, Suite 2210, New Orleans, La 70112

Graduate Student Teaching Assistant, Fall 2004- 2005, Department of Tropical Medicine, Tulane University School of Public Health and Tropical Medicine1440 Canal Street, Suite 2210, New Orleans, La 70112

Adjunct Biological Sciences Instructor, 2003-2005, Southeastern Louisiana University, Department of Biological Sciences, Room 421, SLU BOX 10736, Hammond, LA 70402

Full-time Instructor, 2001-2002, Biology Department, Nunez Community College, 3710 Paris Road, Chalmette, LA 70043
Employment History

CDC Vector-Borne Infectious Disease Competitive Training Grant Fellow, 2003-2007, CDC Cooperative Agreement T01/CCT622308 to Tulane University School of Public Health and Tropical Medicine 1440 Canal Street, Suite 2210, New Orleans, LA 70112

Research Assistant, 2003-2008, Department of Bacteriology and Parasitology, Tulane National Primate Research Center, 18703 Three Rivers Road, Covington, LA 70433

Medical Research Specialist, 2002-2003, Department of Pathology, Tulane National Primate Research Center, 18703 Three Rivers Road, Covington, LA 70433

Medical Research Specialist, 1999-2001, 1998-1999, Department of Bacteriology and Parasitology, Tulane National Primate Research Center, 18703 Three Rivers Road, Covington, LA 70433

Professional Recognition, Honors, etc.

Competitive Training Grant Fellowship, Vector-Borne Infectious Disease, 2003-2007, Centers for Disease Control.

Service Award, 5 years’ recognition of outstanding service/research as a Medical Research Specialist developing new diagnostic assays for *Mycobacterium tuberculosis*, West Nile virus and microsporidiosis, as well as for projects involving *Borrelia burgdorferi* gene regulation, with regard to the pathogenesis of disease, especially pathogen/host interactions leading to manuscripts; 2002, Tulane National Primate Research Center 18703 Three Rivers Road, Covington, LA 70433.
Short Narrative Description of Teaching, Research and Service Interests.

My teaching philosophy incorporates several alternatives and supplements to the standard lecture-style method. I utilize a variety of media, including documentary film presentations, interactive web-based exercises and animations, PowerPoint presentations, class discussion and Problem-Based Learning scenarios. Problem-Based Learning (PBL) is a teaching tool that can often meet the needs of a variety of students. PBL is a student-centered approach that challenges students to learn through real-world applications and examples; it develops both problem solving strategies and discipline-specific knowledge by placing students in the active role of problem-solvers. Students are then confronted with a situation or scenario (“problem”) that simulates the kind of problems they are likely to face in their future workplace. Teaching courses such as Medical Microbiology, Parasitology and Human Anatomy & Physiology, has allowed me to use examples of situations directly related to infectious disease, antibiotic resistance, maintenance of homeostasis and what happens when there is an imbalance in homeostasis. I try to incorporate PBL in my Biology classes as often as possible and find that students enjoy this approach and learn from it as well. PBL does have some drawbacks. I have noticed that PBL works best in classes which have fewer than 40 students. However, it is still possible to use this approach in larger lecture sections. I sometimes give my students a scenario and have them think about it for a few minutes and I give them the opportunity to talk with their neighbors. I then ask for volunteers to present their ideas, and this works pretty well, in terms of a “launching off” point for the rest of lecture. I also encourage students to ask questions. I never want them to feel as if their question is not a good question and I certainly don’t want them to feel intimidated.

I also truly enjoy teaching and using real world experiences to emphasize and explain concepts. It is my belief that students who are actively engaged in the learning process tend to enjoy it and therefore learn more from their experiences. I especially enjoy introducing students to new concepts and ideas and watching them get excited about potential career paths that they may never have thought of before (Medical Technology, for example). I often use my own academic background (diverse) as well as my research interests to get them excited about specific topics and careers. I am interested in the host/parasite relationship; my dissertation research focused on the role that tick saliva (spit!) plays in suppressing our immune systems so that (1) the tick can stay attached to our skin for many days and successfully take a blood meal, and (2) so that the bacteria in the tick’s gut can be transmitted to us, without our immune system interfering. This leads to some interesting discussions about immunity, blood-sucking arthropods, bacterial diseases and how people can become accidental hosts for many parasites. This also allows me to define what a true parasite is (and how the AMC TV show, The Walking Dead, makes no sense from a purely biological standpoint). I have many years of experience as a Pre-Veterinary School Advisor (University of New Orleans) and I use the knowledge at UNM when students ask me about potential career choices that would allow them to study parasites and do research and work with animals. I try to engage students as much as possible and make them aware of all of the resources we have. I very much enjoy co-chairing our Research Day because it affords me the opportunity to get involved in student research. I am contemplating starting a small research program here which would allow undergraduates the opportunity to gain lab and field research, and would allow me to figure out if New Mexico ticks carry the bacterium which causes Lyme disease.
TEACHING ACHIEVEMENTS

Classroom Teaching:

2016; Fall; Human Anatomy & Physiology I; Bio 237 sec 001; 175 students
2016; Fall; Human Anatomy & Physiology I; Bio 237 sec 001; 150 students
2016; Fall; A&P Lab I, Bio 247; course coordinator for 150 students
2016; Fall; A&P Lab II, Bio 248; course coordinator for 100 students
2016; Summer; Human Anatomy & Physiology I; bio 237; 40 students
2016; Summer; A&P Lab I, 2 sections; 48 students
2016; Summer A&P Lab II, 1 section; 24 students
2016; Spring; Human Anatomy & Physiology I; Bio 237; 175 students
2016; Spring; Biology for the Health Related Sciences; Bio 123; 100 students
2016; Spring; A&P Lab I, Bio 247; course coordinator for 150 students
2016; Spring; A&P Lab II, Bio 248; course coordinator for 96 students
2015; Fall; Biology for the Health Related Sciences; Bio 123; 100 students
2015; Fall; Biology for the Health Related Sciences; Bio 123; 100 students
2015; Fall; A&P Lab I; Bio 247; course coordinator for 150 students
2015; Fall; A&P Lab II; Bio 248; course coordinator for 96 students
2015; Summer; Biology for Non-Science majors; Bios 1053; 50 students
2015; Spring; Medical Microbiology, Bios 2743; 125 students
2015; Spring; Biology for Non-Science majors; Bios 1053; 40 students
2015; Spring; General Parasitology; Bios 3953; 80 students
2015; Spring; A&P Lab I; Bios 1301; 50 students (2 sections)
2014; Fall; Medical Microbiology; Bios 2743; 125 students
2014; Fall; A&P Lab I, Bios 1303, 50 students (2 sections)
2014; Fall; Biology for Non-Science Majors; Bios 1053; 50 students
2014; Summer; Medical Microbiology; Bios 2743; 75 students
2014; Summer; General Parasitology; Bios 3953; 50 students
2014; Spring; General Parasitology; Bios 3953; 80 students
2014; Spring; A&P Lab II; Bios 1311; 50 students (2 sections)
2014; Spring; Medical Microbiology; Bios 2743; 125 students
2014; Spring; A&P Lab I, Bios 1301; 50 students (2 sections)
2013; Fall; Anatomy & Physiology I lecture; Bios 1303; 150 students
2013; Fall; A&P Lab I, Bios 1301; 50 students (2 sections)
2013; Fall; A&P Lab II; Bios 1311; 24 students
2013; Fall; Biology for Non-Science Majors; Bios 1053; 100 students
2013; Summer; Medical Microbiology; Bios 2743; 75 students
2013; Summer; Human Anatomy & Physiology I lecture; Bios 1303; 75 students
2013; Spring; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2013; Spring; A&P Lab I; Bios 1301; 75 students
2013; Spring; A&P Lab II; Bios 1311; 25 students
2013; Spring; Biology for Non-Science majors; 100 students
2012; Fall; General Parasitology; Bios 3953; 70 students
2012; Fall; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2012; Fall; A&P Lab I; Bios 1301; 50 students (2 sections)
2012; Fall; Biology for Non-Science majors; Bios 1053; 100 students
2012; Summer; Medical Microbiology; Bios 2743; 65 students
2012; Summer; Human Anatomy & Physiology I lecture; 70 students
2012; Spring; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2012; Spring; Medical Microbiology; Bios 2743; 100 students
2012; Spring; A&P Lab II; Bios 1311; 24 students
2012; Spring; A&P Lab I; Bios 1301; 24 students
2012; Spring; Biology for Non-Science majors; Bios 1053; 75 students
2011; Fall; Medical Microbiology; Bios 2743; 125 students
2011; Fall; Human Anatomy & Physiology I lecture; Bios 1303 125 students
2011; Fall; A&P Lab I, 1301; 50 students (2 sections)
2011; Fall; Medical Microbiology Lab; Bios 2741; 24 students
2011; Fall; University Success; Univ 1001; 25 students
2011; Summer; Medical Microbiology; Bios 2743; 75 students
2011; Summer; Medical Microbiology Lab; Bios 2741; 25 students
2011; Spring; Medical Microbiology; Bios 2743; 75 students
2011; Spring; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2011; Spring; Biology for Non-Science majors; Bios 1053; 75 students
2011; Spring; A&P Lab II; Bios 1311; 25 students
2011; Spring; A&P Lab I; Bios 1301; 50 students (2 sections)
2011; Spring; University Success; Univ 1001; 25 students
2010; Fall; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2010; Fall; A&P Lab I; Bios 1301; 50 students (2 sections)
2010; Fall; Biology for Non-Science majors; Bios 1053; 75 students
2010; Fall; Medical Microbiology; Bios 2743; 75 students
2010; Fall; University Success; Univ 1001; 25 students
2010; Summer; Biology for Non-Science majors; 75 students
2010; Summer; Medical Microbiology; Bios 2743; 75 students
2010; Spring; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2010; Spring; A&P Lab I; Bios 1301; 50 students (2 sections)
2010; Spring; A&P Lab II; Bios 1311; 25 students
2010; Spring; Biology for Non-Science majors; Bios 1053; 75 students
2009; Fall; Human Anatomy & Physiology I lecture; Bios 1303; 125 students
2009; Fall; A&P Lab I; Bios 1301; 25 students
2009; Fall; Biology for Non-Science majors; Bios 1053; 75 students
2009; Fall; A&P Lab II; Bios 1311; 25 students
2009; Summer; Biology for Non-Science majors; Bios 1053; 75 students
2009; Spring; Biology Lab for majors; Bios 1081; 50 students (2 sections)
2009; Spring; Human Anatomy & Physiology I lecture; 100 students
2009; Spring; Biology for Non-Science majors; Bios 1053; 75 students
2008; Fall; Biology Lab for majors; Bios 1081; 100 students; (4 sections)
2008; Fall; Medical Microbiology; Bio 2000; 50 students
2008; Summer; Medical Microbiology; Bio 2000; 50 students
2008; Spring; Biology for Majors I; Bio 1001; 50 students
2007; Fall; Medical Microbiology; Bio 2000; 50 students
2007; Summer; Human Anatomy & Physiology lecture I; Bio 2001; 50 students
2007; Spring; Advanced Medical Entomology; TRMD 7800; 50 students
2004; Fall; General Biology for majors; Gbio 101; 50 students
2004; Summer; General Biology for majors; Gbio 101; 50 students
2004; Spring; General Biology for majors; Gbio 101; 50 students
2003; Fall; General Biology for majors; Gbio 101; 50 students
2003; Spring; General Biology for majors; Gbio 101; 50 students
2002; Spring; Human Anatomy & Physiology I lecture; Bio 2001; 50 students
2002: Spring; Animal Behavior; Bio 2003; 50 students
2002: Spring; General Biology for majors lecture; Bio 1000; 50 students
2002: Spring; General Biology for majors Lab; Bio 1001; 50 students
2001: Fall; Medical Microbiology lecture; Bio 2000; 50 students
2001: Fall; Human Anatomy & Physiology lecture I; Bio 2001; 50 students
2001: Fall; A&P Lab I; Bio 2002; 25 students
2001: Fall; Animal Behavior; Bio 2003; 50 students
2001: Fall; General Biology for majors lecture; Bio 1000; 50 students
2001: Fall; General Biology lab for majors; Bio 1001; 25 students
1999; Spring; General Biology for majors; Gbio 101; 250 students; (5 sections)
1999; Summer; General Biology for majors; Gbio 101; 100 students (2 sections)
1998; Fall; Medical Microbiology Lab; Gbio 201; 75 students (3 sections)
1998; Spring; Medical Microbiology Lab; Gbio 201; 75 students (3 sections)
1997; Fall; Medical Microbiology Lab; Gbio 201; 75 students (3 sections)

**Undergraduate Student Mentoring:**
N/A

**Curriculum Development or Teaching Administrative Positions:**

Course Coordinator for Biology 1303, Human Anatomy & Physiology I lecture Fall 2010- June 2015
Course Coordinator for Biology 1301, Human Anatomy & Physiology I Lab; Fall 2010-June 2015
Course Coordinator for Biology 1311, Human Anatomy & Physiology II Lab; Fall 2010-June 2015
Course Coordinator for Biology 247, Human Anatomy & Physiology Lab I; Fall 2015-present
Course Coordinator for Biology 248, Human Anatomy & Physiology Lab II; Fall 2015- present
**Service:**

Summer 2016: Faculty participation in “Exceed U”, for first-time freshmen at UNM

Summer 2016: Collaboration with UNM Art Department; figure drawing class attended syndaver lab

Spring 2016: faculty judge for oral presentations at the Southwestern Association for Parasitology regional meeting

Spring 2016: Guest Lecturer for Bio 490, Biology of Infectious Organisms (tick-borne diseases)

Spring 2016: Attended “Get Set and Reset” workshop, a day for new and returning faculty to learn about effective teaching strategies and tools, research support, and faculty life

Fall 2016: UNM Parasitology journal club participation

Fall 2015: Attended “Teaching Excellence at UNM” with Aeron Haynie and the Center for Teaching Excellence

Fall 2015: Attended “UNM LEARN: Rob Wolf, Getting Started with UNM Learn” workshop

Fall 2015: Attended “Six Quick Ways to Improve Student Learning: Without Spending All of Your Time” by Aeron Haynie and the Center for Teaching Excellence

Fall 2015: present; Co-Chair, UNM Biology Department Research Day Committee

Fall 2015: present; Curriculum Re-Development for Human Anatomy & Physiology Lab I, University of New Mexico

Fall 2015- present; Curriculum Re-Development for Human Anatomy & Physiology Lab II, University of New Mexico

Summer 2015: Contributing Editor for Norton Publishing, Medical Microbiology Laboratory Manual

Fall 2010: June 2015; Pre-Veterinary Sciences Advisor, Biology Dept., University of New Orleans

Fall 2010: June 2015; Faculty Sponsor of the Pre-Vet Club, University of New Orleans
Scholarly Achievements (not all lecturers participate in scholarship in their disciplines, but for those who do, please list as described below):

**Books Authored or Co-authored:**
N/A

**Books Edited or Co-edited:**
N/A

**Articles in Refereed Journals:**


**Articles Appearing in Chapters in Edited Volumes:**
N/A

**Other Writings:** (not abstracts)

**Works in Progress:**
N/A

**Invited or Refereed Abstracts and/or Presentations at Professional Meetings:**

Immunomodulatory effects of tick saliva on dermal cells exposed to *Borrelia burgdorferi*, the agent of Lyme disease. Dorothy C. Scholl(1), Monica E. Embers (1), Deepak Kaushal (1), Thomas Mather (2), Wayne Buck (3), Lisa Morici (4) and Mario T. Philipp (1). (1) Divisions of Bacteriology and Parasitology, and (3) Comparative Pathology, Tulane National Primate Research Center, Covington, Louisiana; (2) Center for Vector-Borne Disease, University of Rhode Island, Kingston, Rhode Island; (4) Department of Microbiology and Immunology, Tulane University Medical School, New Orleans, Louisiana. Presented at the Gordon Conference, Italy 2010.

Appendix 5-1 59
Heat shock protein expression in *Escherichia coli* under extreme environmental conditions.


**Contributed (un-refereed) Abstracts and/or Oral Presentations at Professional Meetings:**

**Immunomodulatory effects of tick saliva on human monocytes stimulated with *Borrelia burgdorferi*: a gene expression analysis by microarray.**

Authors: Dorothy Scholl¹, Deepak Kaushal¹, Smriti Mehra³, Thomas Mather², Mario Philipp¹.

¹Tulane National Primate Research Center
Tulane University Health Sciences Center, Covington, Louisiana
²University of Rhode Island, Kingston
Presented at the 2008 Annual Meeting of the American Society for Microbiology, Boston, MA.

**Immunomodulatory effects of tick saliva on human monocytes stimulated with *Borrelia burgdorferi*: a cytokine bead array.**

Authors: Dorothy Scholl¹, Lisa Morici³, Deepak Kaushal¹, Thomas Mather², Mario Philipp¹.

¹Tulane National Primate Research Center
Tulane University Health Sciences Center, Covington, Louisiana
²University of Rhode Island, Kingston
³Tulane University Medical School
Presented at Tulane University for Health Sciences Research Days, April 2008.

**Ixodes scapularis Saliva Inhibits Proinflammatory Mediators In Human Monocytes Stimulated With Live *Borrelia burgdorferi*.**

D. Scholl¹, A. Bernardino¹, W. Buck¹, D. Kaushal¹, R. Redmann¹ T. Mather², M. Philipp¹;

¹Tulane National Primate Research Center, Covington, LA, ²University of Rhode Island, Kingston
Presented at the 2007 Annual Meeting of the American Society for Microbiology, Toronto, Canada

**Investigating the immunomodulatory role of *Ixodes scapularis* tick feeding in the pathogenesis of Lyme borreliosis**

Authors: Dorothy Scholl¹, Andrea Bernardino¹, Monica Embers¹, Mary Jacobs¹, and Mario T. Philipp¹.

¹Tulane National Primate Research Center
Tulane University Health Sciences Center, Covington, Louisiana
Presented at the 2005 Annual Meeting of the American Society for Microbiology, Atlanta, Georgia

Appendix 5-1 60
Research Funding (while many lecturers do not participate in outside funding activity, some do, so an opportunity is provided to list those activities):

N/A

Pending Research Funding:

N/A
Educational History:

M.S., August 2003. Department of Biology MSC03 2020, University of New Mexico, Albuquerque, NM 87131, Evolutionary Ecology and Plant Mating Systems.

B.S. (magna cum laude) May 2001. Department of Biology MSC03 2020, University of New Mexico, Albuquerque, NM 87131
Senior Honor Thesis: Under how wide a range of conditions will non random mating occur in Wild Radish, Raphanus sativus? Dr. Diane L. Marshall, advisor.

Employment History:

Lecturer II August 2006 – Present
University of New Mexico
Department of Biology, MSC03 2020
Albuquerque, NM 87131

Part-time Faculty August 2003 – December 2006
CNMCC
525 Buena Vista SE
Albuquerque, NM 87106

UNM Health Sciences Center
Department of Neuroscience, MSC08 4740
Albuquerque, NM 87131

Teaching Assistant June 2003 – July 2003
Biology 122 Lab
UNM Biology Department, MSC03 2020
Albuquerque, NM 87131

Graduate Research Associate June 2001 – May 2003
Dr. Diane Marshall Laboratory
UNM Department of Biology, MSC03 2020
Albuquerque, NM 87131
Professional Recognition, Honors, etc.
Nominee, Lecturer of the Year, May 2011
University of New Mexico

Recipient of the Webster Teaching Award, July 2014
University of New Mexico

Short Narrative Description of Teaching, Research and Service Interests:

Teaching: As a lecturer, my primary function is teaching. Fortunately, my passion is also teaching! My goals for my students are for them to think critically about the world around them, to learn to be good students, to master the concepts that I am trying to teach them and finally to be good human beings. I have worked tirelessly at improving my teaching and am my own worst critic. Every semester, without fail, I try to improve some component of my class and have explored different mediums for dissemination of information such as active learning techniques, use of clickers and more recently, use of case studies. I have recently been involved with a massive overhaul of Anatomy and Physiology labs and lectures in my department and this has become a passion as well as a pet project.

Research: I am not currently active in a traditional research program. I do not rule out engaging in research pursuits in the future.

Service: I firmly believe in service to the department, the university and the community. To that end, I have served on various committees at all three of these levels. I have done outreach in the Albuquerque Public Schools for several years as a volunteer. I have worked on numerous committees in my Department, including some of the more laborious and time-consuming (but important) committees. I have, in recent years, branched out to service at the University level. I have done so at the level of faculty governance as a faculty senator and a member of the Faculty Senate Operations Committee as well as participating as a mentor to multiple student organizations. What I have taken away from the service work that I have done is that the more I do, the more I care. This means that I care about and am more invested in the kids that will someday come to UNM, the kids that are at UNM and the institution itself.

Courses Taught:
Biology 110: Biology for Non-Majors
Biology 123: Biology for the Health-related Sciences
Biology 360L: Introductory Botany
Biology 204: Plant & Animal Form & Functions
Biology 237: Anatomy & Physiology I
Biology 238: Anatomy & Physiology II
Biology 201: Introductory Cell & Molecular Biology
Biology 239L: Microbiology for the Health-related Sciences
Biology 201L: Cell and Molecular Biology
Biology 203L: Ecology and Evolution

Service:
Fall 2006 – Fall 2015 Graduation Committee, CoChair
Spring 2009 – Spring 2010 Lecturer Promotion Committee
Fall 2015 – present Biology Annual Review Committee
Fall 2015 – present Biology Undergraduate Policy Committee
Spring 2016 – present Senator, Faculty Senate
Fall 2016 – present Member, Faculty Senate Operations Committee
Fall 2016 – present University Undergraduate Committee
Fall 2016 – present UNM Gen Ed. Task Force
Summer 2016 – present Faculty Advisor CKI
Fall 2014 – present Faculty Advisor, Be the Match
Fall 2014 – present Faculty Advisor, Pre-PA Club
Biographical Sketch - Robert L. Sinsabaugh
Biology Department, University of New Mexico, Albuquerque, NM 87131, rlsinsab@unm.edu

Professional Preparation:
Lehigh University, Bethlehem, Pennsylvania, Biology, B.S., 1978.
Virginia Polytechnic Institute and State University, Blacksburg, Virginia, Aquatic Ecology, M.S., 1980.
Virginia Polytechnic Institute and State University, Blacksburg, Virginia, Environmental Science and Engineering, Ph.D., 1985.
Clarkson University, Potsdam, New York, Microbial ecology, Postdoc, 1985-88.

Appointments:
2005 – present: Professor, Department of Biology, University of New Mexico
2002- 2004: Associate Professor, Department of Biology, University of New Mexico.
1993-2002: Assistant and Associate Professor, Departments of Biology and Environmental Science, University of Toledo.
1988-1993: Assistant Professor, Biology Department, Clarkson University.

Products:
Closely related products:


Other significant products:


**Synergistic Activities:**
2009-present: Advisory committee for Enzyme Research Coordination Network.
2009-present: Associate Editor for Ecological Applications.
2005-present: Senior Scientist for the Sevilleta Long Term Ecological Research Program.
2014: Keynote speaker, Sixth International Workshop on Soil and Sedimentary Organic Matter Stabilization and Destabilization.
2013: US EPA Nutrient Indicator Workshop to evaluate and develop criteria for water quality assessment
Felisa A Smith, Professor of Biology

a) Professional Preparation

Revelle College, UC San Diego    Biology    B.A.    Dec 1980
UC Irvine (CA)                 Education  CA teaching cert.  1982

b) Appointments

- **Professor**, Department of Biology, University of New Mexico, 2011 to present
- **Director**, Program in Integrative Biological and Biomedical Science, 2010 to 2016; **Co-Director** (2006 to 2010)
- **Associate Professor**, Department of Biology, University of New Mexico, 2006 to 2010
- **Research Assistant/Associate/Full Professor**, Department of Biology, UNM, 1998 to 2006
- **National Science Foundation BBS Minority Postdoctoral Fellow**, Department of Biology, UNM, 1993 to 1996

c) Representative Publications (of 88; h-index=30 as of Dec 2016)


d) Examples of Synergistic Activities

- **Outreach**: Film, radio, and print interviews for NPR, German BBC Deutschlandfunk, Canadian Quirks and Quarks, BBC-World News, History Channel, Discover, Audubon, Geo, National Geographic News, KRQE local Channel 13 news and other venues.

- **Science communication**: Maintain a weekly ‘BioBlog’ ([https://unm-bioblog.blogspot.com](https://unm-bioblog.blogspot.com)); as of Dec 2016, >206,500 page views.

EDUCATIONAL HISTORY:
Ph.D., 1983, Dept of Zoology, Univ of Washington, Seattle, WA
M.Sc., 1979, Dept of Zoology, Univ of Washington, Seattle, WA
B.A., 1976, Dept of Biology, Univ of California, Santa Cruz, CA

EMPLOYMENT HISTORY-PRINCIPAL POSITIONS:
• Professor, 6/02--, Dept. of Biology, Univ. of New Mexico, Albuquerque, NM.
• Associate and Assistant Professor and Director of the Electron Microscopy and Confocal Microscopy Facilities, 9/89-6/02--Dept. of Biology, Univ. of New Mexico, Albuquerque, NM.
• Research Associate, 7/87-12/88, Integrated Microscopy Resource, Univ. of Wisconsin, Madison, WI.
• Postdoctoral Fellow, 5/83-6/87, Dept. of Biology, University of Calgary, Calgary, Alberta, Canada
• Electron Microscopy Technician, 5/80-9/80, Friday Harbor Laboratories, Friday Harbor, WA
• Teaching Assistant, 9/76-12/79; 9/80-6/81, Dept. of Zoology, University of Washington, Seattle, WA

TEMPORARY OR VISITING APPOINTMENTS:
• Visiting Instructor, 2006; 2004; 1999; 1995; 1986; 1985, University of Washington, Seattle, WA.
• Visiting Instructor, 7/98, Physiology Course, Marine Biological Laboratory, Woods Hole, MA.
• Visiting Instructor, 5/97, University of Dakar, Dakar, Senegal, Africa.

PROFESSIONAL RECOGNITIONS, HONORS, AND MEMBERSHIPS:
• Guyer postdoctoral fellowship, 1987-1988, University of Wisconsin.
• Alberta Heritage Foundation Medical Research Postdoc fellowship, 1983-1987, Univ of Calgary.
• Best student paper award, 1981, American Society of Zoologists Annual Meetings.
• Honors award, 1976, B.A. degree, University of California, Santa Cruz.

SELECTED PUBLICATIONS (from a total of 89):


Cristina D. Takacs-Vesbach  
Professor, Department of Biology  
University of New Mexico  
Albuquerque, NM 87131  
Telephone: 505-277-3418, FAX: 505-277-0304  
email: cvesbach@unm.edu

(a) Professional Preparation
University of Colorado, Boulder Biology B.A. 1991  
Montana State University, Bozeman Biological Sciences Ph.D. 1999

(b) Appointments
University of New Mexico  Professor  2015-current  
University of New Mexico  Associate Professor  2009-2013  
University of New Mexico  Associate Chair  2011-2013  
University of New Mexico  Assistant Professor  2002-2009  
Portland State University  Research Faculty  2000-2002  
Portland State University  Postdoctoral Research Associate  1999-2000  
Montana State University  Graduate Research Assistant  1994-1999  
Scripps Inst. of Oceanography  Research Intern  1994

(c) Products (*indicates undergraduate co-author)
(i) Publications Most Relevant to Proposed Project

(ii) Five Other Significant Publications


(d) Synergistic Activities
Co-Director, UNM Maximizing Access to Research Careers Program, MARC U-STAR, NIH, 2015-present.
Member of the Committee on Developing a Strategic Vision and Implementation Plan for the U.S. Antarctic Program, National Academy of Science, 2014-2015.
Invited Participant, Integrating microbial ecology into NEON, LSU, February 2008.
Member of the US Committee on the Intern'l Polar Year, National Academy of Sciences, 2003-2005.
Biographical Sketch: Donald Lee Taylor

Department of Biology
MSC03 2020
1 University of New Mexico
Albuquerque, NM 87131-0001

(a) PROFESSIONAL PREPARATION

Yale University, New Haven, CT - Biology B.S. 1989
University of Florida, Gainesville, FL - Agronomy B.S. 1990
University of California, Berkeley, CA - Plant and Microbial Biology Ph.D. 1997
University of California, Santa Barbara, CA - Speciation Postdoc, 1997-1999
University of California, Santa Barbara, CA - Population genetics Postdoc, 1999
University of California, Berkeley, CA - Plant evolutionary ecology Postdoc, 1999-2002

(b) APPOINTMENTS

Associate Chair, Department of Biology, University of New Mexico, Albuquerque, NM, 2014 – present
Associate Professor, Department of Biology, University of New Mexico, Albuquerque, NM, 2013 – present
Associate Professor, Institute of Arctic Biology and Department of Biology and Wildlife, University of Alaska, Fairbanks, 2008 – 2012
Assistant Professor, Institute of Arctic Biology and Department of Biology and Wildlife, University of Alaska, Fairbanks, 2002 - 2008

(c-i) FIVE MOST CLOSELY RELATED PRODUCTS


(c-ii) FIVE OTHER PRODUCTS


(d) SYNERGISTIC ACTIVITIES

1) I created the new courses “Molecular Analysis of Microbial Diversity” and “Microbial Ecology”, at the University of Alaska, and “Ecology of Plant-Microbe Symbioses” at the University of New Mexico.
2) We have developed publicly accessible bioinformatic tools for sequence-based fungal identification; see http://www.borealfungi.uaf.edu/.
4) I have served on 7 NSF panels spanning MCB Microbial Observatories, MCB Microbial Interactions and Processes, DEB Evolutionary Genetics, DEB Evolutionary Ecology, DEB Biophylogeography and IOS IEP Plant/Microbe. I have provided outside proposal reviews for the NSF panels in Ecology, Systematics, Population Biology, Biological Surveys and Inventories, and Polar Programs. I have served on the DOE JGI Community Sequencing Program panel, as well as provided numerous ad hoc reviews for DOE and other agencies.
5) Councilor in Ecology for the Mycological Society of America 2008-2010 and host for the MSA annual meeting in 2011 in Fairbanks Alaska; Associate Editor of Mycologia 2011-2013, Executive Editor 2014-2016.
TEACHING – 2013-2017
BIOL 204L – Plant & Animal Form & Function (x2)
BIOL 404/504 – Physiology in Medical Practice (x3)
BIOL 435 – Animal Physiology (x1)
BIOL 445/545 – Biology of Toxins (x5)
BIOL 492/592 – Introductory Mathematical Biology (x2)
FLC 613 – Biology of Toxins (x5)

PUBLICATIONS – 2013-2017
• My contribution was development and implementation of a statistical model that is apparently novel & unique in the field. The screening instrument we developed has been adopted by numerous state mental health organizations in the USA and by others around the world. The CDC also has expressed serious interest in having us apply it to new refugee populations and, perhaps, taking it to the field in the Democratic Republic of the Congo.

• My contribution was to develop the mathematical models and algorithms on which this research was based and statistical analysis of the results of field validation studies.


RESEARCH FUNDING – 2013-2017
• I was responsible for the mathematical model development & validation, development of data-acquisition protocols, supervision of data acquisition in the field, statistical analysis of data, and development of wavelet-based classification algorithms.
INVITED PRESENTATIONS – 2013-2017

2013-2014 – Presented a number of classified briefings to representatives of DoD, DEA, and CIA based on my work, which was conducted with funding provided by DARPA W31P4Q-10-C-031 (see Research Funding, above).


Toolson, E.C. (2016) Recent advances in our understanding of the suitability of biological toxins as bioterrorism agents. Summer Pre-Collegiate Institutes (Biological Sciences). Stanford University, Palo Alto, CA. (two 3-hour sessions)

PRESENTATIONS – 2013-2017


RESEARCH IN PROGRESS

1. Mathematical and agent-based modeling of possible untoward range shifts of Western North America plant communities in response to global warming.
2. Nonlinear dynamical modeling of the evolution of performance curves in animals.
3. Thermal physiological and evolutionary ecology of cactiphilic Drosophila.
**Biographical sketch – Thomas F. Turner**

### Professional Preparation

<table>
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<tr>
<th>Institution</th>
<th>Degree</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ohio University</td>
<td>Zoology</td>
<td>B.S. with honors, 1986</td>
</tr>
<tr>
<td>Ohio University</td>
<td>Zoology</td>
<td>M.S., 1990</td>
</tr>
<tr>
<td>Florida International University</td>
<td>Biology</td>
<td>Ph.D., 1996</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>Fisheries</td>
<td>Post-doctoral, 1996 - 1998</td>
</tr>
</tbody>
</table>

### Professional Appointments

<table>
<thead>
<tr>
<th>Year</th>
<th>Appointment</th>
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<tbody>
<tr>
<td>2014 – present</td>
<td>Associate Dean for Research, University of New Mexico</td>
</tr>
<tr>
<td>2009 – present</td>
<td>Professor, Department of Biology, University of New Mexico</td>
</tr>
<tr>
<td>1998 – present</td>
<td>Curator of Fishes, Museum of Southwestern Biology</td>
</tr>
<tr>
<td>2007—2011</td>
<td>Director, Museum of Southwestern Biology</td>
</tr>
<tr>
<td>2004 – 2005</td>
<td>Visiting Research Fellow, University of Western Australia</td>
</tr>
</tbody>
</table>

### Five Publications most closely related to proposed project (* = student author)


### Five Other Publications


Synergistic Activities

1. **STEM Education and Mentorship:**
   - Invited Presenter, Symposium on Transforming Undergraduate Education, focusing on the role of natural history collections in education and training.
   - Member, Education and Human Resources Committee, American Society of Ichthyologists and Herpetologists 2009-2012
   - Graduate Mentor, NSF-IGERT Freshwater Sciences Interdisciplinary Program
   - Undergraduate Mentor, NSF-UMEB – Undergraduate Career Enhancement and Training in Ecological Studies in New Mexico
   - Undergraduate Mentor, NSF-URM – Undergraduate Opportunities
   - Undergraduate Mentor, NIH-IMSD, NIH-PREP
   - *Primary mentor for 67 undergraduate students in research and curation*

2. **Curatorial Resource Development:**
   - Co-founded the MSB Division of Parasitology with NSF support
   - Member, NSF-sponsored committee; natural history repositories and NEON
   - UNM Representative to the Colorado Plateau Cooperative Ecosystems Study Unit
   - Increased specimen holdings in MSB Fishes by 100%, now the largest regional collection in the southwestern US. Georeferenced all collection localities with NSF support (2013 – 2016) [http://fishnet2.net](http://fishnet2.net)
   - Member, Gila River Exhibit Planning, Design and Implementation Team, New Mexico Museum of Natural History, Albuquerque, New Mexico (2012).

3. **Integration of Science and Policy:**
   - Member, Executive Committee, Middle Rio Grande Collaborative ESA Workgroup (2014 – present).
   - Testimony to the New Mexico Interstate Stream Commission regarding implementation of Arizona Water-Settlement Act diversion of the Upper Gila River (2014)
   - Lead Panelist and Facilitator, Greenback Trout Genetics and Meristics Studies, Expert Workshop, USFWS 2013
   - Advisor to The Nature Conservancy: River fragmentation and effects of aquatic biota (2012 – present)
   - Gila Trout and Chihuahua Chub Recovery Team Member (2002 – present).
PROFESSIONAL PREPARATION:
University of Illinois – Urbana  Biology  Bachelor of Science - 1969
University of Wisconsin – Madison  Zoology  Master of Science - 1973
University of Wisconsin – Madison  Zoology  Doctor of Philosophy - 1978

APPOINTMENTS:
2004-present  Professor, Department of Biology, University of New Mexico
2004-present  Director, Center for Research in Ecological Science and Technology
1997-2016  Executive Director, Long Term Ecological Research Network Office
1997-2003  Research Professor, Department of Biology, University of New Mexico
1995-1999  Professor, Department of Biology, University of Puerto Rico
1995-1997  Director, Puerto Rico Minority Research Center of Excellence
1982-1997  Director, Terrestrial Ecology Division/Institute for Tropical Ecosystem Studies
            (University of Puerto Rico-Rio Piedras)

PRODUCTS:
Books


Book chapters


Journal articles


GRADUATE STUDENTS SUPERVISED:

Jennifer Merino – M.S. 2016 - University of New Mexico
Brittany Barker – Ph.D. 2012 - University of New Mexico

SYNERGISTIC ACTIVITIES:

• Principal investigator for awards leading to the creation of the LTER Network Information System
• Leader (along with James R. Gosz) in expansion of the International LTER Network to 40 countries
• Member, development committees for NEON, CLEANER, National Phenological Network
• Member, Science Task Force for the LTER Planning Project
HELEN J. WEARING  
Departments of Biology and Mathematics & Statistics  
The University of New Mexico

Professional Preparation

University of Manchester, U.K.  B.Sc.  1997  Mathematics and French  
Heriot-Watt University, Edinburgh, U.K.  M.Sc.  1998  Mathematics  
Heriot-Watt University, Edinburgh, U.K.  Ph.D.  2002  Mathematical Biology  
University of Cambridge, U.K.  Postdoctoral  2002 - 2004  Ecology  
University of Georgia  Postdoctoral  2004 - 2007  Epidemiology

Appointments

2007 - 2013  Assistant Professor, Departments of Biology and Mathematics & Statistics, UNM  
2013 - present  Associate Professor, Departments of Biology and Mathematics & Statistics, UNM

Distinction and Awards

UNM Outstanding Teacher of the Year Award (2013-2014)

Selected Peer-Reviewed Publications

Christofferson, R.C, Mores, C.N. & Wearing, H.J.; Characterizing the likelihood of dengue emergence and detection in naïve populations; *Parasites & Vectors* 7: 282; 2014.  
WHO-VMI Dengue Vaccine Modeling Group (including Wearing H.); Assessing the potential of a candidate dengue vaccine with mathematical modeling; *PLoS Neglected Tropical Diseases*; 6: e1450; 2012.  
Wearing, H.J. & Rohani, P.; Ecological and immunological determinants of dengue epidemics; *PNAS*; 103; 11802-11807; 2006. *Featured Faculty of 1000 Medicine.*  
Current Research Support

07/01/2016-06/30/2019; NSF/NIH Joint DMS/NIGMS Initiative to Support Research at the Interface of the Biological and Mathematical Sciences funded by NIH
Collaborative Research: Characterization of temperature-driven heterogeneity in mosquito populations, the mosquito-arbovirus interaction and subsequent effects on transmission
Role: PI (Lead PI: Rebecca C. Christofferson, LSU). Total award: $981,793; UNM portion: $357,429.

05/01/2011-04/30/2017; U01 MIDAS program NIH/NIGMS
Predicting vector-borne virus transmission dynamics and emergence potential
Role: co-PI. Total award: $3.1 million; UNM portion: $408,723.

Main Synergistic Activities


Workshop teaching:
Ecology & Evolution of Infectious Disease. Developed or co-developed half-day modules on spectral analysis, age-structured models, simulating stochastic and deterministic disease models in the R programming language. Part of NSF-funded 4-day workshop for graduate students and research scientists at Cornell University (2010), UC Santa Barbara (2011) and University of Michigan (2012).
Modeling Infectious Diseases. Co-developed lectures, in-class problem sets, Matlab programs for intensive week-long course aimed at undergraduate and graduate students from institutions across the Southwest (2012, 2014). Part of summer math camp (NSF-funded Mentoring through Critical Transition Points program) at UNM.

Graduate and Postdoctoral Advisees


Doctoral students: Larissa Anderson, PhD advisee, Biology, UNM, expected Spring 2018; Cesar Alvarado, PhD advisee, Applied Mathematics, UNM, expected Spring 2017; Christian Gunning, PhD advisee, Biology with concentration in Integrative Biology, graduated Summer 2014 with distinction. Currently, postdoctoral research associate at North Carolina State University.

Postdoctoral scholars: Michael Robert, postdoctoral research associate, UNM (October 2013-present); Rebecca Christofferson, postdoctoral research associate based at Louisiana State University (2011-2015). Co-mentored with Christopher Mores, LSU. Currently, assistant professor in the Department of Pathobiological Sciences, School of Veterinary Medicine, LSU.
BIOGRAPHICAL SKETCH: Kenneth D. Whitney

Department of Biology
MSC03 2020
University of New Mexico
Albuquerque, NM 87131

OFFICE PHONE: (505) 277-4408
FAX: (505) 277-0304
EMAIL: whitneyk@unm.edu
http://biology.unm.edu/whitney/index.htm

Professional preparation
Dartmouth College, Hanover, NH  English/Environmental Studies   A.B. 1989
San Francisco State Univ., CA  Ecology and Systematics   M.A. 1997
University of California, Davis  Population Biology    Ph.D. 2003
Indiana University, Bloomington  Postdoctoral Fellowship  2003-2005

Appointments
Associate Professor, Dept. of Biology, University of New Mexico  2012-present
Associate Professor, Dept. Ecology and Evolutionary Biology, Rice University  2012
Assistant Professor, Dept. Ecology and Evolutionary Biology, Rice University  2005-2012
USDA NRI Postdoctoral Fellow        2003-2005
EPA STAR Fellow         1997-2000

Publications (46 total) available from http://biology.unm.edu/whitney/Publications.htm
Related to this proposal:


Other significant publications:


BIOGRAPHICAL SKETCH: Kenneth D. Whitney (cont.)

Synergistic activities

Undergraduate research/Increasing participation of underrepresented groups in the sciences
I am especially interested in encouraging undergraduate and minority participation in field and lab research. I have supervised 28 undergraduate and postgraduate independent research projects (including 14 REU projects) and over 40 undergraduate field assistants in projects located in the U.S., Cameroon, and Australia. Many of these undergraduates have gone on to MS and Ph.D. programs. Seven advisees have been Native American, African-American or Hispanic and the majority have been women.

Graduate training
With other faculty in the department, I initiated a new graduate core course at Rice that ensures students have a common foundation in ecology and evolutionary biology, teaches fundamental concepts, and introduces new techniques to expand awareness of tools available for research. I was the Rice EEB Director of Graduate Studies from 2006-2012. At UNM I helped to revamp the core graduate curriculum in evolution and have been heavily involved in graduate recruitment and retention. I have served as primary or co-advisor for 5 completed Ph.D. students (and two continuing) and one completed M.S. student. I have served on 26 additional Ph.D. or M.S. committees.

K-12 Outreach
I have participated as a workshop leader in several professional development programs, helping high school teachers (Advanced Placement and International Baccalaureate) to bring cutting-edge biological research to their classrooms. I have hosted a high school teacher in my lab via NSF’s RET program. I frequently interact with local K-12 science classes and science fairs. I regularly participate in the Rocky Mountain Biological Lab's Kids Nature Camp and Adult Science Education programs as a guest scientist.

Classroom Teaching
Finalist, Phi Beta Kappa Teaching Prize, Rice University (2012)
BIOL 203 Ecology and Evolution (2014, 2016)
BIOL 419/519 Invasive Species Research (2015)
BIOL 517 Basic Graduate Evolution (annually 2013-2017)
EBIO 336 Plant Diversity (annually 2007-2012)
EBIO 569 Graduate Core Course in Ecology and Evolutionary Biology (annually 2006-2011)

Editorial
Associate Editor, *Journal of Ecology*, 2011 - present
**BIOGRAPHICAL SKETCH – CHRISTOPHER C. WITT**

Associate Professor and Curator of Birds  
Museum of Southwestern Biology & Department of Biology  
University of New Mexico, MSC03 2020; Albuquerque, NM 87131  
Phone: 505-918-7199; Fax: 505-277-1351; Email: cwitt@unm.edu  
Lab webpage: [http://biology.unm.edu/witt/index.html](http://biology.unm.edu/witt/index.html); Twitter: @MSBbirds

**Expertise:** Specimen-based studies of avian biodiversity & evolution; phylogenetic comparative analysis; high-altitude adaptation; biogeography of Andean birds, hemoglobin, & haemosporidian parasites.

**(a) Professional preparation**

- College of the Atlantic  
  Human Ecology  
  B.A. 1997
- Louisiana State University  
  Biological Sciences  
  Ph.D. 2004
- Univ. of California-Berkeley  
  Integrative Biology  
  Postdoc, 2005-2006

**(b) Appointments**

- Louisiana State University:
  - Dept. of Biological Sciences  
  - Teaching Assistant  
  - 2001-2002, 2004
  - Museum of Natural Science  
  - Curatorial Assistant  
  - 2003
  - Graduate School  
  - Board of Regents Fellow  
  - 1998-2001

- University of California – Berkeley:
  - Museum of Vert. Zoology  
  - Postdoctoral Researcher  
  - 2005-2006

- University of New Mexico:
  - Dept. of Biology  
  - Asst. Professor & Curator  
  - 2007-2013
  - Assoc. Professor & Curator  
  - 2013-present

**(c) Products (available at [http://biology.unm.edu/witt/pub.html](http://biology.unm.edu/witt/pub.html), or as noted)**

(i) Five most relevant products: (***/** equal contributions)

(ii) Five other significant products:

(d) Synergistic Activities

(i) 2007-present: Led growth of Museum of Southwestern Biology Bird collection from 24,000 to 45,000, including >11,000 South American specimens that have been subject to 51 tissue loans to date.

(ii) 2007-present: Mentored 32 American and 13 Peruvian students on field projects in Peru.

(iii) 2007-present: Presented 17 popular science talks and six popular articles for New Mexico non-profit groups and public schools.

(iv) 2001-present: Fifty-nine talks at national or international scientific meetings over sixteen years, including: (1) Three ‘best student talk awards’ (Ernst Mayr Award, SSB; Council Award, AOU; Cooper Society Award); (2) Keynote talk at the Peruvian Ornithological Congress, Ayacucho, Peru, 2014; (3) Invited talk at the USAID-sponsored Andes-Amazon Biodiversity Conservation Conference, Lima, Peru, 2015.

(v) 2013-present. International outreach via social and traditional media, including *The Ornithology Blog* (http://wp.me/P5fEMM-1), tweeting about evolutionary biology via @MSBbirds (https://twitter.com/MSBbirds) and @UNMornithology to >2600 followers, and a featured eight-minute segment of a *PBS Nature* Documentary, *Super Hummingbirds* (October 2016) about our Andean hummingbird research.
Biographical sketch of Blair O. Wolf

(a) Professional preparation
1987  California State University, San Jose, Zoology, B.S. May 1987
1991  California State University, San Jose, Biology, M.A., December 1991
1996  Arizona State University, Ph.D. Zoology, May 1996

(b) Appointments
2013-  Professor of Biology, University of New Mexico, Albuquerque, NM
2006-2013  Associate professor of Biology, University of New Mexico, Albuquerque, NM
2000-2006  Assistant professor of Biology, University of New Mexico, Albuquerque, NM
1996-2000  NSF Postdoctoral Research Fellowship in Environmental Biology, The University
            of Arizona, Department of Physiology and Ecology and Evolutionary Biology

(c) Products
   i. Five related products
   population size and reproductive dynamics of an avian predator in the arid southwest. Global
   reproductive dynamics and productivity of an avian predator in the arid southwest. Oecologia
   production to the pathways of carbon flow in higher trophic level consumers in a desert

   ii. Five other significant products
   implications for ecological studies using stable isotopes in terrestrial ectotherms
   Physiological and Biochemical Zoology 83: 608-617.
   hierarchical model of pulse dynamics in aridland ecosystems. Annual Review of Ecology,
   Evolution and Systematics 45: 397-419.
Wolf, B. O., C. Martinez del Río and J. Babson (2002) Stable isotopes reveal that saguaro fruit
   provides different resources to two desert dove species, Ecology 83:1286-1293.


**Synergistic activities**

1. Proposed, produced and manage SORA - the Searchable Ornithological Research Archive; http://sora.unm.edu an open access free electronic archive of ornithological literature that contains about 400,000 pages of material from more than 15 serial publications that is free to the world.


4. Panel member for NSF DEB Population Biology and Evolutionary Ecology (2), Doctoral Dissertation Improvement Grant (2) and IOS Animal Physiological Ecology panels.
### Appendix XX: Google Scholar accounts for tenured or tenure-track faculty members in the Department of Biology

<table>
<thead>
<tr>
<th>Faculty member</th>
<th>Google Scholar account link</th>
</tr>
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<tr>
<td>Adema, Coenraad M.</td>
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<td>Litvak, Marcy E.</td>
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<td>Lowrey, Timothy K.</td>
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<td>Miller, Kelly B.</td>
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<td>Milne, Bruce T.</td>
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<td>Sinsabaugh, Robert L.</td>
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<td>Turner, Thomas F.</td>
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<td>Wolf, Blair O.</td>
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### Organization Level 5: 048A - Biology Department

**Revenue**

<table>
<thead>
<tr>
<th>Account Description</th>
<th>Budget (FYTD)</th>
<th>Budget (FYTD)</th>
<th>Actuals</th>
<th>Actuals</th>
<th>Actuals</th>
<th>Actuals</th>
<th>Encumbrances</th>
<th>Balance</th>
<th>Balance</th>
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<tr>
<td></td>
<td>Adopted</td>
<td>Adjustments</td>
<td>Current Month</td>
<td>Pct</td>
<td>Fiscal YTD</td>
<td>Pct</td>
<td>Available</td>
<td>Pct</td>
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</table>

<table>
<thead>
<tr>
<th>Revenue Item</th>
<th>Budget</th>
<th>Adjustments</th>
<th>Current Month</th>
<th>Pct</th>
<th>Fiscal YTD</th>
<th>Pct</th>
<th>Available</th>
<th>Pct</th>
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</thead>
<tbody>
<tr>
<td><strong>Revenue</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>TOTAL Revenue</strong></td>
<td>$7,634,730.00</td>
<td>$1,199,410.00</td>
<td>$8,834,140.00</td>
<td>$90,009.15</td>
<td>1.02%</td>
<td>$10,287,641.60</td>
<td>116.45%</td>
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**FOROLDS Operating Ledger Summary**

**Through the Month of Jun 2016**

**02/13/17**
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</thead>
<tbody>
<tr>
<td>2000 - Faculty Salary Detail Gen</td>
<td>$3,398,803.00</td>
<td>$327,951.00</td>
<td>$3,726,754.00</td>
<td>$12,885.33</td>
<td>.35%</td>
<td>$3,588,801.18</td>
<td>94.96%</td>
<td>$0.00</td>
<td>94.96%</td>
<td>$187,952.82</td>
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<td>2002 - Faculty Summer Research</td>
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<td>$49,713.00</td>
<td>$49,713.00</td>
<td>$14,662.30</td>
<td>29.49%</td>
<td>$37,968.37</td>
<td>76.38%</td>
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<td>76.38%</td>
<td>$11,744.63</td>
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<td>2004 - Teaching Overload</td>
<td>$0.00</td>
<td>$7,666.00</td>
<td>$7,666.00</td>
<td>$0.00</td>
<td>.00%</td>
<td>$4,331.03</td>
<td>56.50%</td>
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<td>56.50%</td>
<td>$3,334.97</td>
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<td>2005 - Faculty Incentive</td>
<td>$0.00</td>
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<td>$0.00</td>
<td>.00%</td>
<td>$2,000.00</td>
<td>.00%</td>
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<td>.00%</td>
<td>($2,000.00)</td>
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<tr>
<td>2007 - Faculty Temp Part Time</td>
<td>$10,000.00</td>
<td>$0.00</td>
<td>$10,000.00</td>
<td>$0.00</td>
<td>.00%</td>
<td>$10,000.00</td>
<td>100.00%</td>
<td>$0.00</td>
<td>100.00%</td>
<td>$10,000.00</td>
<td>100.00%</td>
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<tr>
<td>2040 - Technician Salary Detail Gen</td>
<td>$3,400,534.00</td>
<td>$31,098.00</td>
<td>$3,711,632.00</td>
<td>$28,581.39</td>
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<td>$226,253.91</td>
<td>60.88%</td>
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<td>60.88%</td>
<td>$145,378.09</td>
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<td>2060 - Support Staff Salary Detail Gen</td>
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<td>.68%</td>
<td>$1,019,088.06</td>
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<td>$0.00</td>
<td>99.05%</td>
<td>$9,816.94</td>
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<td>2080 - Student Salaries Gen</td>
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<td>$54,064.40</td>
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<td>$7,511.09</td>
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<td>20N0 - State Workstudy Gen</td>
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<td>($9,944.52)</td>
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<td>2110 - Fica Gen</td>
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<td>$4,251.00</td>
<td>$15,251.00</td>
<td>$3,729.88</td>
<td>24.46%</td>
<td>$32,419.84</td>
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<td>23.38%</td>
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<td>$197,025.72</td>
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<td>($7,514.39)</td>
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<td>($138.00)</td>
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<td>3.41%</td>
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<td>83.68%</td>
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<td>83.68%</td>
<td>($3,980.73)</td>
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<td>$335.00</td>
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<td>1.44%</td>
<td>$2,173.00</td>
<td>68.23%</td>
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<td>$120.00</td>
<td>$1,592.80</td>
<td>1,327.33%</td>
<td>$1,592.80</td>
<td>1,327.33%</td>
<td>$0.00</td>
<td>1,327.33%</td>
<td>($1,472.80)</td>
<td>(1,227.33%)</td>
</tr>
<tr>
<td>3140 - Computer Software Gen</td>
<td>$7,863.00</td>
<td>$417.00</td>
<td>$8,280.00</td>
<td>$1,763.00</td>
<td>21.29%</td>
<td>$9,979.12</td>
<td>120.52%</td>
<td>$0.00</td>
<td>120.52%</td>
<td>($1,699.12)</td>
<td>(20.52%)</td>
</tr>
<tr>
<td>3150 - Computer Supplies &lt;$5,001</td>
<td>$15,826.00</td>
<td>$5,950.00</td>
<td>$21,776.00</td>
<td>$635.57</td>
<td>2.92%</td>
<td>$23,050.38</td>
<td>105.85%</td>
<td>$0.00</td>
<td>105.85%</td>
<td>($7,274.38)</td>
<td>(31.48%)</td>
</tr>
<tr>
<td>3180 - Non Capital Equipment &lt;$5,000</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>.00%</td>
<td>$0.00</td>
<td>.00%</td>
<td>$0.00</td>
<td>.00%</td>
<td>($0.00)</td>
<td>100.00%</td>
</tr>
<tr>
<td>Account Description</td>
<td>Budget (FYTD)</td>
<td>Budget (FYTD)</td>
<td>Actuals (Current Month)</td>
<td>Actuals Pct</td>
<td>Actuals Fiscal YTD</td>
<td>Actuals Pct</td>
<td>Encumbrances</td>
<td>Balance Available</td>
<td>Balance Pct</td>
<td></td>
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<tr>
<td></td>
<td>Adopted</td>
<td>Adjustments</td>
<td>Accumulated</td>
<td>Pct</td>
<td></td>
<td>Pct</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3189 - Computers &amp; Servers &lt;$5,000</td>
<td>$16,203.00</td>
<td>$24,281.00</td>
<td>$40,484.00</td>
<td>$1,392.36</td>
<td>$52,135.49</td>
<td>128.78%</td>
<td>$0.00</td>
<td>($11,651.49)</td>
<td>(28.78%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31A0 - Business Food - Local</td>
<td>$6,555.00</td>
<td>$17,045.00</td>
<td>$23,600.00</td>
<td>$2,102.62</td>
<td>$28,757.40</td>
<td>121.85%</td>
<td>$0.00</td>
<td>($5,157.40)</td>
<td>(21.85%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31B0 - Food &amp; F&amp;A Unallowable Gen</td>
<td>$25,244.00</td>
<td>$3,550.00</td>
<td>$28,794.00</td>
<td>$104.20</td>
<td>$1,416.41</td>
<td>111.47%</td>
<td>$0.00</td>
<td>($145.61)</td>
<td>(11.47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31C0 - Dues Memberships Gen</td>
<td>$7,405.00</td>
<td>$2,122.00</td>
<td>$9,527.00</td>
<td>$50.00</td>
<td>$5,009.33</td>
<td>52.58%</td>
<td>$0.00</td>
<td>$3,695.99</td>
<td>47.42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31D0 - Freight In-Bound</td>
<td>$60.00</td>
<td>$4,300.00</td>
<td>$4,360.00</td>
<td>$0.00</td>
<td>$9,692.00</td>
<td>222.29%</td>
<td>$0.00</td>
<td>($5,332.00)</td>
<td>(122.29%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31D1 - Freight Out-Bound</td>
<td>$617.00</td>
<td>$652.00</td>
<td>$1,269.00</td>
<td>$173.19</td>
<td>$1,414.61</td>
<td>111.47%</td>
<td>$0.00</td>
<td>($145.61)</td>
<td>(11.47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31J0 - Parking Permits Gen</td>
<td>$5,933.00</td>
<td>$64.00</td>
<td>$6,097.00</td>
<td>($8.38)</td>
<td>$800.81</td>
<td>82.81%</td>
<td>$0.00</td>
<td>$166.19</td>
<td>17.19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31K0 - Postage Gen</td>
<td>$1,800.00</td>
<td>$241.00</td>
<td>$2,041.00</td>
<td>$417.38</td>
<td>$1,414.61</td>
<td>111.47%</td>
<td>$0.00</td>
<td>($145.61)</td>
<td>(11.47%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31K1 - Overnight Delivery</td>
<td>$698.00</td>
<td>$268.00</td>
<td>$966.00</td>
<td>$21.94</td>
<td>$28,757.40</td>
<td>121.85%</td>
<td>$0.00</td>
<td>($5,157.40)</td>
<td>(21.85%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31L0 - Printing Supplies Gen</td>
<td>$698.00</td>
<td>$0.00</td>
<td>$698.00</td>
<td>$0.00</td>
<td>$820.69</td>
<td>117.58%</td>
<td>$0.00</td>
<td>$4,517.67</td>
<td>47.42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31M0 - Recruitment Expense Gen</td>
<td>$4,200.00</td>
<td>$2,800.00</td>
<td>$7,000.00</td>
<td>$6,200.00</td>
<td>$34,840.60</td>
<td>168.03%</td>
<td>$0.00</td>
<td>($14,706.40)</td>
<td>(68.55%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31P1 - Instructional Materials &amp; Supplies</td>
<td>$325.00</td>
<td>$64.00</td>
<td>$389.00</td>
<td>$64.00</td>
<td>$520.00</td>
<td>160.00%</td>
<td>$0.00</td>
<td>$166.19</td>
<td>17.19%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31S0 - Lab Supplies Gen</td>
<td>$10,030.00</td>
<td>$0.00</td>
<td>$10,030.00</td>
<td>$0.00</td>
<td>$2,505.45</td>
<td>243.25%</td>
<td>$0.00</td>
<td>($1,475.45)</td>
<td>(143.25%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>31T3 - Lighting</td>
<td>$166.00</td>
<td>$100.00</td>
<td>$266.00</td>
<td>$0.00</td>
<td>$266.00</td>
<td>100.00%</td>
<td>$0.00</td>
<td>$266.00</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>37Y0 - Supply Costs F&amp;A Unallowable</td>
<td>$3,295.00</td>
<td>$0.00</td>
<td>$3,295.00</td>
<td>$0.00</td>
<td>$225.00</td>
<td>.00%</td>
<td>$0.00</td>
<td>($225.00)</td>
<td>.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3800 - In State Travel Gen</td>
<td>$22,550.00</td>
<td>$0.00</td>
<td>$22,550.00</td>
<td>$0.00</td>
<td>$7,214.49</td>
<td>57.49%</td>
<td>$0.00</td>
<td>($5,335.51)</td>
<td>42.51%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3810 - In State Travel-Per Diem Non</td>
<td>$1,600.00</td>
<td>$0.00</td>
<td>$1,600.00</td>
<td>$0.00</td>
<td>$4,050.00</td>
<td>253.12%</td>
<td>$0.00</td>
<td>$4,000.00</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3820 - Out Of State Travel Gen</td>
<td>$81,999.00</td>
<td>$0.00</td>
<td>$81,999.00</td>
<td>$0.00</td>
<td>$4,144.55</td>
<td>49.58%</td>
<td>$0.00</td>
<td>($41,955.45)</td>
<td>50.42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3825 - Out Of State Travel-Per Diem</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$450.00</td>
<td>100.00%</td>
<td>$0.00</td>
<td>($450.00)</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3830 - Out Of State Travel-Per Diem Non</td>
<td>$4,955.00</td>
<td>$0.00</td>
<td>$4,955.00</td>
<td>$0.00</td>
<td>$4,144.55</td>
<td>49.58%</td>
<td>$0.00</td>
<td>($811.45)</td>
<td>20.42%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3840 - Foreign Travel Gen</td>
<td>$39,580.00</td>
<td>$0.00</td>
<td>$39,580.00</td>
<td>$0.00</td>
<td>$32,837.40</td>
<td>83.05%</td>
<td>$0.00</td>
<td>($6,742.60)</td>
<td>(17.19%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3841 - Foreign Travel-Per Diem Std</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$35.99</td>
<td>.00%</td>
<td>$0.00</td>
<td>($35.99)</td>
<td>.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3842 - Foreign Travel-Per Diem Non</td>
<td>$2,350.00</td>
<td>$0.00</td>
<td>$2,350.00</td>
<td>$0.00</td>
<td>$2,185.00</td>
<td>92.22%</td>
<td>$0.00</td>
<td>($450.00)</td>
<td>18.78%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3850 - Foreign National Travel Gen</td>
<td>$12,560.00</td>
<td>$0.00</td>
<td>$12,560.00</td>
<td>$0.00</td>
<td>$32,837.40</td>
<td>262.02%</td>
<td>$0.00</td>
<td>($20,277.40)</td>
<td>(162.02%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3860 - Bus Meals and Hospitality</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$142.88</td>
<td>.00%</td>
<td>$0.00</td>
<td>($142.88)</td>
<td>.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3880 - Vehicle Expense Gen</td>
<td>$15,980.00</td>
<td>$0.00</td>
<td>$15,980.00</td>
<td>$0.00</td>
<td>$16,035.49</td>
<td>101.63%</td>
<td>$0.00</td>
<td>($5,055.49)</td>
<td>(29.90%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38A0 - Motor Pool Rental Gen</td>
<td>$6,600.00</td>
<td>$0.00</td>
<td>$6,600.00</td>
<td>$0.00</td>
<td>$5,009.33</td>
<td>76.63%</td>
<td>$0.00</td>
<td>($1,590.67)</td>
<td>(23.37%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38C0 - External Vehicle Rental Gen</td>
<td>$4,500.00</td>
<td>$0.00</td>
<td>$4,500.00</td>
<td>$0.00</td>
<td>$4,500.00</td>
<td>100.00%</td>
<td>$0.00</td>
<td>($4,500.00)</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38E0 - Vehicle Fuel Gen</td>
<td>$13,927.00</td>
<td>$0.00</td>
<td>$13,927.00</td>
<td>$0.00</td>
<td>$14,239.59</td>
<td>102.63%</td>
<td>$0.00</td>
<td>($312.59)</td>
<td>(2.32%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38L0 - New Employee Moving Expenses</td>
<td>$1,600.00</td>
<td>$0.00</td>
<td>$1,600.00</td>
<td>$0.00</td>
<td>$1,564.12</td>
<td>97.76%</td>
<td>$0.00</td>
<td>($35.88)</td>
<td>(2.29%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>38N0 - Travel Recruiting Gen</td>
<td>$500.00</td>
<td>$0.00</td>
<td>$500.00</td>
<td>$0.00</td>
<td>$500.00</td>
<td>100.00%</td>
<td>$0.00</td>
<td>($500.00)</td>
<td>100.00%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>39Z1 - Travel Non UNM Emp-Non</td>
<td>$2,185.00</td>
<td>$0.00</td>
<td>$2,185.00</td>
<td>$0.00</td>
<td>$16,035.49</td>
<td>101.63%</td>
<td>$0.00</td>
<td>($14,379.59)</td>
<td>(89.72%)</td>
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</tr>
<tr>
<td>Account Description</td>
<td>Budget (FYTD) Adopted</td>
<td>Budget (FYTD) Adjustments</td>
<td>Budget (FYTD) Accumulated</td>
<td>Actuals Current Month</td>
<td>Actuals Pct</td>
<td>Actuals Fiscal YTD</td>
<td>Actuals Pct</td>
<td>Encumbrances</td>
<td>Available</td>
<td>Balance Pct</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>4000 - Student Tuition Fee Expenses</td>
<td>$500.00</td>
<td>$500.00</td>
<td>$1,000.00</td>
<td>($1,000.00)</td>
<td>(100.00%)</td>
<td>$5,940.81</td>
<td>594.08%</td>
<td>$.00</td>
<td>($4,940.81)</td>
<td>(494.08%)</td>
<td></td>
</tr>
<tr>
<td>4020 - Student Awards Gen</td>
<td>$5,750.00</td>
<td>$.00</td>
<td>$5,750.00</td>
<td>$94.35</td>
<td>1.64%</td>
<td>$12,166.35</td>
<td>211.59%</td>
<td>$.00</td>
<td>$6,416.35</td>
<td>(111.59%)</td>
<td></td>
</tr>
<tr>
<td>4060 - Scholarships Fellowships Gl</td>
<td>$30,500.00</td>
<td>$100,024.00</td>
<td>$130,524.00</td>
<td>$2,250.00</td>
<td>1.72%</td>
<td>$79,500.86</td>
<td>60.91%</td>
<td>$.00</td>
<td>$51,023.14</td>
<td>39.09%</td>
<td></td>
</tr>
<tr>
<td>4080 - Student Travel Gen</td>
<td>$3,356.00</td>
<td>$.00</td>
<td>$3,356.00</td>
<td>$385.88</td>
<td>11.50%</td>
<td>$1,374.23</td>
<td>94.58%</td>
<td>$.00</td>
<td>$181.77</td>
<td>5.42%</td>
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</tr>
<tr>
<td>40A0 - Student Participant Costs Gl</td>
<td>$1,440.00</td>
<td>$.00</td>
<td>$1,440.00</td>
<td>$.00</td>
<td>.00%</td>
<td>$414.00</td>
<td>28.75%</td>
<td>$.00</td>
<td>$1,026.00</td>
<td>71.25%</td>
<td></td>
</tr>
<tr>
<td>4200 - Student Costs Other Gen</td>
<td>$120.00</td>
<td>$.00</td>
<td>$120.00</td>
<td>$.00</td>
<td>.00%</td>
<td>$1,123.00</td>
<td>935.83%</td>
<td>$.00</td>
<td>($1,003.00)</td>
<td>(835.83%)</td>
<td></td>
</tr>
<tr>
<td>4600 - Animal Expense Gen</td>
<td>$.00</td>
<td>$.00</td>
<td>$.00</td>
<td>$425.45</td>
<td>.00%</td>
<td>$1,384.07</td>
<td>40.00%</td>
<td>$.00</td>
<td>$1,384.07</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>6000 - Telecom Charges Gen</td>
<td>$38,583.00</td>
<td>($197.00)</td>
<td>$38,386.00</td>
<td>$3,830.25</td>
<td>9.98%</td>
<td>$47,199.58</td>
<td>122.96%</td>
<td>$.00</td>
<td>($8,813.58)</td>
<td>(22.96%)</td>
<td></td>
</tr>
<tr>
<td>6020 - Long Distance Gen</td>
<td>$1,110.00</td>
<td>$50.00</td>
<td>$1,160.00</td>
<td>$139.99</td>
<td>12.07%</td>
<td>$1,667.46</td>
<td>143.75%</td>
<td>$.00</td>
<td>($507.46)</td>
<td>(43.75%)</td>
<td></td>
</tr>
<tr>
<td>6040 - Telephone Line Spec Circuit!</td>
<td>$.00</td>
<td>$1,700.00</td>
<td>$1,700.00</td>
<td>$253.42</td>
<td>14.91%</td>
<td>$1,616.25</td>
<td>95.07%</td>
<td>$.00</td>
<td>$83.75</td>
<td>4.93%</td>
<td></td>
</tr>
<tr>
<td>6060 - Voice Mail Box Gen</td>
<td>$2,120.00</td>
<td>$80.00</td>
<td>$2,200.00</td>
<td>$180.00</td>
<td>8.18%</td>
<td>$2,247.12</td>
<td>102.14%</td>
<td>$.00</td>
<td>($472.12)</td>
<td>(2.14%)</td>
<td></td>
</tr>
<tr>
<td>6080 - Cellular Charges Gen</td>
<td>$5,112.00</td>
<td>$.00</td>
<td>$5,112.00</td>
<td>($106.64)</td>
<td>(1.97%)</td>
<td>$4,642.69</td>
<td>90.82%</td>
<td>$.00</td>
<td>($469.31)</td>
<td>9.18%</td>
<td></td>
</tr>
<tr>
<td>60A0 - Paging Charges Gen</td>
<td>$.00</td>
<td>$.00</td>
<td>$.00</td>
<td>$.00</td>
<td>.00%</td>
<td>$.00</td>
<td>.00%</td>
<td>$.00</td>
<td>$68.06</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>60B0 - Data Networking Gen</td>
<td>$6,000.00</td>
<td>$.00</td>
<td>$6,000.00</td>
<td>$.00</td>
<td>.00%</td>
<td>$0.00</td>
<td>.00%</td>
<td>$.00</td>
<td>$6,000.00</td>
<td>100.00%</td>
<td></td>
</tr>
<tr>
<td>6200 - Other Telephone Charges</td>
<td>$400.00</td>
<td>$.00</td>
<td>$400.00</td>
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## Organization Level 5: 048A - Biology Department

<table>
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</tr>
<tr>
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<td>$.00</td>
<td>.00%</td>
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<td>100.00%</td>
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<tr>
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<td>.00%</td>
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<td>$.00</td>
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<td>.00%</td>
<td>$.00</td>
<td>100.00%</td>
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<td>7200 - Natural Gas Fuel Oil Gen</td>
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<td>7200 - Natural Gas Fuel Oil Gen</td>
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<tr>
<td>7400 - Loss On Sponsored Project</td>
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<tr>
<td>7402 - Contingency Budget Gen</td>
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<td>$.00</td>
<td>$173,850.00</td>
<td>$.00</td>
<td>.00%</td>
<td>$173,850.00</td>
<td>100.00%</td>
<td>$.00</td>
<td>(173,850.00) (100.00%)</td>
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<td>7402 - Contingency Budget Gen</td>
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<td>$173,850.00</td>
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<td>(173,850.00) (100.00%)</td>
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<td>.00%</td>
<td>$173,850.00</td>
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<td>(173,850.00) (100.00%)</td>
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<td>$173,850.00</td>
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<td>.00%</td>
<td>$173,850.00</td>
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<td>$.00</td>
<td>(173,850.00) (100.00%)</td>
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<td>7402 - Contingency Budget Gen</td>
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<td>(173,850.00) (100.00%)</td>
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## Operating Ledger Summary
Through the Month of Jun 2016

### Organization Level 5: 048A - Biology Department

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<th>Account Description</th>
<th>Budget (FYTD) Adopted</th>
<th>Budget (FYTD) Adjustments</th>
<th>Budget (FYTD) Accumulated</th>
<th>Actuals Current Month</th>
<th>Actuals Fiscal YTD</th>
<th>Actuals Pct</th>
<th>Encumbrances</th>
<th>Available</th>
<th>Balance Pct</th>
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<tr>
<td><strong>TOTAL Expense</strong></td>
<td>$7,634,730.00</td>
<td>$1,199,410.00</td>
<td>$8,834,140.00</td>
<td>$318,244.27</td>
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<td>$65,457.14</td>
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<td>Total Revenue:</td>
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<td>$(1,453,501.60)</td>
<td>(16.45%)</td>
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<tr>
<td>Total Expense:</td>
<td>$7,634,730.00</td>
<td>$1,199,410.00</td>
<td>$8,834,140.00</td>
<td>$318,244.27</td>
<td>$7,748,111.91</td>
<td>87.71%</td>
<td>$65,457.14</td>
<td>$1,020,570.95</td>
<td>11.55%</td>
</tr>
</tbody>
</table>

Net: $0.00 $0.00 $0.00 $(228,235.12) 0.00% $2,539,529.69 0.00% $(65,457.14) $2,474,072.55 0.00%

### Parameters:
- Organization Level 5: 048A - Biology Department

### Groupings:

Warning: These reports will show fiscal year activity. For inception to date activity for Grants please use the FRRGLDS - Grant Ledger Detail Summary report.