SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

The University of New Mexico

Biochemistry Academic Program Review Self-Study 2023

Department of Biochemistry and Molecular Biology (BMB).
Health Science Center (HSC), School of Medicine (SOM) and
College of Arts and Sciences (CAS).

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Criterion 1. Introductory Section & Background Information

The section should provide a brief introduction to the Self-Study Report, which includes the following elements:

1A: Summary *An Executive Summary that provides a one to two-page summary/abstract of the information contained within the Self-Study Report.*

The University of New Mexico (UNM) is a Carnegie Research I University (R1), a Hispanic Serving Institution (HSI), and a Minority Serving Institution (MSI). The Biochemistry and Molecular Biology (BMB) Department is located within the University of New Mexico Health Sciences Center (HSC), at the School of Medicine on North Campus. The department mission is to be a center of academic excellence that creates and imparts knowledge of the biochemical and molecular bases of diseases affecting New Mexicans.

The Undergraduate Biochemistry Program is located in the BMB Department, that is within walking distance of the Main Campus. The Program is a model of collaboration between Main and North Campuses. The College of Arts & Sciences grants the degree and the Department of Biochemistry and Molecular Biology has administered the Program since 1984. This association, within the School of Medicine (SOM) environment, is important for students who are considering enrolling in postgraduate health-related programs. The vast majority of laboratories participating in research programs for students belong to the HSC.

The Biochemistry Program attracts some of the University's best undergraduate students, including many Presidential and Regents Scholars. The majority of students matriculating into the Program select the B.S. degree option over the B.A. option. The Program has high retention rates (by gender and race/ethnicity). The average retention rate of students who declare Biochemistry major (Sophomore year) is 9% higher than the overall retention rate of student who declare other UNM majors (Sophomore year). The Biochemistry Program has awarded 448 Bachelor's degrees since the last APR (74.6 average per year, ~50% Hispanics). The number of students that complete the degree in four years has increased from 47% in 2016-17 to 73% in 2021-2022. The average GPA of the graduating class is 3.65.

The Program is very successful also according to national metrics. In 2015, the Program received the full 7-year term accreditation by the American Society for Biochemistry and Molecular Biology (ASBMB), which is a national, independent, outcomes-based evaluation mechanism that recognizes excellence in B.S. or B.A. degree programs in biochemistry and molecular biology and related disciplines. In 2023, the Program received full re-accreditation for an additional 7-years (2023-2029). The accreditation body identified the following aspects of the renewal 2022 application particularly noteworthy: (1) the availability of ÉLITE Career Mentoring Program; (2) a strong roster of faculty; (3) the use of inquiry-based components in courses; and (4) submission

of a well-rounded application. Notably, in the 2022 renewal, the ASBMB accreditation committee did not identify areas that need improvement for the UNM Biochemistry Program.

We have taken the recommendations from the ASBMB accreditation team (June 2015); and the APR evaluation committee (Nov. 2015) seriously. *First*, we have revamped the biochemistry teaching laboratory course, which we systematically upgrade every year. We have developed a modern, new research-inquired CURE (Course-based Undergraduate Research Experience) curriculum, renovated the teaching laboratory space, and upgraded the equipment. We created three Lecturer III positions and one staff position and increased the number of times the course is offered to cope with the number of students, among other interventions. *Second*, we have developed three departmental upper division elective courses to satisfy student demand (BIOC 451, Physical Biochemistry; two BIOC 495 Topics). *Third*, we have used several strategies to engage more students in research. Data collected in the survey administered to graduating seniors (60%-82% responders) indicate that the proportion of students who participated in some type of research here at UNM including participation in local internships, or summer research programs in the national laboratories and other universities nationwide have gradually increased from 50% (2017-2019) to 63% (2020) to 69% (2021), and finally to 76% (2022), suggesting that our interventions to promote participation in research are working. In addition, we developed the 12-weeks ÉLITE Career Mentoring Program, for junior and senior biochemistry majors, to prepare students for career exploration and flexibility. This new program focuses in particular on URM and first-generation graduates who tend to get left behind without appropriate mentoring and who represent 50% of UNM students. We have also integrated Diversity, Equity and Inclusion initiatives in the undergraduate program to encourage open discussions and make STEM more diverse and inclusive to everyone. These efforts are paying off, as our students continue to thrive. In 2022, 59.1% of our BMB students met the threshold for an ASBMB Degree Certification after taking the exit certification exam provided by the ASBMB. For comparison, 42.8% of students nationwide met the threshold. This level of success has been possible thanks to the dedication of the BMB faculty and continuous support by the School of Medicine.

Strengths of the BMB Department include the Biochemistry Program and a strong faculty team, who take on leadership roles in strategic planning and faculty recruitment decisions, as well as in the direction of the educational and research programs. The demographics of the department have changed due to faculty retirement and separations from the university or department since the last APR in 2015. We have recruited an excellent cadre of productive junior faculty scholars. They include five assistant professors in the tenure track and three lectures (level III). Of the current BMB faculty members, two were promoted to Associate Professor with Tenure (2018; 2019) and one to Professor (2018). BMB research spans discovery science to translational research to population health, and takes place in renovated laboratories. BMB research focuses on metabolism and metabolic diseases. The areas of research excellence are obesity, diabetes, chronic kidney disease (CKD), cancer, aging, and state-of-the-art postmortem imaging. The extramural grant

funding level has increased, and this success has been propelled by an unprecedented increase in high-impact peer-reviewed publications, and productive research collaborations nationally and globally. The BMB faculty have earned seven university recognitions including Regents Professor (Dr. Shah, 2016), Distinguished Professor (Dr. Shah, 2018), the STC UNM Innovation Award (Dr. Adolphi, 2016), the HSC Excellence in Research Award for Junior Faculty Research (Dr. Liu, 2017; Dr. Xue, 2021), the UNM Excellence Award for Lecturers (Dr. Hayek, 2022), and CURE Fellow award (Dr. de Lorenzo, 2022).

In summary, the BMB Department has made important transformations following a clearly defined mission, vision, and strategic priorities despite limited resources. The Biochemistry Program learning goals and student outcomes are aligned with the ASBMB core concepts, upholding the highest standards of quality and innovation in BMB education. In the research area, a culture of excellence continues to thrive offering effective and appropriate laboratory experiences for our students that are aligned with the ASBMB requirements. As we strive to make research-based and inquiry-based learning the normal learning mode, we seek to further expand course offering to prepare our biochemistry students for a broader array of careers in research and biomedical sciences. We seek to further expand the ÉLITE Career Mentoring Program increasing the number of participating students, as well as integrating cultural awareness, science communication, and personal branding in the curriculum. We welcome the input of the APR evaluation team to maximize student learning experiences and outcomes, a primary goal of the Program.

1B: History *A brief description of the history of each degree/certificate program offered by the unit.*

The Department of Biochemistry, one of the original academic departments of the University of New Mexico (UNM) School of Medicine (SOM), was established in 1964. Dr. Robert B. Loftfield was the founding Chair (1964-1971). The modern Department of Biochemistry and Molecular Biology was established in 1997, with Dr. Jeffrey Griffith as Chair (1997-2007). In 2007, Dr. William Anderson became department Chair until 2012 (2007-2012) when he was succeeded by Dr. Karlett Parra (2012-current). The Biochemistry Program milestones are summarized in **Appendix 1.1**. In 1969, the Danforth Foundation reviewed the UNM Chemistry Department and recommended appointing responsibility for providing undergraduate biochemistry instruction at UNM to the Department of Biochemistry at the School of Medicine. The Department of Biochemistry faculty developed the courses and instructed students in the Main Campus facilities (1969-1984). Biochemistry as an undergraduate major in the College of Arts & Sciences was founded and administered by the Department of Biochemistry and Molecular Biology in 1984. The College of Arts & Sciences has degree granting authority and provides many resources, including student advisement services, course instruction for courses in the lower division, and classroom facilities for most courses. The School of Medicine hires the Biochemistry and

Molecular Biology Department faculty and staff, provides faculty office and research laboratory space as well as office and laboratory teaching supplies and teaching laboratory instrumentation, and supports fundamental programmatic activities such as teaching assistantships.

The Biochemistry and Molecular Biology Department is located within the University of New Mexico Health Sciences Center, School of Medicine, which is within walking distance of the Main Campus. The vast majority of laboratories participating in research programs for students belong to the Health Sciences Center. The Bachelor's degree in Biochemistry is consistent with current national recommendations for educational practices for the 21st century.

The Biochemistry Program has been highly successful and has had a long and successful association with the Health Science Center (HSC). This association, within the SOM environment, is important for students who are considering enrolling in postgraduate health-related programs. The HSC also offers important recourses for biomedical research that can be used for students with supervised research experiences (see **Criterion 6**). The Biochemistry Program continues to attract some of the University's best students, including many Presidential and Regents Scholars. In the last six years (2017-2022), the Program awarded 448 degrees. The average GPA of our students graduating with a Biochemistry major was 3.65.

1C: Organizational Structure *A brief description of the organizational structure and governance of the unit, including a diagram of the organizational structure.*

Organizational Structure

The Department of Biochemistry and Molecular Biology organizational structure diagram is provided in **Appendix 1.2**.

Dr. Garnett S. Stokes has been the President of the University of New Mexico since 2018. She reports directly to the Board of Regents. Her responsibilities include implementing the policies adopted by the Board of Regents and overseeing the quality of university programs. As president, Dr. Stokes coordinates UNM's core missions of conducting top-tier research, ensuring compassionate and equitable health care and health services, and providing access to a quality education for one of the most diverse student populations in the nation. She has made it a priority to promote and support collaborative efforts of the UNM community that benefit the entire State of New Mexico. In collaboration with the Board of Regents, she continues to strengthen relationships with key stakeholders to advance UNM's mission. She advocates tirelessly for a transformative student experience, an empowered faculty, and continuous improvement of campus culture. Since her arrival, UNM has received the Carnegie Community Engagement Classification, a designation that indicates institutional commitment to community engagement that only 119 institutions have earned. UNM also ranks among the institutions with the highest number of Fulbright awardees in the country.

Dr. James Paul Holloway serves as the Provost and Executive Vice President (EVP) for Academic Affairs (2019-present). He is the chief academic officer of the University of New Mexico. The Office of Academic Affairs is responsible for all aspects of the academic mission including research, teaching, service, community engagement, international work, and overseeing academic personnel. As Provost and EVP for Academic Affairs, he is focused on fostering excellence in education and research at UNM with the goal of positively impacting individuals and communities in New Mexico and across the globe. As Provost, Dr. Holloway works with the President and the Dean of the Health Sciences Center to coordinate academic planning and budgeting for UNM's Main Campus. He oversees the activities of the schools and colleges on Main Campus, including the College of Arts & Sciences.

Dr. Douglas Ziedonis is the Executive Vice President (EVP) for the UNM Health Sciences and Chief Executive Officer (CEO) of the UNM Health System (2020-present). His responsibilities include overseeing the clinical, educational, research, and community activities of the UNM HSC and the UNM Health System.

Dr. Patricia M. Finn is the Dean of the School of Medicine (2022-present). She provides leadership and has administrative responsibility for all activities, operations, and programs of the HSC. Programmatic governance is through the Senior Associate Deans for Education, Research, and Academic Affairs to ensure that UNM policies and procedures are properly followed and administered, and that the SOM enjoys effective and responsive leadership and management. The goals of the SOM Strategic Plan are implemented through completion of specific objectives, each with measurable metrics/deliverables that comprise the annual Action Plans of the Executive Vice Dean, the Senior Associate Deans and the department Chairs. These Action Plans guide and prioritize the department Chairs' allocation of human and financial resources and provide the basis for each faculty member's annual performance plan. The Executive Vice Dean, Senior Associate Deans, and Department Chairs are appointed by and serve at the discretion of the Dean of the SOM. The Dean of the SOM conducts performance evaluations of the SOM department Chairs, including the Department of Biochemistry and Molecular Biology Chair every year in the spring. The evaluations of the SOM Chair are scheduled semiannually (since FY 2016).

Dr. Arash Mafi is the Interim Dean of the College of Arts & Sciences (2021-present). He provides academic leadership for the College of Arts & Sciences programs. He reviews and assesses the College departments, including the Department of Biology and the Department of Chemistry and Chemical Biology, and makes decisions concerning each department's budget and instructional programs.

The Department of Biochemistry and Molecular Biology is located in the Health Sciences Center School of Medicine. Dr. Karlett Parra is Chair of the Department of Biochemistry and Molecular Biology (2012-present). The Chair has administrative responsibility for the operations and programs of the department, allocates financial resources, reviews and assesses individual faculty

research and instructional activities, and allocates teaching and committee assignments. Dr. Laura de Lorenzo is the Undergraduate Program Director in the Department of Biochemistry and Molecular Biology (2022-present). The Program Director provides recommendations and oversees the educational activities of the Program including the courses, the course directors and all aspects of curricula. Dr. Curt Hines is the Undergraduate Biochemistry Honors Research Program Director of the department (2022-present). He provides recommendations and direction for student research programs. In FY 2016, a Chair advisory committee was established, which provides recommendations for education and research programs, strategic planning, and execution of goals. Currently, the Chair advisory committee has consisted of three faculty members of the department, Dr. de Lorenzo as undergraduate educational advisor, Dr. Curt Hines and Dr. Meilian Liu as medical educational and research advisors.

Governance of the Biochemistry Program

The governance of the Biochemistry Program at the University of New Mexico (UNM) is managed by the administration and faculty of the Department of Biochemistry and Molecular Biology, College of Arts and Sciences, and School of Medicine. The BMB Department governance structure diagram is provided in the **Figure 1.1**.

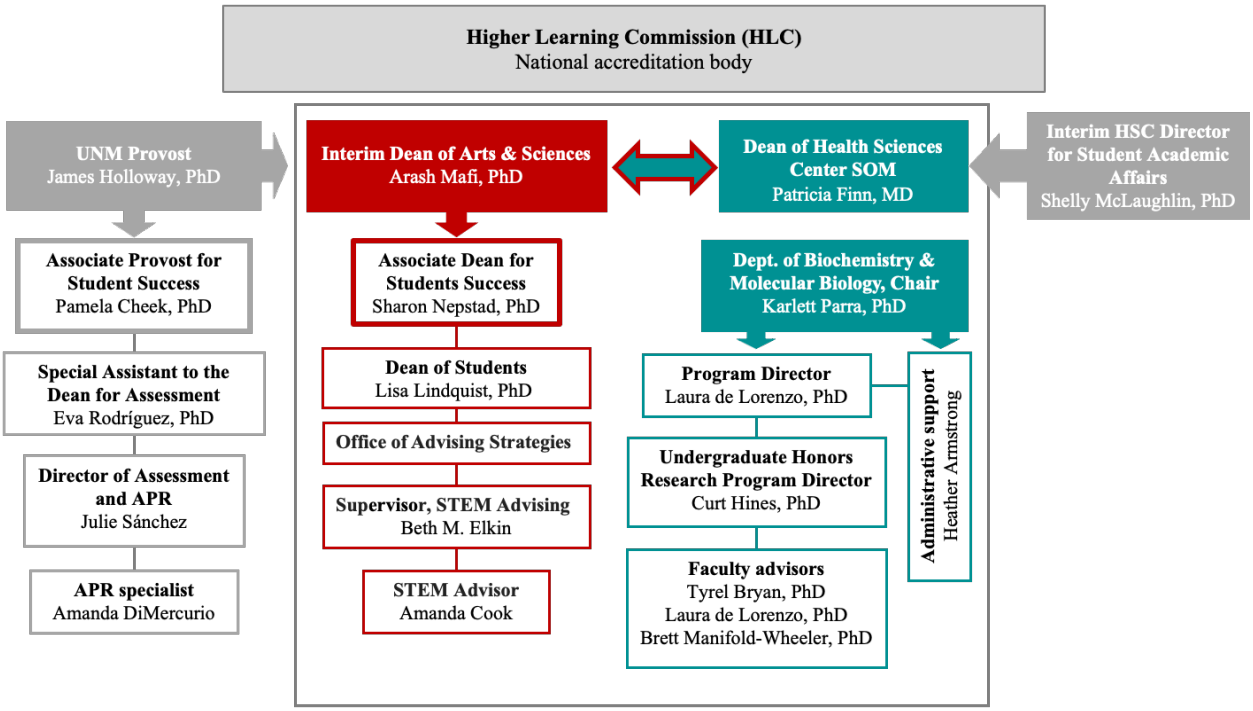


Figure 1.1 Governance of the Biochemistry Program

The diagram illustrates the administration and management of the Biochemistry Program, which is jointly governed by the College of Arts (grants the degree) and Department of Biochemistry and Molecular Biology of the School of Medicine (administrates the Program). The diagram also depicts the departments that provide essential administrative support for the Biochemistry Program.

1D: Accreditation *Information regarding specialized/external program accreditation(s) 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 accreditation(s).*

In 2015, the Biochemistry Undergraduate Program received its first full accreditation from the American Society for Biochemistry and Molecular Biology (ASBMB). Accreditation was granted for a full 7-year term (2015-2022). This year, the Biochemistry Program received the full re-accreditation from the ASBMB for another 7-year term (2023-2029). Notably, our Biochemistry Program is one of only 101 ASBMB-accredited programs nationwide (since 2013). The Biochemistry Undergraduate Program Accreditation Letter from the ASBMB can be found in **Appendix 1.3**.

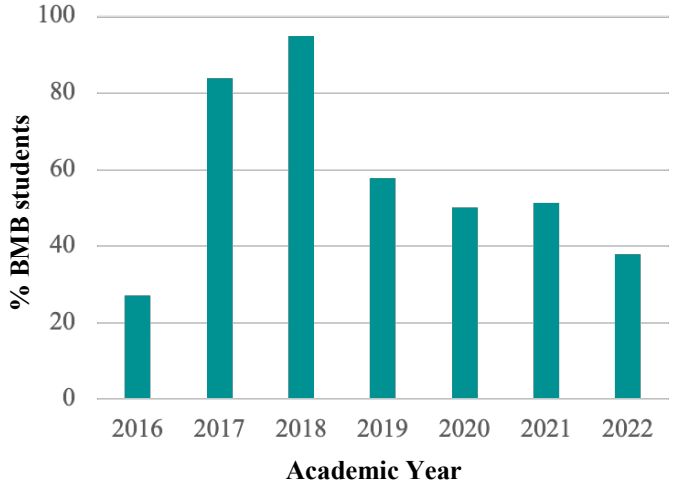
The ASBMB accreditation committee identified the following aspects of our renewal 2022 application particularly noteworthy:

- Availability of the ÉLITE Career Mentoring Program.
- A strong roster of faculty, many of whom have completed postdoctoral studies.
- Use of inquiry-based components in courses.
- Submission of a well-rounded application.

In the 2022 renewal, notably, there were no areas of the UNM Undergraduate Biochemistry Program identified by the ASBMB accreditation committee that needed improvement. For the next renewal (October 2029), they are asking for a description of how the ASBMB accreditation will impact our Program moving forward.

The ASBMB accreditation has allowed our graduating Biochemistry majors the opportunity to demonstrate their competitiveness against peers from across the nation. To have a degree certified by the ASBMB, a student must earn a B.A., B.S. or equivalent degree from an ASBMB-accredited program and exhibit acceptable performance on the exit certification exam provided by the ASBMB (https://www.asbmb.org/education/certification-exam). Students who exhibit exceptional performance on the ASBMB certification exam are recognized as having graduated with distinction by the ASBMB. **Figure 1.2 (A)** shows the percentage of BMB graduating students who have taken the ASBMB certification exam during the last seven academic years (from 2016 to 2022). Over this time, an average of 57.5% of our BMB graduating students have taken the exam. In our Program, the number of graduating students who have achieved ASBMB certification increased markedly from 2016 to 2022 by 34.1%. Notably, in 2022, 42.8% of students nationwide meet the threshold for an ASBMB Degree Certification, compared to 59.1% of our BMB students. In our department, students that achieved certification with distinction correspond to an average of 6.9% of students (7-years average), compared to an average of 13.2% nationwide (**Figure 1.2 B**).

(A)



(B)

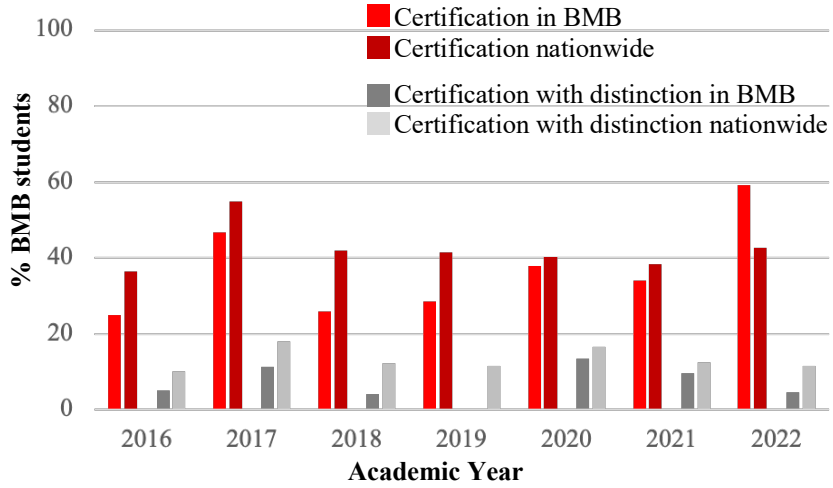


Figure 1.2 ASBMB certification exam data

(A) Percentage of BMB graduating students who took the ASBMB certification exam in the last seven years. The number of students who participated each year are as follows: 20 students in 2016, 62 students in 2017, 73 students in 2018, 49 students in 2019, 37 students in 2020, 41 students in 2021, and 22 students in 2022. **(B)** Percentage of BMB graduating students who achieved ASBMB certification compared to students nationwide (light red and dark red colored bars, respectively) and the percentage of BMB graduating students who achieved ASBMB certification with distinction compared to nationwide (dark grey and light grey colored bars, respectively).

Characteristics of an ASBMB-accredited program are related to the institution, faculty, and the curriculum (core concepts and learning objectives, experimental learning; safety, ethics, communication and teamwork, undergraduate research, cooperative experiences, and internships). The ASBMB link https://www.asbmb.org/education/accreditation/characteristics provides a more

detailed description of these characteristics. As described by the ASBMB, the program benefits of an ASBMB accreditation are: (1) recognition for upholding the highest standards of quality and innovation in BMB education, (2) leverage for acquiring resources from institutions and other funders, (3) access to an independently constructed and scored instrument for assessing student achievement and program effectiveness, and (4) competitive advantage when recruiting talented students and star faculty members. The benefits for students graduating from an ASBMB-accredited degree program are: (1) curriculum that aligns with the fundamental concepts and critical reasoning skills needed in BMB careers, (2) training in communication, teamwork, safety and ethics, (3) independent, mentored research or cooperative experiences and internships, and (4) optional degree certification exam to demonstrate competitiveness against peers from across the nation independent of institutional prestige. The accredited program also has benefits for employers as well as graduate and professional schools including the following: (1) confidence in an accredited institution's curriculum, faculty expertise and instrumentation, (2) pool of job candidates with 400 or more hours of hands-on laboratory experience, (3) job seekers with communication skills and experience working in diverse teams, and (4) high-caliber grads who've completed accredited programs and earned degree certification.

ASBMB does not consider an advisory board to be an accreditation standard for several reasons. An advisory board provides advice and support to the department or program, such as curriculum development, fundraising, and outreach efforts. It is not directly related to the quality of education offered by an institution. While an advisory board can be a valuable resource for the department, it is not considered a fundamental part of a high-quality biochemistry and molecular biology education that is essential for accreditation.

1E: Previous APR *A brief description of the previous Academic Program Review Process for the unit. The description should:*

- *note when the last review was conducted;*
- *provide a summary of the findings from the Review Team Report;*
- *indicate how the Unit Response Report and Initial Action Plan addressed the findings; and*
- *provide a summary of actions taken in response to the previous APR.*

The last Academic Program Review (APR) was submitted in 2015. The Review Team site visit was conducted in November 2015, and fifteen days after that, the Review Team Report was received. The Unit Response Report and the Initial Action Plan was presented in August 2016.

Summary of the Findings from the Review Team Report

The findings from the 2015 Review Team Report are summarized as follows:

(1) Curriculum revision and departmental collaborations.

(1a) Collaborations with the Department of Biology and Chemistry & Chemical Biology should be fostered to pursue better alignment of teaching resources and coursework, and to benefit these three educational programs.

(1b) The Biochemistry Program should increase the number of upper division elective courses. The elective courses offered lacks breadth considering the number of sub-disciplines represented by modern biochemistry and molecular biology. The Review Team suggested to review the Biochemistry curriculum to address the lack of evolution, bioinformatics and modern "-omics" dataset analysis and production.

(2) Administration and BMB faculty.

(2a) Emergency resources should be provided for the effective teaching of the biochemistry laboratory (BIOC 448L). These actions should consider the unprecedented number of students expected, as well as, assess and modernize the equipment and the laboratory course to teach this laboratory class properly.

(2b) A stopgap measure waiving the required laboratory course for honors students with research experience and appropriate research credit hours could be considered.

(2c) The number of faculty or staff implicated in teaching BIOC 448L should be increased to remain effective and address the substantially increased number of students. Likewise, this course should be taught in both academic semesters (fall and spring semester), to increase access and improve student throughput. It would reduce time to degree completion since it appeared to be the major bottleneck.

(2d) Teaching assistants (TAs) should support BMB classes, particularly larger classes and laboratories.

(3) Division orientation.

(3a) A program or activity for early contacts between faculty, staff and students before they formally interact in the classroom starting in their third year should be included. It would contribute to the student's retention, early integration into undergraduate research and other departmental opportunities.

(3b) An informal face-to-face exit interview with a departmental representative should be integrated in the Program.

(3c) The exit survey form should be improved to acquire information to better the Program.

(4) Research experiences to the STEM major.

An authentic research experience should be included in the curriculum.

(5) Morale of the BMB Department.

The Review Team found a low morale in some faculty in the department. A departmental retreat was suggested to contribute to departmental cohesiveness.

(6) Interaction and collaboration with A&S administration and departments.
A biochemistry departmental representative should be involved in the regular interaction with the A&S administration and other relevant A&S departments and chairs to reduce possible duplication of efforts and to become aware of opportunities available to undergraduate programs from the Main Campus.

(7) Effective communication between the Chair, Faculty and Colleges.
(7a) The empathy and transparency in decision making processes should be considered to overcome the departmental changes and challenges.
(7b) The number of senior faculty members should be increased to improve overall experience and mentorship available to junior faculty.
(7c) The administration of both involved colleges should foster open lines of communication (example, funding transparency for the Biochemistry Program). The A&S college should be involved in program accountability, program direction, assessment or evaluation of instruction.
(7d) A neutral committee of HSC and A&S representatives headed by the provost's office should be formed and tasked with determining the best institutional placement of the Biochemistry Undergraduate Program and its resources.

Findings Addressed for the Unit Response Report and Initial Action Plan & Summary of Actions Taken in Response to the Last APR
The findings addressed for the unit response report and the initial action plan are summarized in the "**response to reviewers**" subsection. The summary of actions taken in response to the last APR have been included below each "response" subsection and indicated as an "**actions taken**" subsection. The seven sections addressed correspond with the same numerology in the above section (*summary of the findings from the Review Team Report)*:

(1) Curriculum revision and departmental collaborations.
Response to reviewers: We agree with the review team report and thank the team for their suggestions. In response, several meetings were held between the educational leaders from the Departments of Biology, Chemistry & Chemical Biology (CCB), and the BMB to promote collaborations and align teaching resources in 2016. These meetings resulted in the following action plan which all three departments participated in: review the list of courses in other departments which are allowed as upper-level elective courses for the Biochemistry major, and increase inter-departmental elective offerings by two courses over five years.

Actions taken: As a result, the following departmental collaborations and Biochemistry Program improvements are now in place:
(1a) In 2022, the Biology Department curriculum was revised and the CCB Department developed a new program that will be launched in the fall of 2023. Currently the BMB Department is engaged in communications with the Biology and CCB Departments and with A&S advisors to align curricula and offer the best options to our students.
(1b) Curricular revisions, programs improvements, and outcomes are indicated as follows:

(1) We have added a pre-requisite of General Chemistry II (CHEM 302) and Cellular and Molecular Biology w/Lab (BIOL 2110C) (effective fall 2017) to ensure the sequence of course content is correct and the appropriate foundational knowledge is present prior to entering into the Biochemistry degree Program.

(2) We have removed PHYS 2310 as a requirement for the calculus-based physics I sequence option to ensure the required pre-requisites for the Biochemistry Program are appropriate. PHYS 2310 covers highly specialized topics, which are not necessary for an understanding of modern biochemistry. We feel that the Physical Chemistry requirement that is in place (CHEM 311/312 or CHEM 315) is adequate and also more appropriate for Biochemistry majors since this course covers topics in the physical properties of macromolecular structures and thermodynamics.

(3) We have increased the number of elective courses in the Biochemistry major by creating the elective course "Topics in Advanced Biochemistry" (BIOC 495) (effective spring 2018). This course has the pre-requisites of BIOC 445 and BIOC 446. Physical Biochemistry (BIOC 451) was added to the Biochemistry major Program as an elective in the spring semester of 2017.

(4) We have developed two new BIOC 495 elective courses "Topics: Omics" and "Topics: Proteins, Evolution & Secondary Metabolism" (effective in the spring and fall 2021, respectively). These electives are taught by BMB faculty, for a total of five to six electives offered by the BMB Department annually, satisfying the demand for additional electives by a growing student body.

(5) We have revised the credit hours of the Undergraduate Research Course (BIOC 499) to encourage and enhance opportunities for participation in research. Biochemistry majors can now take one to three credits of Undergraduate Research for a maximum of six credits.

(6) We have revamped the biochemistry teaching laboratory curriculum (BIOC 448L) to participate in the CURE program. The Biochemistry Program Director, Dr. de Lorenzo who is a CURE Fellow, oversees the laboratory course. We have offered the laboratory course (BIOC 448L) three times each semester (16 student cap per course offering) over the last four years.

(7) The department has included active learning pedagogies in every course.

(8) We have included a revised exit survey to evaluate student success (60%-82% graduating responders).

(9) We have incorporated Career Day (on the last day of class each semester) in which invited speakers (BMB faculty and alumni) discuss diverse career options available with the biochemistry majors (2020-2022).

(10) We have developed the ÉLITE Career Mentoring Program for junior and senior biochemistry majors to prepare students for career exploration and flexibility (refer to **Criterion 4E**). This new program was launched in September 2022. This comprehensive mentoring program replaced our Career Day.

(11) We have integrated Diversity, Equity and Inclusion (DEI) initiatives in the undergraduate Program (BIOC 464, refer to **Criterion 4D**).

(12) We have continued and revised the Student Evaluations of Teaching (SET) to improve effectiveness by reducing biases (year two pilot project). The results indicate the continued good assessment by class instructors.

(13) We have maintained national accreditation status of the Biochemistry Program by the ASBMB (2015-2022).

(14) We have received the full 7-year re-accreditation (2023-2029) by the ASBMB (see **Criterion 1D**).

(2) Administration and BMB faculty.

Response to reviewers: We agree with the review team report. In response, a pre-proposal to the Keck Foundation was submitted for additional funding for the BMB Undergraduate Education Program in 2016 (not successful). In the spring of 2016, the number of BIOC 448L sections were increased to satisfy the increased number of students, and a part-time temporary instructor was hired for the semester. Dr. Parra, Chair of the BMB Department, requested salary funding for a full-time instructor to allow the BMB Department to offer the BIOC 448L lab course in both fall and spring semesters. During the 2016 BMB faculty education retreat, the following goals regarding BIOC 448L were recommended by the faculty:

- Review and revise the BIOC 448L course curriculum including content, process goals, and assessments.
- Compare the current course curriculum to national recommendations and our programmatic priorities.
- Develop a long-term (5 years) budget for the BIOC 448L course.

Actions taken: The BMB Department agrees with the review team and has taken actions to increase the number of faculty, staff, and teaching assistants, as well as to assign a space dedicated for the teaching laboratory course. These actions are summarized as follows:

(2a) We have a new dedicated laboratory space for the Biochemical Methods course (BIOC 448L). This laboratory is in Fitz Hall, room 284 (HSC Campus). We have renovated our undergraduate laboratory teaching facilities with well-equipped and modern tools and equipment, that are regularly maintained and upgraded. Prior to this, BMB did not have a designated space to teach this important hands-on course.

(2b) The required lab course was left in place to ensure standard lab practices across all graduates of the Program. Participation in the Laboratory Biochemical Methods course (BIOC 448L) is required to obtain a B.S. Participation in BIOC 448L is optional for the B.A. degree.

(2c) We have recruited an excellent cadre of junior faculty members including five tenure track faculty (a new Assistant Professor joined the department in January 2023, and another will join us in March 2023) as well as three lecturers (see **Criterion 5A**). The increased number of faculty has broadened the Biochemistry competencies to cover all program and curricular areas (the optimal area of research and teaching expertise was considered during hiring). The three lecturers recruited are involved in the BIOC 448L course instruction to remain effective and address the number of students. To enhance access and improve student throughput, we have expanded course

availability by opening two to three sections (with a maximum capacity of 16 students) each semester, both in the fall and spring. This allows us to adjust the number of sections based on student enrollment and ensure that each student has the opportunity to participate in a more personalized and interactive learning experience. Over the last four years, the lab course has been offered three times each semester with a maximum of 16 students per class, which reduced the time to degree completion since it appeared to be the major bottleneck.

(2d) We have increased the number of teaching assistants (TAs) supporting BMB classes, particularly larger classes and highly active learning classes. Additionally, we have created a full-time Coordinator of Curriculum Development staff position to support the teaching load and preparation of the BIOC 448L course (since 2018).

(3) Division orientation.

Response to reviewers: In response, a student ASBMB chapter was instituted to promote the advancement of biochemistry and molecular biology research, education and science outreach (https://www.asbmb.org/education/student-chapters). Dr. Rosenberg, BMB Faculty Advisor, was the faculty leader in 2016. The BMB Program Director and BMB Faculty Advisor agreed to revise the exit survey for Biochemistry majors and worked with the A&S Assessment Director to design an exit interview. Likewise, the revision of the BMB Department Assessment Plan was planned.

Actions taken:

(3a) For early contacts with students before they formally interact in the classroom in their third year, the BMB faculty members attend orientations for majors, discuss research, and distribute handouts that outline opportunities for research in the BMB Department (BIOC 497, BIOC 498 and BIOC 499) and other programs (UPN, MARC/U-RISE, Lane, ROP/McNair, etc. described in **Criterion 6E**). We also outline work-study options to participate in research during orientation. The BMB faculty and graduate students have manned a table at UNM STEM fair. The student advisors distribute the BMB welcome letter to majors in which we encourage participation in research, as well as offer tips on how to find research labs and how to thrive in the lab setting. In the third year, the BMB faculty visit classrooms in our upper-level course BIOC 445 the first day of classes to provide information on research opportunities including lab openings. We also disseminate research opportunities for students through the A&S and BMB advisors, and highlight student accomplishments on Instagram (instagram.com/unm_bmb). We offer open houses with laboratory tours during BMB research day (annually in April) and integrate these with course schedules when feasible.

(3b) We revised the exit surveys (refer to **Criterion 4F**, and **Appendix 4.1**), instead of conducting formal face-to-face exit interviews.

(3c) In 2019, the exit survey was improved and better designed to acquire information to advance the Program and evaluate the students' success. Response rates for this survey are typically between 60-82%. The survey covers a variety of topics related to students' experiences, performance and planning (refer to **Criterions 4A & 4F,** and **Appendix 4.1**). This information

has been invaluable in tracking the success of our students, areas of excellence, and areas of growth.

(3d) We have revised the Annual Program Assessment; currently we use the results of the BIOC 445 and BIOC 446 final exams, the ASBMB certification exam, and the feedback from our graduation survey as assessment metrics for our Program as a whole, and as input for the continuous improvement of programs. Continuous revisions of the assessment plan are planned to expand our metrics and cover all courses in the major.

(4) Research experiences for the STEM major.

Response to reviewers: We agree with the review team report in including an authentic research experience in the curriculum. BMB faculty met to develop an innovative curriculum that would introduce our students to a variety of authentic research experiences, including the revision of the Biochemical Methods course (BIOC 448L). During the 2016 Education Retreat a plan was developed and we have followed it through, as explained below.

Actions taken:

(4a) We have made efforts to develop local and national connections for summer internships.

(4b) We have incorporated a research concierge function into the Undergraduate Biochemistry Honors Research Program Director position (Dr. Hines) with educational/service FTE credit provided for it. The Undergraduate Honors Research Director supports the organization of research activities and liaisons with students, faculty, and staff in the department with regard to research opportunities.

(4c) In addition, to increase research opportunities for our students we develop/maintain good relationships with lab mentors in other departments (HSC and Main Campus). We have published (on the BMB website) a list of lab openings; and organized and recorded procedures for finding and entering a research lab in the welcome letter distributed by the A&S advisors. We invite BIOC 446 students to spring Research Day presentations and we present a "research experience overview" in BIOC 445. We hold an annual review lead by the UG Program Director and Research Director of the research course (BIOC 497, BIOC 498 and BIOC 499) evaluations, which we share with mentors. Data collected in surveys administered to graduating seniors indicate that research program participation has markedly increased from 50% of students to 76% (2017 *vs.* 2022), highlighting the effectiveness of these interventions (see details below).

(**4d**) The Chair is engaged in collaborations with the UNM Foundation to reach out to our alumni to identify ways in which we can partner to create opportunities for research, professional development, and break-through to additional career options for our graduates beyond academics. For this purpose, a LinkedIn account has been created and the department has distributed BMB eNewsletters to the alumni annually since 2020.

(5) Morale of the BMB Department.

Response to reviewers: The BMB Department agreed with the review team's suggestion to have a department retreat. On June 8th, 2016, faculty met for a retreat to address several of the APR

report's most immediate concerns. Faculty were enthusiastic in offering solutions and brainstorming new ideas to ensure the excellence of the Program.

Actions taken: BMB retreats have been conducted regularly every other year. In the January 2018 retreat, we developed the BMB Department's strategic plan to align with the SOM's plan after the SOM strategic plan was updated 2018-2020. The Chair used a participative method in which the faculty were, and felt, involved from the beginning. We invited a facilitator to create a structure designed to complete a strategic plan in one day with the input from each and every faculty member. The method was inclusive such that everyone was heard, and his/her ideas were considered. Together the faculty developed the FY 2019-2021 Department Strategic Plan with metrics and an action plan for FY 2019. In the process, faculty voted on the three goals to be included. Faculty worked in groups (one plan goal/group) to develop and present the goal's tactics and metrics. The entire faculty decided which tactics and metrics to adopt. Many of the faculty volunteered to be leaders for the implementation and advancement of one or more tactics. We held the next retreat in January 2020 where the faculty updated the BMB strategic plan tactics. The next retreat scheduled for January 2022 was postponed due to the COVID-19 pandemic. It will be held in the spring-summer of 2023, after the new HSC strategic plan is finalized (anticipated completion in March 2023). Dr. Laura de Lorenzo (the Undergraduate Program Director and Advisor to the Chair), Dr. Curt Hines (the Undergraduate Biochemistry Honors Research Program Director) and Dr. Meilian Liu (Medical Educational and Research Advisor to the Chair) work closely with the department Chair to ensure faculty ideas and concerns are heard and addressed.

(6) Interaction and collaboration with A&S administration and departments.

Response to reviewers: Meetings with other A&S departments continue to improve communication and the Program Director has participated in the A&S program directors' meeting.

Actions taken: We have established better lines of communication and new collaborations between the BMB Department and College of A&S (CAS) to maximize support and resources available to our students. The following collaborations have been established (see **Criterion 2A**):

- Collaborations between the BMB Department and the CAS to improve advising. CAS is now responsible for academic advising, and the Biochemistry Program Director, Dr. de Lorenzo, is in communication with the Biochemistry A&S advisors and supervisor on a regular basis. Dr. de Lorenzo interacts with the Undergraduate Research, Arts & Design Network (URAD) to attract students to opportunities to participate in research.

- Collaborations with CAS to enhance program accountability. CAS oversees the program assessment, which is detailed in **Appendices 3.1 & 3.2**. CAS also manages course evaluations of instruction using UNM EvaluationKIT (https://coursefeedback.unm.edu) that allows students to provide feedback on their learning experience and inform future course improvements. These efforts have been instrumental in our Program's continuous improvement.

- Collaborations with the Departments Biology and Chemistry and Chemical Biology to coordinate programmatic revisions. This year, we are re-assessing our lower-division biology course requirements to seamlessly incorporate new revisions made in the biology curriculum and

reduce duplication of efforts. The Biochemistry Program Director and BMB Department Chair are collaborating with the CAS STEM Advisement Supervisor and Chemistry and Chemical Biology Program Director to maximize the resources available to students. In addition, this line of communication will minimize duplication between our Biochemistry Program and the new Chemistry Program. Together these interventions will ensure that students receive clear advising that accommodates their career goals, particularly first year students who tend to be goals-driven when choosing a major.

- Collaborations with the BA/MD Program Director at Main Campus, Dr. Sushilla Knottenbelt (Chemistry and Chemical Biology Lecturer) to ensure that our instruction meets the needs of students in the BA/MD Program. Our instructors teach one or two biochemistry courses for BA/MD students each year. They also serve in BA/MD Program committees. Dr. Knottenbelt has participated in numerous BMB faculty lecturer searches and contributed her expertise and knowledge to mentoring our lectures (Dr. Hayek and Dr. Manifold-Wheeler).

- Collaborations with faculty across campuses to provide wide-ranging research opportunities for our students (see **Criterion 2A & 6E**). For this purpose, we have joined efforts with departments in the CAS (Biology and Chemistry and Chemical Biology), School of Engineering (Biomedical Engineering), College of Pharmacy (Pharmaceutical Sciences), and School of Medicine (Cell Biology and Physiology, Anesthesiology & Critical Care Medicine, Internal Medicine, Molecular Genetics and Microbiology, and Pathology). Reciprocally, BMB Department faculty members serve as mentors for students from other programs (e.g., Biology, Biomedical Engineering, and Chemistry and Chemical Biology).

- Collaboration with other CAS programs to expand breadth and depth of learning has led to diversification of the external elective courses available (refer to **Appendix 2.1**). Consequently, students expand their network of faculty and students have a better understanding of the interdisciplinary nature of the field, which is beneficial in the long run.

- Collaborations with the Pre-Health Professions Student Development Office to help students prepare for the Health Professions Program applications and interviews.

- Going forward, we anticipate new and long-lasting collaborations emerging between BMB and CAS as a consequence of developing the ÉLITE Career Mentoring Program.

(7) Effective communication between the Chair, Faculty and Colleges.

Response to reviewers: We agree and are pleased to report that the communication between A&S and the HSC has continued to improve over time. The BMB has made significant efforts to create specific connections between the Chair, Faculty and Colleges to benefit BMB students which are outlined in the action section below.

Actions taken:

(7a) Faculty meetings are held monthly to ensure empathy and transparency in departmental decision making. The meeting minutes are distributed to the faculty for revisions and the BMB faculty is encouraged to request topics for discussions that are included in the agenda distributed prior to the meetings. In August 2017, we developed the BMB Ground Rules for Effective

Meetings, which are revised and approved by the faculty every year thereafter. The rules are: (1) Keep the cell phone off or on silent; (2) Practice roundtable discussions - everyone has a say; (3) Do not interrupt or talk over each other, wait for your turn; (4) Stick to the agenda items; (5) Use parking lot for tangential topics; (6) Consent if there is not consensus; and (7) Reinforce these rules.

(7b) In the School of Medicine, faculty mentoring is a requirement for promotion to full professor. The demographics of the BMB Department have changed due to faculty retirement and separations from the university since the last APR in 2015. Currently, the BMB Department lacks the necessary resources to hire senior faculty who will require larger start up packages and salaries. The Department has three senior faculty (25%) and nine junior faculty (75%) members (see **Criterion 5A**). By FY 2024-2025, four faculty members will be promoted; three to associate professors and one to full professor. To ensure that strong mentors are available to our junior faculty and assure that they have an optimal chance for success, we assign mentors for all incoming faculty. Each junior faculty member in the BMB Department is assigned one to three faculty mentors, who are identified in their offer letter. Mentors provide support and guidance to help the junior faculty define and achieve education, research, and career goals. They are identified from departments across the HSC with input from the mentee and the faculty search committee. In addition, every faculty member in the BMB Department (junior and senior) is encouraged to complete the School of Medicine Faculty Mentor Development Program "Become a Better Mentor" to learn more about mentoring strategies to maintain effective and productive mentoring relationships.

(7c) We anticipate new lines of communications between the School of Medicine and the College of Arts and Science in the coming years with their new administration. Dr. Patricia Finn is the Dean of School of Medicine (September 2022), and the new Dean of the College of Arts and Science will be named this year (search in progress).

(7d) Please refer to 7c above. This Program is a model of collaboration between Main and North campuses. The Biochemistry Undergraduate Program has been housed in the School of Medicine since 1984, in the heart of the biomedical research laboratories on the HSC Campus. The Program is very successful. In 2015, the Program received ASBMB accreditation, which is a national, independent, outcomes-based evaluation mechanism that recognizes excellence in B.S. or B.A. degree programs in biochemistry and molecular biology and related disciplines. This year, the Biochemistry Program received full re-accreditation for an additional seven years (2023-2029). This level of success has been possible thanks to the dedication of the BMB faculty and the continuous support of the School of Medicine. The Biochemistry Program attracts many of the best and finest students on campus because of its location in the School of Medicine and its reputation for providing excellent education. Many biochemistry majors want to pursue biomedical research and professional careers, particularly medical education. For many years, the Biochemistry Program has been a pipeline for the UNM health professions. Our graduates represent ~25% of the medical school student body (4-year Program).

1F: Vision & Mission *Provide a brief overview of the vision and mission of the unit and how each degree/certificate offered addresses this vision and mission. Describe the relationship of the unit's vision and mission to UNM's vision and mission. In other words, to assist the university in better showcasing your unit, please explain the importance of its contribution to the wellbeing of the university, including the impact of the unit's degree/certificate program(s) on relevant disciplines/fields, locally, regionally, nationally, and/or internationally.*

University of New Mexico Biochemistry Undergraduate Program Goals

The Baccalaureate Program in Biochemistry at UNM provides students with a solid foundation in basic biochemical principles and provides them with opportunities to apply these principles to understand pathologic processes. This Program prepares students for success in graduate or professional school in the biomedical sciences and/or employment in biotechnology or pharmaceutical industries. Students are provided with opportunities to learn fundamental biochemical principles and apply these principles to real-life situations via a variety of active learning pedagogies in their courses (e.g., small-group discussion, problem-based or case-based learning, and/or authentic research). The undergraduate Program in Biochemistry seeks to support students in developing skills in problem-solving, critical thinking, and communication that are necessary for successful scientific careers.

Currently, the department offers two degrees tracks which include Bachelor of Science (B.S.) and Bachelor of Arts (B.A.). The majority of students matriculating in the Biochemistry Program select the B.S. option. The difference between the two degrees is minimal. To obtain a B.S. requires participation in the Laboratory Biochemical Methods course (BIOC 448L). Participation in BIOC 448L is optional for the B.A. degree.

Department Mission Statement

The mission of the Department of Biochemistry and Molecular Biology is to be a center of academic excellence that creates and imparts knowledge of the biochemical and molecular basis of disease through individual and collaborative multidisciplinary and translational research; undergraduate, graduate, postgraduate, and medical education; and the training of basic and clinical research scientists and junior faculty. The objectives of the BMB Department are aligned with our fundamental principles of excellence in education and research, fostering collaboration and teamwork, promoting diversity and inclusion, and upholding professionalism and integrity.
To fulfill this mission, the department strives to:

- Conduct individual and collaborative basic/translational research into the biochemical and molecular basis of disease, particularly diseases affecting New Mexico's population.
- Provide a dynamic environment that supports the development of critical thinking, transferable and technical skills, and intellectual independence in our undergraduate, graduate, medical, and postgraduate students.

- Make research a fundamental part of the educational experience for all of our students, especially students from under-represented populations.
- Attract and retain high caliber and diverse faculty and staff.
- Provide the culture, environment, and state-of-the-art resources for faculty, staff, and students to achieve their full potential.

Department Vision Statement

To be a vibrant, innovative, and inclusive department that is making a real impact on the world through education, research and outreach.

Relationship of the BMB's Vision and Mission to UNM's Vision and Mission

BMB's vision, mission and core values are in excellent alignment with the mission and goals of the University of New Mexico (https://opportunity.unm.edu/vision/index.html) and School of Medicine (https://hsc.unm.edu/about/vision-mission-values.html) including the following:

- Educating and encouraging students to develop the skills they need to contribute to the state and national economies.
- Discovering and disseminating new knowledge and creative endeavors.
- Demonstrating and facilitating growth in teaching and research excellence.
- Fostering innovation, discovery and creativity; and translating our research and discoveries into clinical or educational practice.
- Building a strong biomedical workforce in New Mexico by providing a premier education and transformative experience that prepares future generations for success.
- Nurturing and cultivating an environment of diversity, integrity, fairness, honesty and transparency. Respecting individual differences and valuing the opportunity to work in a collaborative environment where diversity is embraced.

Criterion 2. Teaching & Learning: Curriculum

The unit should demonstrate the relevance and impact of the curriculum associated with each degree/certificate program. (Differentiate for each undergraduate and graduate degree and certificate program offered by the unit.)

2A: Curricula *Provide a detailed description of the curricula for each degree/certificate program within the unit.*

- *Include a description of the general education component required, including any contributions from the unit to general education, and program-specific components for both the undergraduate and graduate programs.*
- *Discuss the unit's contributions to and/or collaboration with other internal units within UNM, such as common courses, courses that fulfill pre-requisites of other programs, courses that are electives in other programs, cross-listed courses, etc*.

Program Description

The Biochemistry Program is a model of collaboration between the University of New Mexico College of Arts & Sciences and the School of Medicine, founded and administered by the Department of Biochemistry and Molecular Biology since 1984. Delivery of the Biochemistry Program is divided between departments located within the School of Medicine (Department of Biochemistry and Molecular Biology) and College of Arts & Sciences. The lower division course requirements are offered through the Department of Biology and the Department of Chemistry & Chemical Biology, along with core curricular requirements of the University and the College (A&S). Once students have completed the fundamental pre-requisites, they are then formally admitted into the College of Arts & Sciences to begin the required courses for the Biochemistry degree (often at the beginning of their junior year). The Department of Biochemistry and Molecular Biology faculty teach a sequence of upper division courses needed to fulfill the degree requirements for biochemistry, which are generally completed in two years. Elective courses are available through the Departments of Biochemistry, Biology, Chemistry, and Mathematics, as well as the Biomedical Sciences Graduate Program and the College of Pharmacy. The Bachelor's degree in Biochemistry is consistent with current national recommendations for educational practices for the 21st century. The national recommendations have been compiled and published by the American Society for Biochemistry and Molecular Biology (ASBMB, http://www.asbmb.org/teachbmb/).

In addition to the Biochemistry major, the department also administers two course sections per semester of Introductory Biochemistry for non-majors (BIOC 423). One course section is primarily dedicated to the combined BA/MD Program, while the other is open to all other majors in the University. This course satisfies pre-requisite needs for admission into the UNM SOM, out of state medical and dental schools, UNM Pharmacy Programs, and most recently the UNM Nutrition Program.

The school year at the University of New Mexico is divided by semesters (fall and spring semesters).

Curricular Overview

The Department of Biochemistry and Molecular Biology (BMB) offer two degrees: Bachelor of Science (B.S.) and Bachelor of Arts (B.A.). No minor course of study is required for the Biochemistry major and Biochemistry is not offered as a minor. However, some BMB students complete a minor in other disciplines such as Chemistry, Computer Science, Business & Management, Psychology, Spanish, Statistics, or Health, Medicine & Human Values (HMHV).

The B.S. Degree in Biochemistry requires a total of 120 credit hours. Successful completion of the core courses is required of both B.S. and B.A. students. Students must successfully complete the one-year sequence (two semesters) of Organic Chemistry (CHEM 301 and CHEM 302) before they can register for their first Biochemistry course (BIOC 445).

Although students occasionally take courses in an altered order, the list below represents the suggested sequence of courses required for the Biochemistry major and for completion of the B.S. degree in 4 years:

<u>Semester 1</u>
MATH 1430 (Applications of Calculus I) -or- MATH 1512 (Calculus I)
CHEM 1215 (General Chemistry I for STEM majors)
CHEM 1215L (General Chemistry I for STEM majors Laboratory)

<u>Semester 2</u>
MATH 1440 (Applications of Calculus II) -or- MATH 1522 (Calculus II)
CHEM 1225 (General Chemistry II for STEM majors)
CHEM 1225L (General Chemistry II Laboratory for STEM majors)
BIOL 2110C (Principles of Biology: Cellular and Molecular Lecture & Laboratory)

<u>Semester 3</u>
CHEM 301 (Organic Chemistry I)
CHEM 303L (Organic Chemistry I Laboratory)
BIOL 2410C (Principles of Biology: Genetics Lecture & Laboratory)
PHYS 1230 (Algebra-Based Physics I) -or- PHYS 1310 (Calculus-Based Physics I)
PHYS 1230L (Algebra-Based Physics I Lab) -or- PHYS 1310L (Calculus-Based Physics I Lab)
calculus-based physics & physical chemistry track only: MATH 2531 (Calculus III)

<u>Semester 4</u>
CHEM 302 (Organic Chemistry II)
CHEM 304L (Organic Chemistry II Laboratory)
CHEM 2310C (Quantitative Analysis Lecture & Laboratory)

PHYS 1240 (Algebra-Based Physics II) -or- PHYS 1320 (Calculus-Based Physics II)
PHYS 1240L (Algebra-Based Physics II Lab) -or- PHYS 1320L (Calculus-Based Physics II Lab)

Semester 5
BIOC 445 (Intensive Introductory Biochemistry I)
CHEM 315 (Introductory Physical Chemistry) -or- CHEM 311 (Physical Chemistry I)

Semester 6
BIOC 446 (Intensive Introductory Biochemistry II)
calculus-based physics & physical chemistry track only: CHEM 312 (Physical Chemistry II)

Semester 7 (or Semester 8)
BIOC 448L (Biochemical Methods)
Biochemistry upper division elective (*course options listed in **Table 2.3***)

Semester 8 (or Semester 7)
Biochemistry upper division elective (*course options listed in **Table 2.3***)
Biochemistry upper division elective (*course options listed in **Table 2.3***)

The following courses (**Table 2.1**) are mandatory for the B.S. in Biochemistry (including all science and math courses required for the Biochemistry degree):

Table 2.1 Mandatory courses required for the B.S. in Biochemistry degree

Course number and course title ***Brief course description***	**Required or Elective**	**Number of hours of laboratory experience (if applicable)**	**Credits**
CHEM 1215: General Chemistry I *Introduction to general chemistry for students enrolled in science, engineering, and certain pre-professional programs. Concepts include mole, concentration, heat, atomic and molecular structure, periodicity, bonding, physical states, stoichiometry, and reactions.*	required		3
CHEM 1215L: General Chemistry I Lab *Laboratory course designed to complement the theory and concepts presented in lecture. Introduces students to techniques for obtaining and analyzing experimental observations pertaining to chemistry.*	required	3 hours per week = 45 hours total	1
CHEM 1225: General Chemistry II *Continuation of general chemistry for students enrolled in science, engineering, and certain pre-professional programs. Concepts include theoretical and quantitative coverage of solutions, kinetics, chemical equilibria,*	required		3

acids/bases, entropy and free energy, electrochemistry, and nuclear chemistry.			
CHEM 1225L: General Chemistry II Lab *Laboratory course designed to complement the theory and concepts presented in lectures. Experiments will illustrate the fundamental principles and techniques of chemistry.*	required	3 hours per week = 45 hours total	1
BIOL 2110C: Cellular & Molecular w/Lab *This course focuses on the principles of structure and function of living things at the molecular, cellular, and organismic levels. Major topics include the scientific process, chemistry & organization of cells, cellular respiration, photosynthesis, cell division, DNA replication, transcription, and translation.*	required	1 hour per week = 15 hours total	4
CHEM 2310C: Quantitative Analysis w/Lab *Introduces chemical characterization & data interpretation with an emphasis on solution equilibria & electrochemistry. Students will obtain reproducible quantitative lab data using classical & simple instrumental methods as well as analyze & interpret lab data using statistical & validation approaches.*	required	4 hours per week = 60 hours total	4
BIOL 2410C: Genetics w/Lab *Mitosis, meiosis, Mendelian genetics, chromosomes and inheritance, molecular basis of inheritance, genes to proteins, genetic models (viruses and bacteria), eukaryotic genomes, genetics basis of development, and overview of genomes.*	required	1 hour per week = 15 hours total	4
CHEM 301: Organic Chemistry I *Chemistry of the compounds of carbon.*	Required		3
CHEM 302: Organic Chemistry II *Continuation of CHEM 301.*	Required		3
CHEM 303L: Organic Chemistry I Lab	Required	3 hours per week = 45 hours total	1

Teaches basic organic chemistry lab techniques, including separations, thin-layer chromatography, gas chromatography, and organic synthesis apparatus set up.			
CHEM 304L: Organic Chemistry II Lab *Teaches synthesis of organic compounds using reactions learned in CHEM 302 and spectroscopic characterization of the products.*	Required	3 hours per week = 45 hours total	1
BIOC 445: Introductory Biochemistry I** *Intensive introduction to the physical and chemical properties of proteins and enzymes, enzyme catalysis, signal transduction, and the structure, synthesis, and processing of nucleic acids.*	Required		4
BIOC 446: Introductory Biochemistry II** *Intensive introduction to intermediary metabolism and hormonal control of catabolic and anabolic pathways.*	Required		4
BIOC 448L: Biochemical Methods** *Laboratory course uses a semester-long research project to introduce biochemical and molecular biology techniques, including cloning, PCR, purification & analysis of nucleic acids & proteins, bioinformatics, and enzyme kinetics. Students generate hypotheses, gather & analyze data, and present their results.*	Required (only for B.S.) Can use as internal elective for B.A.	4 hours per week = 60 hours total	4

*Please note that by NM state law, lower division courses must comply with statewide numbering conventions to allow for easier course transfer between institutions. Therefore, 100- and 200-level courses usually contain 4 digits. In contrast, 300- and 400-level courses follow UNM-specific conventions and contain only 3 digits. We've listed our courses by their starting numeral, with lower division courses starting with "1" listed first.

**Indicates courses offered for our Biochemistry Program.

UNM's required biochemistry curriculum includes courses in math, physics, and physical chemistry, although students can choose from two tracks, the "algebra-based" track or the "calculus-based" track. While both tracks require two semesters of calculus, the calculus-based track involves a calculus-rich physics sequence and two semesters of physical chemistry, which requires an additional, third semester of calculus (**Table 2.2**). The large majority of our students choose to take the algebra-based track, although we encourage students interested in chemistry, biochemical engineering, or biophysics careers to consider the calculus-based track.

Table 2.2 Courses required for the B.S. in Biochemistry degree in each track ("algebra-based" and "calculus-based")

Course number and course title ***Brief course description***	**Required or Elective**	**% BMB majors taking course**	**Number of hours of laboratory experience (if applicable)**	**Credits**
PHYS 1230: Algebra-Based Physics I *Algebra-based treatment of Newtonian mechanics. Topics include kinematics & dynamics in one & two dimensions, conservation of energy & momentum, rotational motion, equilibrium, and fluids.*	required (algebra track)	90%		3
PHYS 1230L: Algebra-Based Physics I Lab *Series of laboratory experiments associated with the material presented in PHYS 1230.*	required (algebra track)	90%	3 hours per week = 45 hours total	1
PHYS 1240: Algebra-Based Physics II *Second half of a two-semester algebra-based introduction to physics. This course covers electricity, magnetism, and optics.*	required (algebra track)	90%		3
PHYS 1240L: Algebra-Based Physics II Lab *Series of laboratory experiments associated with the material presented in PHYS 1240.*	required (algebra track)	90%	3 hours per week = 45 hours total	1
PHYS 1310: Calculus-Based Physics I *Calculus-level treatment of classical mechanics and waves, which is concerned with the physical motion concepts, forces, energy concepts, momentum, rotational motion, angular momentum, gravity, and static equilibrium.*	required (calculus track)	10%		3
PHYS 1310L: Calculus-Based Physics I Lab *Series of laboratory experiments associated with the material presented in PHYS 1310.*	required (calculus track)	10%	3 hours per week = 45 hours total	1
PHYS 1320: Calculus-Based Physics II *Calculus-level treatment of classical electricity and magnetism.*	required (calculus track)	10%		3

PHYS 1320L: Calculus-Based Physics II Lab *Series of laboratory experiments associated with the material presented in PHYS 1320.*	required (calculus track)	10%	3 hours per week = 45 hours total	1
MATH 1430: Applications of Calculus I *An algebraic and graphical study of derivatives and integrals, with an emphasis on applications to business, social science, economics, and the sciences.*	required (algebra track)	90%		3
MATH 1440: Applications of Calculus II *Topics in this course include functions of several variables, techniques of integration, an introduction to basic differential equations, and other applications.*	required (algebra track)	90%		3
MATH 1512: Calculus I *Limits. Continuity. Derivative: definition, rules, geometric interpretation and as rate-of-change, applications to graphing, linearization and optimization. Integral: definition, fundamental theorem of calculus, substitution, applications such as areas, volumes, work, averages.*	required (calculus track)	10%		3
MATH 1522: Calculus II *Transcendental functions, techniques of integration, numerical integration, improper integrals, sequences and series, Taylor series with applications, complex variables, differential equations.*	required (calculus track)	10%		3
MATH 2531: Calculus III *Vector operations, vector representation of planes and curves, functions of several variables, partial derivatives, gradient, tangent planes, optimization, multiple integrals in Cartesian cylindrical and spherical coordinates, vector fields, line integrals, and Green's theorem.*	required (calculus track)	10%		3
CHEM 311: Physical Chemistry I *Introduction to quantum chemistry that starts from the postulates of quantum mechanics and*	required (calculus track)	10%		3

simple models and covers structure of polyatomic molecules.				
CHEM 312: Physical Chemistry II *Introduction to chemical thermodynamics. Topics will include basic thermodynamic principles, phase diagrams, and solution phase thermodynamics.*	required (calculus track)	10%		3
CHEM 315: Introductory Physical Chemistry *Fundamentals of physical chemistry with primary emphasis upon biological and biochemical applications.*	required (algebra track)	90%		3

Our biochemistry students must also complete at least three upper division biochemistry electives as a requirement of the major. Of these three electives, at least two must come from our internal Biochemistry curriculum, listed below in **Table 2.3**. Note that none of these BIOC electives contain a laboratory component.

Students may choose to use an external, non-BIOC course to fill one of their upper division elective slots, provided it contains an appropriate level of biochemistry and/or molecular biology content, as determined by a review of the course syllabus. Our department maintains a list of approved external electives, this list is appended as supplemental material (**Appendix 2.1**), and in our website (https://hsc.unm.edu/medicine/departments/biochemistry/education/courses.html).

Table 2.3 Internal BMB electives

Course number and course title ***Brief course description***	**Required or Elective**	**% BMB majors taking elective**	**Credits**
BIOC 451: Physical Biochemistry *Quantitative physical chemical approach to analyzing macromolecular structure and function. Topics discussed include electrophoretic and hydrodynamic methods, mass spectrometry, optical and vibrational spectroscopic methods, NMR, diffraction methods, and computational techniques.*	elective	33%	3

BIOC 463: Biochemistry of Disease I *Course is broken into multiweek-long modules, each designed to advance understanding of biochemistry and cell & molecular biology in the context of human health and disease.*	elective	85%	3
BIOC 464: Biochemistry of Disease II *Course is broken into multiweek-long modules, each designed to advance understanding of biochemistry and cell & molecular biology in the context of human health and disease.*	elective	85%	3
BIOC 495-001: Topics (Proteins Evolution & Metabolites Discovering) *This course expands upon knowledge of enzymes and their structure-function relationships in biochemistry. It investigates the evolution of complex organisms starting at accretion and the necessary steps to go from abiotic to biotic life, as well as the importance of secondary metabolic pathways as selective factors and in healthcare.*	elective	33%	3
BIOC 495-002: Topics (Omics) *This course covers state-of-the-art high-throughput established and novel approaches used in genome sequencing, transcriptomics and epigenetics to obtain, integrate, analyze, and interpretate complex data (bioinformatics).*	elective	33%	3

Summary of the Biochemistry Core Courses

Table 2.4 summarizes the BMB courses and indicates the total number of credit hours, the course schedule, the course capacity and the course directors in the Biochemistry Program. All Biochemistry courses and electives are offered on a fall and/or spring semester (16 weeks) schedule.

Table 2.4 Summary of BMB courses

BMB course	Credit Hours	Schedule	Capacity	Course Director
Introductory Biochemistry I (BIOC 445)	4 credits	fall	100	Dr. Tyrel Bryan

Introductory Biochemistry II (BIOC 446)	4 credits	spring	80	Dr. Tyrel Bryan
Biochemical Methods (BIOC 448L)*	4 credits	fall & spring	16 per section 3 sections	Dr. Laura de Lorenzo
Physical Biochemistry (BIOC 451)	3 credits	fall	30	Dr. Natalie Adolphi
Biochemistry of Disease I (BIOC 463)	3 credits	fall	60	Dr. Xiang Xue
Biochemistry of Disease II (BIOC 464)	3 credits	spring	48	Dr. Curt Hines
Topics (Proteins, Evolution & Secondary Metabolism) (BIOC 495-001)	3 credits	fall	30	Dr. Tyrel Bryan
Topics (Omics) (BIOC 495-002)	3 credits	spring	30	Dr. Laura de Lorenzo
Senior Honors Research (BIOC 497)	3 credits	fall	8-10	Dr. Curt Hines
Senior Honors Research (BIOC 498)	3 credits	fall & spring	8-10	Dr. Curt Hines
Undergraduate Research (BIOC 499)	up to 6 credits	fall & spring	8	Dr. Curt Hines
Introductory Biochemistry I (BIOC 423)**	3 credits	fall & spring	49 and 126	Dr. Brett Manifold-Wheeler

*Biochemical Methods (BIOC 448L) is *required for the B.S. degree in Biochemistry and optional for the B.A. degree.*

**BIOC 423 is for non-Biochemistry majors and fulfills admission pre-requisites for graduate, medical, pharmacy, dental schools, and the UNM Nutrition Program. The BMB Department administers 2 course sections per semester of BIOC 423: one course section is primarily dedicated to the BA/MD Program, while the other is open to all other majors in the University.

BIOC courses include a total of 24-39 credit hours with a maximum of 42 credits. The minimum number of credit hours required for a B.S. degree in Biochemistry in 120.

Most students complete their degree in 4 years. A small proportion of students (usually < 15%) take an additional 1-2 semesters to complete the Program. Given the structured nature of the curricular sequence, very few students complete their degree requirements in fewer than 4 years. **Appendix 2.2** includes the road map for the two degrees, B.A. and B.S. in Biochemistry, and **Appendix 2.3** includes the major coursework template used to map the required and elective courses in the B.S. in Biochemistry (boxes are checked only if substantial time is spent on the topic or skill).

Stem Experiential Learning

As an ASBMB-accredited Program we require students to engage in a cumulative minimum of 400 contact hours of direct, hands-on laboratory experience in Science, Technology, Engineering, and/or Math (STEM) over the course of the degree program (see below). It is recommended by the ASBMB that at least one of these experiences be research or inquiry-based. Attention is devoted to the topic of laboratory safety, including the recognition of common laboratory hazards, responsible laboratory practices, and methods and equipment used for the prevention of, protection from, and response to incidents involving potential hazards. The principles of ethical conduct of research and scholarship, including plagiarism and appropriate citation, qualifications for authorship, appropriate application of image and data manipulation techniques, confidentiality, etc., are also addressed.

The total number of all required laboratory experiential learning contact hours for the Biochemistry major, including laboratory courses in or out of the major are detailed below:

Required Course Name	Number of Laboratory Hours
Cell and Molecular Lecture & Lab (BIOL 2110C)	1 hr/wk (15 hrs/semester)
Genetics Lecture & Lab (BIOL 2410C)	1 hr/wk (15 hrs/semester)
General Chemistry I Lab (CHEM 1215L)	3 hrs/wk (45 hrs/semester)
General Chemistry II Lab (CHEM 1225L)	3 hrs/wk (45 hrs/semester)
Organic Chemistry I Lab (CHEM 303L)	3 hrs/wk (45 hrs/semester)
Organic Chemistry II Lab (CHEM 304L)	3 hrs/wk (45 hrs/semester)
Physics I Lab (PHYS 1230L or PHYS 1310L)	3 hrs/wk (45 hrs/semester)
Physics II Lab (PHYS 1240L or PHYS 1320L)	3 hrs/wk (45 hrs/semester)
Quantitative Analysis Lecture & Lab (CHEM 2310C)	4 hrs/wk (60 hrs/semester)
Biochemical Methods (BIOC 448L)	4 hrs/wk (60 hrs/semester)
	minimum of 420 required hrs

Students who choose to take certain courses to fulfill their advanced biochemistry elective will gain additional laboratory hours. Two approved external electives containing laboratory components are:

Lab Methods in Molecular Biology (BIOL 446)	5 hr/wk (75 hrs/semester) = 495 hrs
Parasitology (BIOL 482L)	3 hr/wk (45 hrs/semester) = 465 hrs

Safety Trainings

In the curriculum, the BMB Department incorporates resources for students' safety training and implementation. The safety trainings are conducted online and are assessed for each of the following groups:

Student in-lab courses: All students taking the laboratory course (BIOC 448L) are required to pass online self-training safety modules prior to the practical laboratory course. Self-training modules are designed for self-directed learning and evaluation providing individuals with more control over when they learn and the pace at which they learn. These modules include: (1) Biosafety training for BSL-1 & BSL-2 laboratories (online course BIO-H 122); (2) Online course EHS chem safety (chemical safety); (3) Online course EHS lab safety (laboratory safety); and (4) Bringing back the pack (2021 COVID-19 safety training).

Students doing independent research: All students doing independent research are required to pass online self-training safety modules prior to working in faculty laboratories while receiving credit for BIOC 497/498/499. These modules are designed for self-directed learning and evaluation. Modules include, but are not limited to: (1) Basic annual safety training; (2) Online course EHS chem safety (chemical safety); (3) Online course EHS lab safety (laboratory safety); (4) Biosafety training for BSL-1 & BSL-2 laboratories (online course BIO-H 122); (5) Effective use of class II biological safety cabinets (BIO-H 117); (6) Bloodborne pathogen training for HSC (HSC 2282); and (7) Bringing back the pack (COVID-19 safety training). Any student doing independent research with animals is also required to complete the ABSL-2 working safely with laboratory animals (BIO-H 111) module.

Likewise, BMB faculty and staff must complete initial and refresher university training:

Initial university training: all University staff and faculty are required to pass online self-training safety modules prior to working at the University. These modules are designed for self-directed learning and evaluation, and include, but are not limited to: (1) Basic annual safety training; (2) Information privacy and security awareness training; (3) Active shooter on campus; (4) Ethics – a framework for ethical decision making; (5) HIPAA security training; (6) HIPAA and HITECH training; (7) HSC code of conduct and ethics; (8) Prevention of harassment and discrimination; (9) UNM School of Medicine competencies and learning objectives; (10) UNM School of medicine teacher-learner compact; (11) UNMH/HSC compliance training; (12) Biosafety training for BSL-1 & BSL-2 laboratories (online course BIO-H 122); (13) Effective use of class II biological safety cabinets; (14) Bloodborne pathogen training for Health Science Center (HSC); (15) Bringing back the pack (2021 COVID-19 safety training); and (16) Family Educational Rights and Privacy Act (FERPA) training by AACRAO.

Refresher university training: every year, faculty and staff are required to complete the self-training safety modules. The refresher trainings include: (1) Basic annual safety training; (2) Active shooter on campus- run, hide, fight; (3) HIPAA and HITECH training; (4) HIPAA security training; (5) HSC code of conduct and HSC code of ethics; (6) UNMH/HSC compliance training; (7) Biosafety training for BSL-1 & BSL-2 laboratories (online course BIO-H 122); (8) Effective use of Class II biological safety cabinets; and (9) Bloodborne pathogen training for HSC.

Curriculum Advisory Committee

The curriculum advisory committee of the BMB Department plays a crucial role in ensuring that the Program and department's curriculum is current, relevant, and meets the needs of students in alignment with the ASBMB core concepts, upholding the highest standards of quality and innovation in BMB education. The committee is composed of key members of the department, including the Undergraduate Program Director (Dr. de Lorenzo), Undergraduate Honors Research Program Director (Dr. Hines), and BMB Director for DEI (Dr. Bryan).

The committee's main responsibilities include reviewing and recommending changes to course offerings, requirements, and Program objectives. They also review and provide input on the use of technology and other resources in the curriculum, as well as review and make recommendations for student assessment and evaluation. The committee's recommendations are then presented to all faculty members and the department Chair for approval. Once approved, the recommendations are implemented, thus ensuring that the curriculum remains relevant and up-to-date, and that students receive a high-quality education that prepares them for successful careers in their chosen field.

Collaboration with other Internal Units within UNM

The BMB Department strives to nurture success on all levels of education and readily collaborates with CAS and SOM programs. Some of the most prominent collaborations are the following:

(1) The BA/MD Combined Degree Program is offered to graduating seniors beginning their UNM journey in the fall semester. The Program goal is to address the physician shortage in New Mexico and train a diverse set of individuals dedicated to helping New Mexico communities. The BMB Department contributes to the program by instructing one of the Introduction to Biochemistry course sections (BIOC 423), which is dedicated to BA/MD students, yearly. Our Lecturer III, Dr. Brett Manifold-Wheeler works closely with the BA/MD students and Dr. Sushilla Knottenbelt (BA/MD Program Director and Dr. Manifold-Wheeler's mentor).

(2) Our other collaborations which are important in facilitating diversity in New Mexico's healthcare system are with the Premedical Enrichment Program (PrEP). PrEP is a two-semester post-bachelorette Program offered to educationally disadvantaged New Mexicans. Students that have been selected, once completed, will attend UNM SOM in the cycle following the two semesters. The BMB Department collaborates with PrEP through mentoring and instruction. The selected students must attend and pass the BIOC 445 and BIOC 446 series (Intensive Biochemistry I & II) and attend a 1-hour weekly session over the two semesters with the instructor (Dr. Tyrel Bryan).

(3) Our approach of connecting undergraduates interested in research including students in the honors research program with faculty mentors in departments housed in Main and North Campuses (Biology, Biomedical Engineering, Chemistry & Chemical Biology, Cell Biology and

Physiology, Anesthesiology & Critical Care Medicine, Internal Medicine, Molecular Genetics and Microbiology, and Pathology). The students develop a wider range of skills and knowledge, network with students from other departments, and become competitive in the job market or in graduate school. This interdisciplinary approach leverage learning with a variety of institutional resources. It enhances our students' academic experiences and benefits the department and the university as a whole.

(4) Our department appreciates the importance of providing a well-rounded education, and integrating with the larger UNM community. This can be achieved by offering external elective courses from other departments. Our students deepen their understanding of specific topics, explore new areas of interest, and gain a broader perspective on the field of biochemistry. Moreover, external electives can help to build new connections with the students and faculty in other programs.

(5) The CAS is now responsible for academic advising and the BMB Program Director, Dr. de Lorenzo, is engaged in regular communication with biochemistry advisors and supervisor in CAS. Open and frequent communication is important for alignment of the Biochemistry Program with CAS academic goals.

(6) Dr. de Lorenzo frequent communication with the Senior Student Success Specialist, Dr Jennifer Payne, at the Undergraduate Research, Arts & Design Network (URAD) is important to inform, support, and promote student participation in research. Dr. de Lorenzo helps the student to network and identify funding opportunities, thereby increasing their chances of success in academia or industry.

(7) Tight coordination between undergraduate programs of the Departments of BMB, Biology, and Chemistry and Chemical Biology is crucial for completion of the Biochemistry B.S. and B.A. degrees in four years. It also is important to continuo offering positive experiences to our students. We are reviewing the three curricula to prevent unnecessary duplication of efforts after the biology curriculum has been revised and a new chemical biology curriculum developed.

(8) Dr. de Lorenzo communicates with the assessment team in CAS regularly. This relation has been important for accountability of continuous improvement, and our sustained program success. The CAS oversees the program assessment, which is detailed in **Appendix 3.1** and **Appendix 3.2**.

(9) The CAS also plays a key role in evaluating instruction, through the UNM EvaluationKIT (https://coursefeedback.unm.edu), which allows students to provide feedback on their learning experience and inform future improvements to the program.

The BMB Department is committed to providing our students with the resources and opportunities that they need to succeed in their chosen field. We are always open to increasing collaborations and contributions to promote UNM student success.

2B: Mode of Delivery *Discuss the unit's mode(s) of delivery for teaching courses.*

Most courses in the Biochemistry Program are administered using Main Campus classroom facilities, while more advanced courses and senior research are conducted in two modern, well equipped research buildings in the SOM complex. This is a comprehensive Program that capitalizes on a variety of instructional methods, detailed as follows:

Description of Inquiry-Based Components of the Curriculum, whether Lab- or Lecture-Based
Our course curriculum uses active learning, problem-based learning and inquiry-based components for lectures and laboratory courses (course-based undergraduate research experiences [CUREs]) as student engagement approaches.

The biochemistry courses BIOC 445 and BIOC 446 incorporate substantial inquiry-based components and are taught in a studio classroom designed for collaborative learning. Before-class preparation and formative assessment using short quizzes are routine practices. There are relatively few lectures, relying more heavily on small group learning to construct and evaluate scientific knowledge and identify solutions to complex, real-world biochemical problems (i.e., engage in the scientific process). Daily problem sets or case studies take a scaffolded approach so that students use critical reasoning to solve problems at different levels of complexity. Students develop skills in utilizing background information, selecting proper techniques, experimental design, trouble-shooting, extrapolation to real-word issues, and effective biochemical communication.

In the fall of 2018, we reimagined our BIOC 448L capstone laboratory course in conjunction with the national malate dehydrogenase (MDH) CURE community. Students study kinetic mutants of MDH, starting from molecular biology characterization of the mutants, through bioinformatics and protein structure visualization to design a structure-function hypothesis, and finally to hypothesis testing and data analysis using kinetic assays. The project includes a mock grant proposal (students are guided to prepare and develop the mock proposal during the semester, receiving feedback) and concludes with an oral presentation of their preliminary kinetic assay results at the end of the semester. This approach offers our students, especially those without outside research experience, a chance to take ownership of an entire research project.

Finally, all of our senior-level electives incorporate both lecture and small group active learning components, including literature reviews/journal clubs, case studies, data collection and analysis projects, and presentations about medical topics of interest to the students.

Description of How the Program Promotes Communication Skills
The Biochemistry Program promotes and assesses both written and oral communication skills. Our lecture courses (BIOC 445, BIOC 446, and the electives) involve substantial amounts of teamwork and peer learning, which promotes inquiry and oral communication skills. Additionally,

many of the BMB electives use short oral presentations as assessment metrics. Numerous classroom activities and homework assignments in these courses involve short writing assignments or "explain your answer" assessments, giving students a chance to hone their written communication skills.

Furthermore, our BIOC 448L laboratory course has an extensive role in promoting effective communication; 50% of the final course score comes from the following summative assessments: (1) an individually written mock grant proposal (30%) covering background & significance, specific aims (hypothesis, prediction & rationale) and proposed experiments; and (2) a group oral presentation (20%) covering the above sections plus results and conclusions. In both of these BIOC 448L assessments, students are asked to critique their peers, providing further practice in recognizing superb communication skills and providing professional feedback.
We offer additional optional communication practice opportunities for students who are interested. For example, students who participate in the honors program must write a final thesis covering the work they have completed in their 1+ year independent research project and then defend their thesis orally, at a department-wide undergraduate research day. We also offer teaching assistant opportunities for our undergraduate students, helping with BIOC 445, BIOC 446, electives and BIOC 423 (non-majors' biochemistry).

Description of Curricular Activities for the Development and Assessment of Teamwork Skills in Both Laboratory and Classroom Environments

In BIOC 445, BIOC 446 and our electives (BIOC 451, BIOC 463, BIOC 464, BIOC 495-001 and BIOC 495-002), students are individually responsible for coming prepared to class and reviewing material after class. However, the bulk of the critical thinking, synthesis, and integration portions of the curriculum in each course are delivered through team-lead activities, so ultimately, success in these courses is heavily reliant on the development of teamwork skills. Teamwork is scaffolded across our curriculum, using defined activities in the earlier, mandatory courses and culminating in elective projects where teams are given freedom to design, implement, and present their projects (as mentioned above).

In BIOC 448L (lab), students are individually responsible for preparing their research notebooks beforehand and writing up their lab archive after each lab. However, students work in pairs during lab, which allows for discussion of protocol theory and method choices, troubleshooting, results interpretation, and formation of conclusions. These pairs must also present their work at the end of the semester via oral presentation, and their success here hinges upon having developed teamwork skills. The curriculum also incorporates an individual mock grant proposal but includes multiple iterations of peer editing and a mock peer review process, underscoring the collaborative nature of scientific research. Finally, we emphasize the importance of teamwork and sharing of data and resources by asking lab teams studying the same mutant to share their kinetic data. This

allows students to identify sources of error and ways to improve accuracy and reiterates the importance of replicability in the scientific process.

Description of How the Program Incorporates the Teaching of Responsible Conduct of Research/Professional Code of Conduct (Ethics)

Our Biochemistry Program incorporates the teaching of responsible conduct of research/professional code of conduct (ethics). UNM has suggested honor code wording that is to be included in all course syllabi. The specific wording changes from semester to semester but refers students to the Student Pathfinder (https://pathfinder.unm.edu) and Faculty handbook (https://handbook.unm.edu) for policies related to student grievances, academic dishonesty and plagiarism, and maintaining a respectful campus. The suggested wording includes reference to "serious academic consequences" for academic dishonesty, but individual faculty members are given leeway to design a specific academic dishonesty policy that best fits the design of their course. Instructors are expected to elaborate on their unique academic dishonesty policy in their syllabi. In general, our BMB faculty set expectations that include the following pillars: (1) completion of work must be done individually unless otherwise noted, (2) acknowledgment of others' work and ideas by appropriate citation, and (3) incidences of academic dishonesty result in a failing grade and possible university disciplinary action.

The BMB Department also incorporates ethics-based modules into its required senior capstone research course (BIOC 448L) as well as our Biochemistry of Disease electives each year. These sections provide an overview of research ethics and include topics such as authorship, plagiarism, treatment of data, conflict of interest, use of human and animal subjects, genomic research, and international research. In Biochemistry of Disease, students are further given an ethical scenario to evaluate and are assessed through a brief written report and group presentation to the class.

Criterion 3. Teaching & Learning: Assessment

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: Assessment Plans *Provide Current Assessment Plan for each degree and certificate program in the unit.*

The undergraduate degree program for Biochemistry and Molecular Biology at the University of New Mexico is based on instructional practices that maximize interaction between students and faculty. The department's most current outcomes assessment plan and report is included as **Appendix 3.1** (AY 2020-2021) and summarized below:

Our Program Goals

Program Goal #1: Understand major biochemical concepts, theoretical principles, and experimental findings in the field of biochemistry.
Program Goal #2: Be able to employ critical thinking and hypothesis-driven methods of scientific inquiry.
Program Goal #3: Present scientific data in an appropriate context and in a variety of ways, at different levels.
Program Goal #4: Appreciate and promote the ethical dimensions of science.
Program Goal #5: Practice critical self-reflection in order to progress as a scientist and as a life-long learner.

Our Student Learning Outcomes

The following student learning outcomes (SLOs) are assessed for our undergraduate Program.
SLO #1: Students will demonstrate advanced knowledge and apply their understanding of the core curriculum (as outlined by the American Society for Biochemistry and Molecular Biology, ASBMB), our accrediting body): (1) Energy & metabolism, (2) Structure & function, (3) Information storage & transfer, (4) Homeostasis, and (5) Evolution. *Aligned with Program Goal #1.*
SLO #2: Students will develop a hypothesis; design and conduct appropriate experiments to test that hypothesis; analyze and interpret data; reflect on the evidence, the process, and plan the next experiment. *Aligned with Program Goal #2.*
SLO #3: Students will write, explain, and present on biochemical topics; using prose, drawings, flowcharts, tables, and figures; in quizzes, exams, papers, laboratory reports, presentations; in small- and large- group course settings, and in professional settings. *Aligned with Program Goal #3.*

SLO #4: Students will explain the necessity of objectivity and honesty in the process of science. *Aligned with Program Goal #4.*
SLO #5: Students will reflect on their strengths and weaknesses in biochemistry and, with a mentor, develop related learning and career plans. *Aligned with Program Goal #5.*

Our Assessment Plans
The internal assessments used to evaluate student performance in the degree Program vary according to the individual course. Common assessments include:

- individual and group quizzes
- exams (multiple choice, short answers, essay questions)
- analysis of scientific literature
- generation and preparation of experimental data
- analyses and interpretation of experimental data
- mock grant preparation
- oral presentations
- term papers
- social media posts

Thus far we have only assessed SLOs #1, #2, and #5. We assess these SLOs every year, over the course during the fall and spring semesters. We have started the process of reevaluating our assessment plan to better encompass the goals of the entire undergraduate Program and to include a wider variety of SLOs and assessment metrics that span all of our major courses (please see **Appendix 3.1** for more details).

Designation for departmental Honors for Research is assessed by the entire faculty and is based on an evaluation of the written thesis and on the student's presentation of their work at the Annual Biochemistry Research Symposium, which convenes during spring semester.

Since our Biochemistry Program is accredited by ASBMB, the BMB Department administers a biochemistry degree certification exit exam to monitor individual student performance and as an overall assessment of the Degree Program.

3B: Assessment Reports *Provide current Assessment Report for each degree and certificate program in the unit. Expand on any initiatives/changes that have resulted from these reports.*

We have included our assessment plan & report (2020-2021 academic year) in **Appendix 3.1**, and the most recent assessment plan & report (2021-2022 academic year) in the link Biochemistry APR Spring 2023 for reference. We have program-wide student learning outcomes (see below), which we assess on an annual basis via a process mandated by UNM's Office of Assessment. In January of each year, the faculty meet to discuss the results of the previous year's assessment

report and make modifications to the curriculum as needed. Examples of programmatic revisions that have arisen from our annual assessment include (1) offering more sections of BIOC 448L, (2) increasing our elective diversity, (3) organizing a career development seminar series, and (4) revamping our independent research opportunities. Please, note that we currently use the results of the BIOC 445 and BIOC 446 final exams, the ASBMB certification exam, and the feedback from our graduation survey as assessment metrics for our Program as a whole, but we have plans to revise our assessment plan and expand our metrics to cover all courses in the major.

Our most recent A&S College Assessment Review Committee Program Assessment Rubric (corresponding to the AY 2020-2021 assessment plan & report) has been attached (see **Appendix 3.2)**.

3C: Primary Constituents *Describe the unit's primary constituents and stakeholders. Include explanation of how the student learning outcomes for each degree/certificate are communicated to students, constituents, and other stakeholders.*

Primary Constituents

The primary constituents for the Biochemistry Program are a top-ranking group (as defined by GPA and recipients of university awards) of undergraduate students in the College of Arts & Sciences who wish to pursue a degree that bridges the disciplines of biology and chemistry. The Biochemistry Program requires students to complete the lower division biology and chemistry (BIOL 2410C, Principles of Biology: Genetics Lecture & Laboratory; and CHEM 302, Organic Chemistry II, respectively) core courses and achieve minimum grade standards of C, before being admitted to our Program.

The Biochemistry Program is highly desirable to students, and it attracts many of the best students at UNM. Our Program is one of few in the U.S. that is centered in a School of Medicine, offering an emphasis on medical biochemistry– integrating the study of fundamental biochemistry with the dysfunction that occurs in human disease states (nearly all UNM students who apply to the School of Medicine have taken one of the department's upper division biochemistry courses). Our Program is one of the most rigorous and demanding graduate programs at the University. Thus, this degree meets or exceeds the curricular recommendations of the American Society of Biochemistry and Molecular Biology.

Our Biochemistry Program has been adapted to meet the career goals of our students. The majority of our students, including many minority students, are interested in pursuing post-graduate studies in the health sciences, which includes graduate (12%), medical (15%), dental, and pharmacy programs (2%), as well as STEM careers (7%) in industry, forestry and teaching. Moreover, a

significant portion of the Biochemistry Undergraduates continue on to our UNM School of Medicine.

Communication of Learning Objectives to Students

Learning goals and expected outcomes are explicitly presented in course syllabi along with an explanation of how outcomes will be measured during the course (explicit assessment criteria); in addition, outcomes and their measurements are discussed with students several times during the course. The syllabus for all the current BMB courses may be found in the link Biochemistry APR Spring 2023.

Primary Stakeholders

The primary stakeholders are the School of Medicine, the College of Arts & Sciences, and the State of New Mexico. The Biochemistry Program is a model of collaboration between the University of New Mexico School of Medicine and the College of Arts & Sciences. The administration of the Program has been the responsibility of the School of Medicine for the past 39 years (from 1984). The Program has been supported and highly praised by Dr. Paul Roth, the past Dean of the School of Medicine and Chancellor of the Health Sciences Center. He demonstrated his commitment to the Program by providing (1) compensation for the faculty FTE committed to the administration and instruction of the undergraduate Biochemistry major, (2) office and research laboratory space for the faculty, and (3) financial resources used to support basic programmatic operational activities (office and laboratory teaching supplies, instruments for the teaching laboratory course, TA support, etc.). The current Dean of the School of Medicine is Dr. Patricia Finn (since September 2022). Since her appointment she has demonstrated her support and interest for our Program. The College of Arts & Sciences has granting authority over the B.A. and B.S. degrees. The College has supported the Program by providing (1) student advisement, (2) the pre-requisite courses for biochemistry majors, and (3) classroom facilities for most courses.

Finally, BMB faculty lead and participated in a number of outreach and community activities, as well as institutional in-service (see **Criterion 5C**).

Criterion 4. Students (Undergraduate & Graduate)

The unit should have appropriate structures in place to recruit, and retain undergraduate and graduate students. (If applicable, differentiate for each degree and certificate program offered by the unit). Include specific measures and activities aimed at increasing equity and inclusion.

4A: Recruitment *Discuss the unit's proactive recruitment activities for both undergraduate and graduate programs, including specific efforts focused on recruiting students of color, underserved students, and students from groups that have been traditionally under-represented in your academic field.*

The Biochemistry Program is jointly offered by the School of Medicine's Department of Biochemistry and Molecular Biology and the College of Arts & Sciences. Lower division coursework is provided by the Department of Biology and Department of Chemistry & Chemical Biology, in addition to the university's core curriculum. After fulfilling pre-requisites, students are formally admitted into the College of Arts & Sciences to begin the Program's required courses, usually during their junior year.

We gathered the undergraduate headcount of freshmen students who were initially interested in pursuing a Biochemistry major (the major is only declared in the sophomore year) (**Figure 4.1**). On average, 372 students declared major in Biochemistry during the 2018-2022 period.
These data were compared to the number of students enrolled in other three Colleges at HSC. We compared the number of students who declared Biochemistry major with the number of students enrolled in the College of Population Health, the College of Nursing, and the College of Pharmacy (data from 2018-2022). As shown in **Figure 4.1**, our Biochemistry Program attracts the second largest number of students following the College of Nursing.

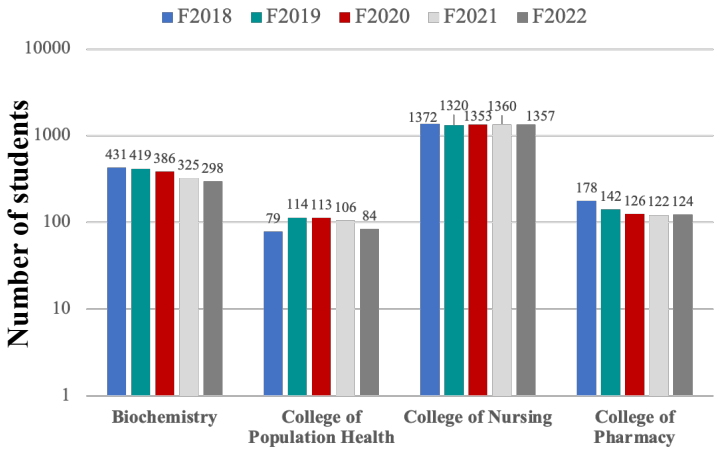


Figure 4.1 Freshmen undergraduate enrollment data

The number of students enrolled in Biochemistry was compared to the number of students enrolled in three similar Colleges at UNM from 2018 to 2022 (College of Population Health, College of

Nursing, and College of Pharmacy). F, fall semester. Student enrollment data were obtained from the UNM Office of Institutional Analytics.

In their sophomore year, students then formally declare their chosen major. On average, 82 students initiated the Biochemistry Program during the 2018-2022 period. There are various reasons why UNM pre-majors do not choose Biochemistry as their major. One reason is that the Biochemistry Program is considered one of the most rigorous majors at UNM and some pre-majors perceive it as a challenging field of study and do not feel confident in their ability to succeed in the major. Additionally, after completing lower division courses, pre-majors are more inclined to other fields of study, such as business, engineering, computer science, chemistry, or biology, and do not see Biochemistry as a good fit for their career goals.

Although recruitment does not occur in the traditional sense, the majority of students that are accepted into our Program (starting BMB courses at the beginning of their junior year) intend on pursuing a career in medicine or research (documented in **Criterion 4F**). Outreach to recruit or inform students of the BMB Department occurs on a more informal basis. Current informal outreach occurs through (1) the A&S and BMB advisors, via one-on-one conversations with advisors or faculty, as well as, through the Biochemistry Department orientation; (2) presence on social media (Instagram at instagram.com/unm_bmb, and through the BMB website, bmb.unm.edu); and (3) occasional recruitment booths in association with research opportunities within the department. Likewise, in affiliation with other programs, we extend research opportunities and mentoring to increase awareness of our department to students of under-represented minorities. Some of these programs include the Undergraduate Pipeline Network (UPN), the BA/MD program, the Post-baccalaureate Research, and the Premedical Enrichment Program (PrEP) documented in **Criterion 4E**.

What Factors Drew Students to the Biochemistry Major?

Over the past four years, prior to graduation, graduating seniors from the Biochemistry Program have been asked to participate in the graduation exit survey (**Appendix 4.1**). The survey covers a variety of topics related to students' experiences, performance and planning (further explained in **Criterion 4F**). One of the topics on the survey is related to the main reason the students were attracted to the Biochemistry major. Choice options included the following: (1) the student found biochemical topics interesting, (2) the student developed a special aptitude for the topics that make up biochemistry, (3) biochemistry looked like a good area in which they could ultimately help solve problems that people face, (4) biochemistry looked like a good area in which to find a job, (5) biochemistry was good preparation for training in the field they really wanted to go into, (6) they randomly chose the Biochemistry major, and (7) other reason (reason not listed). **Figure 4.2** shows the survey results from 2019 to 2022.

As illustrated in the **Figure 4.2,** results show that the main reason the majority of respondents were attracted to the Biochemistry major was that biochemistry was good preparation for training in the field they really wanted to go into. This result is consistent across the four years analyzed (30% to 62% of respondents). The second highest reason for choosing our major was students find biochemical topics interesting (9.2% to 35.7% of respondents chose this option across the four years). About 15% of respondents chose our Program because biochemistry looked like a good area in which they could help solve problems that people face.

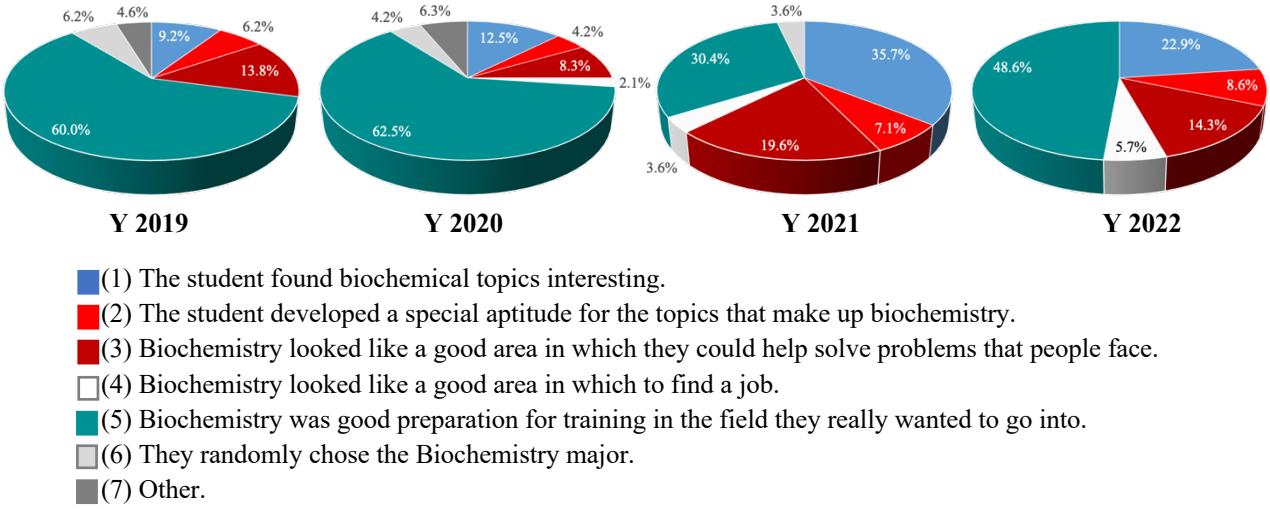


Figure 4.2 Self-reported reasons students were attracted to the Biochemistry major
Graduating seniors from the Biochemistry Program were asked for the main reasons they were attracted to our major across the years (2019-2022 period). Seven options were available (noted in the figure legend). These data were collected from the graduation exit survey from 2019 to 2022. The number of students who participated each year are as follows: 65 students in 2019, 48 students in 2020, 56 students in 2021, and 35 students in 2022.

4B: Admissions *Discuss the unit's admissions criteria and decision-making processes (including transfer articulation(s)) for both undergraduate and graduate programs. Evaluate the impact of these processes on enrollment.*

UNM students are offered entry into either the B.A. or B.S. Biochemistry Program after completing the pre-requisite general education requirements according to CAS and the specific admission requirements of the Biochemistry major. The admission requirements are as follows:

- A minimum of 26 credit hours, with at least 23 credit hours earned in courses that fulfill graduation requirements.
- A cumulative grade point average (GPA) of 2.00 or higher, both for transfer students (based on transfer GPA) and continuing UNM students (based on institutional GPA).

- Completion of the General Education Curriculum, including courses in Communication, Mathematics and Statistics, and a Second Language, with demonstration of academic proficiency.
- Successful completion of the required Biochemistry admission coursework with grades of "C" or better, as outlined in **Table 2.1** and **Appendix 2.2**.

Because academic requirements to join the Biochemistry Program are essential to success in BMB courses; the admission requirements do not impact enrollment.

In 2012, the admissions process was transferred to the College of Arts & Sciences' Advisement Center. A professional academic advisor (currently Amanda Cook, see **Criterion 4D**) completes the review process to declare a Biochemistry major (we do not offer a minor to students). The A&S Advisement Center uses a four-year roadmap to the Biochemistry degree (**Appendix 2.2**) as a recruitment tool and to help students in the process. In the BMB Department, the Director of the Undergraduate Program (currently, Dr. de Lorenzo) advises and helps our students in selecting the coursework best suited to their interests and their career goals.

4C: Data *Provide available data and an analysis of the unit's 1) enrollment, 2) retention, and 3) graduation (i.e. time to degree, graduation rates, etc.) trends. Please provide data and analysis on enrollment, retention and graduation rates for students by race/ethnicity and gender, where possible. Include an explanation of the action steps or initiatives the unit has taken to address any significant challenges or issues highlighted in these trends. When possible, data should be obtained from a UNM source such as MyReports or OIA. The APR office will assist with identifying appropriate data sources.*

Enrollment in the Biochemistry Program

Enrollment in the Biochemistry Program was determined using the number of students enrolled in the required junior Biochemistry course (Intensive Biochemistry I, BIOC 445). Between 2018 and 2022, we observed a tendency for a decrease in the number of undergraduate students enrolled in our Biochemistry Program (**Figure 4.3 A**). The lowest number of students enrolled in the Biochemistry Program, during this period was in the fall of 2022, with a decreased of 31% with respect to 2018 (**Figure 4.3 A** and **C**). To determine whether this was program specific, we observed the biochemistry undergraduate headcount over the 5-year period and the UNM Main Campus undergraduate headcount obtained from the UNM Official Enrollment Report OIA (https://public.tableau.com/app/profile/unm.oia/viz/UNMOfficialEnrollmentReport/Story1).
Given that the undergraduate headcount from the Biochemistry Program refers to juniors and the UNM undergraduate headcount refers to freshmen, we only evaluated the general trend in both groups (comparison should be made between similar cohorts). A similar tendency was observed in the number of undergraduate students enrolled in programs offered through the UNM Main

Campus (**Figure 4.3 B**), with the lowest enrollment noted in the fall of 2021 (a decreased of 11% with respect to 2018, **Figure 4.3 B and C**). A potential reason for these trends may be the COVID-19 pandemic.

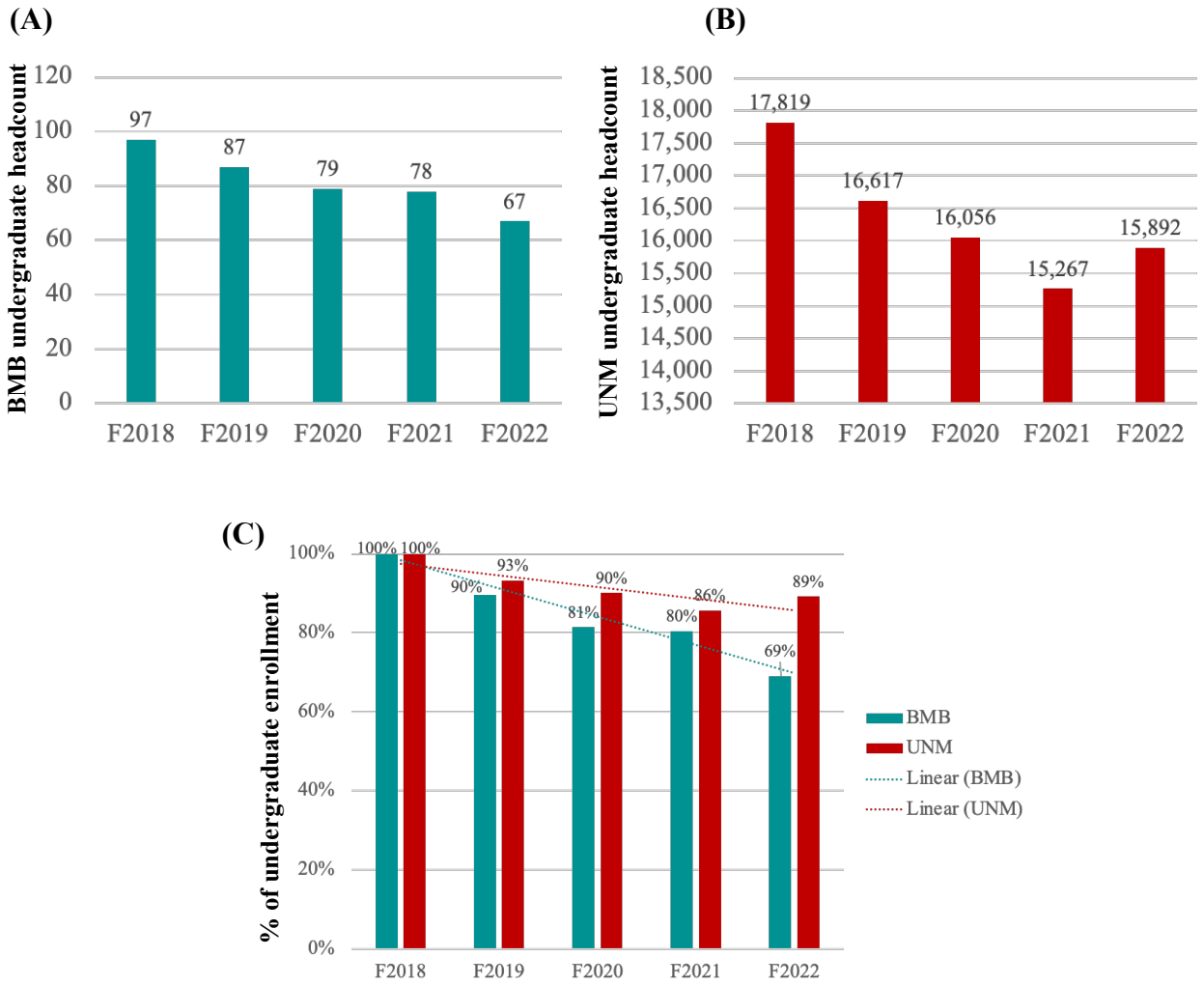


Figure 4.3 Undergraduate enrollment

The total number of undergraduates enrolled in our Biochemistry Program **(A)** and the number of undergraduates enrolled in various other programs on UNM Main Campus **(B)** are shown for the fall semesters from 2018 to 2022. The percentage of students enrolled in the Biochemistry Program and other programs at UNM's Main Campus **(C)** was calculated by using the year with highest number of undergraduate students (fall 2018) as the reference number. BMB, Biochemistry and Molecular Biology Department; UNM, University of New Mexico; F, fall semester. Data were obtained from the UNM Official Enrollment Report OIA (https://public.tableau.com/app/profile/unm.oia/viz/UNMOfficialEnrollmentReport/Story1).

Undergraduate Retention

Although the Biochemistry Program does not have a mechanism for student retention that originates in the department itself, several of our past students have taken advantage of UNM wide pipeline programs that are designed to expose students to excellent research opportunities (see **Criterion 6E**). These programs integrate students into modern research facilities and foster enthusiasm for continued biochemical study and research. Research opportunities range from volunteer work, work study, and non-work study jobs, to independent research projects. Students can arrange research projects with individual faculty members or they may participate in one of several research programs. These programs place specific emphasis on recruiting under-represented minorities (URM) and women to benefit students from various backgrounds.

The undergraduate student retention rate is determined by the number of students who re-enroll from one year to the next. We have evaluated the retention rate by analyzing third-semester re-enrollment data for five cohorts of students (students beginning University classes in 2016, 2017, 2018, 2019, and 2020). Data were obtained from the public database UNM OIA which can be found at https://public.tableau.com/app/profile/unm.oia/viz/FCT2017/Retention. In general, we observed retention rates of students declaring major in Biochemistry above 80% for each entry cohort analyzed except for the 2020 entry cohort (**Figure 4.4**). Between the five cohorts, the students declaring major in Biochemistry had an average retention rate 9% higher than the overall retention rate of students who declare major in other UNM programs (**Figure 4.4**). The 2021 cohort data has not been included in this graph as the fall 2022 third semester re-enrollment data has not yet been complied.

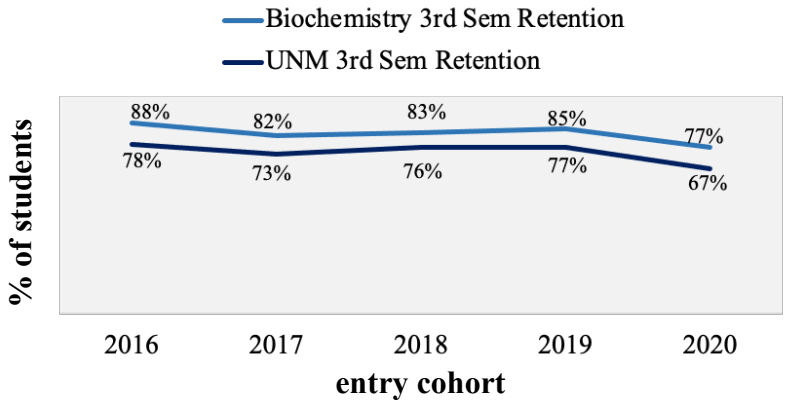


Figure 4.4 Undergraduate student retention

The undergraduate retention data was analyzed using third semester student re-enrollment numbers from the Biochemistry Program compared to overall third semester student re-enrollment numbers from UNM for the five cohorts of students. The 2021 cohort data has not been included in this graph as the fall 2022 third semester re-enrollment data has not yet been complied. Data obtained from https://public.tableau.com/app/profile/unm.oia/viz/FCT2017/Retention.

We also assessed the retention rate by gender and ethnicity within the Biochemistry Program (**Figure 4.5 A** & **C**) and compared these findings to total retention rates at UNM analyzed by gender and ethnicity (**Figure 4.5 B** & **D**). We observed consistent retention values when analyzing for gender in the Biochemistry Program with an average of 83% retention for both genders across the five different cohorts analyzed (2016-2020, **Figure 4.5 A**). However, the 2020 cohort showed lower retention of females compared to the female retention rates of the four other cohorts (possibly because of the COVID-19 pandemic). Thus, a decrease of 16% in the retention rate was observed in the 2020 female cohort versus the 2016 female cohort. At UNM, slightly more females were retained compared to males (with an average of 76% +/- 0.04% for females and 71% +/- 0.04% for males across all five cohorts). However, both genders show decreased retention in the 2020 cohort compared to the 2016 cohort (about 10% lower, **Figure 4.5 B**).

The retention rates analyzed by ethnicity was performed using data from the two student populations with the highest numbers of enrollment, White and Hispanic. In the Biochemistry Program (**Figure 4.5 C**), the retention rates for both groups vary with a higher retention rate for Hispanics in the cohorts of students who began university courses in 2016, 2017 and 2020. Higher retention rates were observed for White students in 2018 and 2019. However, we observed retention rates of 74% or above for both groups in all five cohorts with the highest retention values reaching 93%. At UNM Main Campus (**Figure 4.5 D)**, the retention rates of both groups were similar and consistent between the 2016, 217, 2018, and 2019 cohorts, with a decrease of about 10% in the 2020 cohort (the trend was observed in both White and Hispanic undergraduate students). Comparing the retention rates of our Biochemistry Program to that of the UNM Main Campus, in general, our retention rates were higher for both student populations, with an average 6% and 9% higher retention of White and Hispanic students, respectively (**Figure 4.5 C** & **D)**.

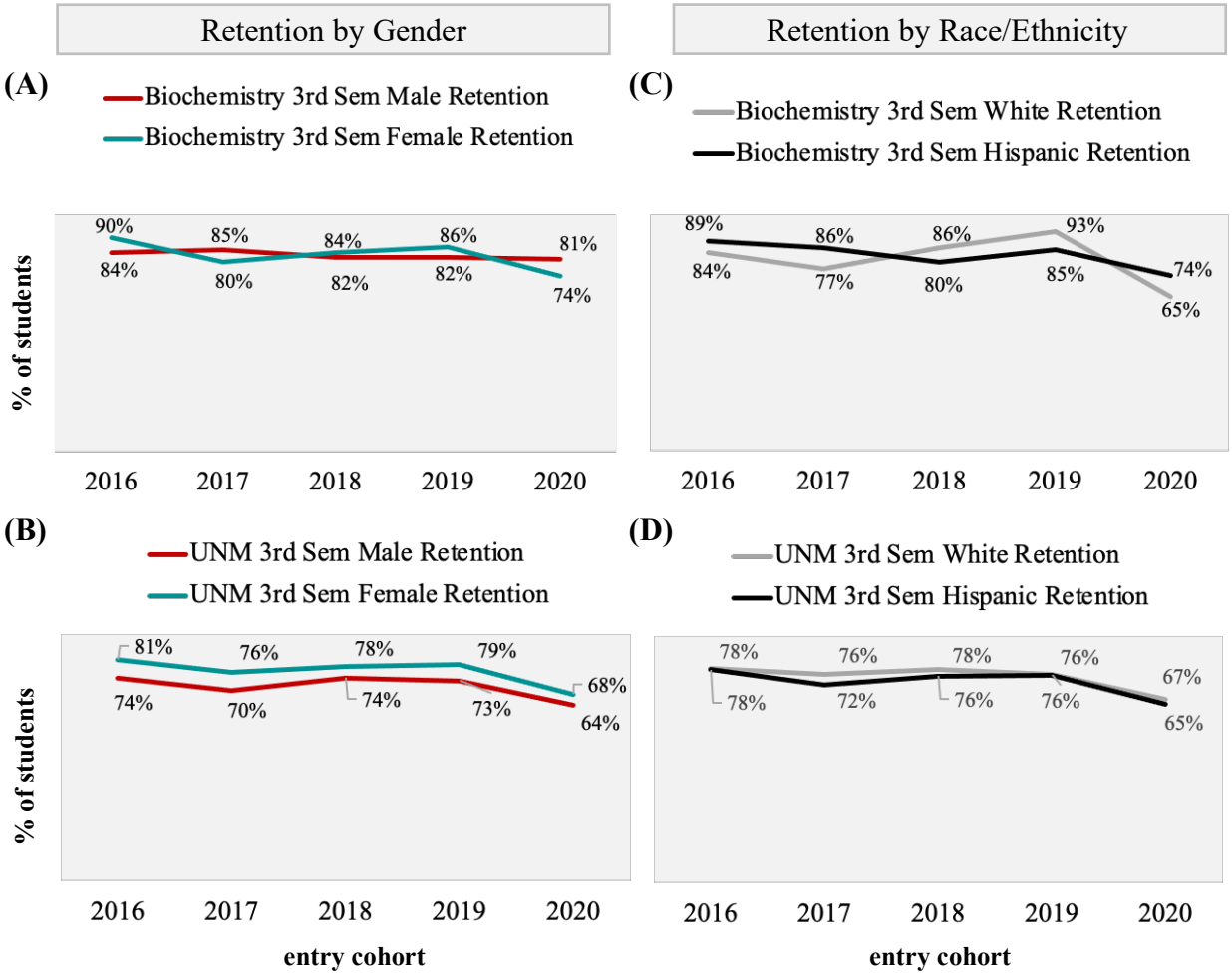


Figure 4.5 Retention rates of Hispanic and White students

The undergraduate retention was analyzed using third-semester re-enrollment student data. **(A-B)** Graphs of 3rd semester retention data by gender of students who declare major in Biochemistry **(A),** and students who declare major in other UNM programs **(B)** for the 2016 to 2020 entry student cohorts. **(C-D)** Graphs of 3rd semester retention by ethnicity (White and Hispanic students only. Other races/ethnicities omitted due to low n-values) of students who declare major in Biochemistry and students who declare major in other UNM programs. The 2021 cohort data has not been included in this graph as the fall 2022 third semester re-enrollment data has not yet been complied. Data obtained at https://public.tableau.com/app/profile/unm.oia/viz/FCT2017/Retention.

Undergraduate Graduation

The number of Bachelor's Degrees in Biochemistry awarded has increased substantially with respect to our last APR in 2015. In the preceding seven years (from 2016 to 2022), the average number of degrees awarded has been 74.6 (**Figure 4.6**). This average shows a 48.6% increase in degrees awarded over 2008, and a 22.6% increased over 2014. In 2022, we observed a decrease in the number of degrees awarded (58-degree recipients), potentially owing to the COVID-19

pandemic. The majority of students matriculating into the Biochemistry Program select the B.S. degree option (**Figure 4.6**, teal bars) versus the B.A. option (**Figure 4.6**, red bars). The difference between the two-degree tracks is minimal with the B.S. requiring participation in the Laboratory Biochemical Methods course (BIOC 448L). The course is optional for the B.A. degree. We note this selection as positive because more students are opting for experiential learning through hands-on biochemical principles that better prepares them for the rigors of post-graduate work. The percentage of students who chose the B.A. degree corresponded to 8% of our students in 2017 and has decreased through 2022 with only 1.7% of students choosing the B.A. degree option.

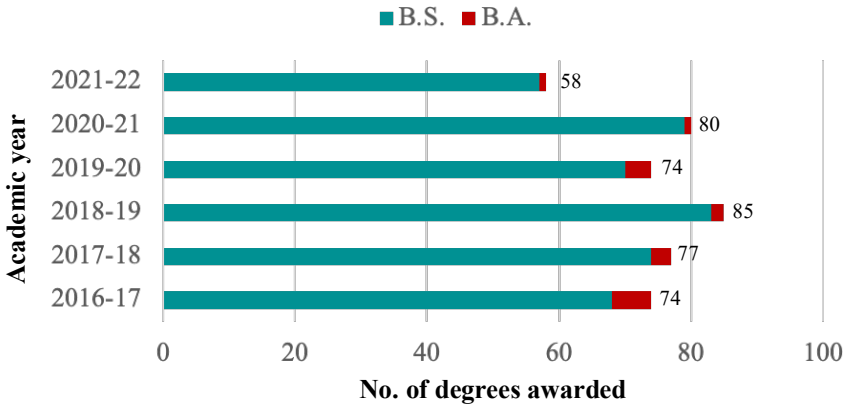


Figure 4.6 Number of degrees awarded in the Biochemistry Program
Number of degrees awarded (B.A. and B.S.) for the academic years 2016-2017 to 2021-2022.

Based on the frequency of course offerings and course caps, the average degree completion time for students in our Program is four years (**Figure 4.7)**. A proportion of students (25% on average) take an additional 1-2 semesters to complete the Program (five years graduation), and 5% of our students are graduated within six or more years. Very few students graduate in less than four years (0.8% students on average).

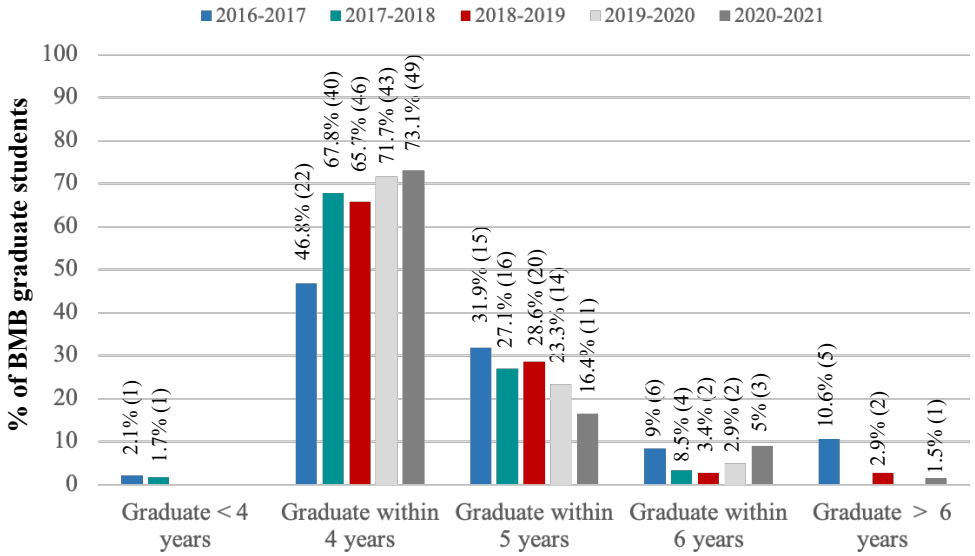


Figure 4.7 Biochemistry degree completion

The average degree completion time for students in our Program is shown in percentage from 2017 to 2021. Groups include students who graduate in less than four years, graduate within four, graduate within five and six years, and take more than six years to graduate.

The B.S. and B.A. undergraduate degree recipients were analyzed by gender (**Figure 4.8**). Since 2018, the proportion of graduating students in the Biochemistry Program has been consistent regarding gender. Similar percentages were observed over the four years in the number of male graduating students (average of 46% across the years). The number of females graduating students also remained similar (average of 54% across the years). The percentage of UNM Main Campus undergraduate degree recipients across the years remained stable with regard to gender as well, with an average of 41% male and 59% female students graduating over the 2017-2021 period. In general, the number of female students graduating was higher than the number of males ~9% and 18% more degrees were awarded to females in the BMB and on UNM Main Campus, respectively.

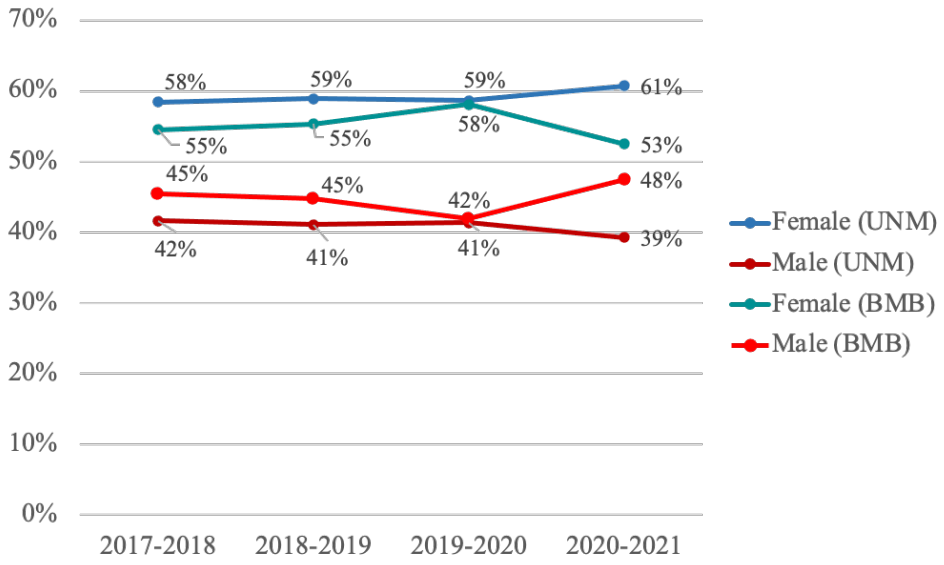


Figure 4.8 Undergraduate degree recipients by gender
The percentage of biochemistry and UNM Main Campus undergraduate degrees awarded are shown by gender (male and female) for the academic years from 2016-2017 to 2020-2021. The total number of degrees awarded correspond to: 74, 77, 85, 74 and 80 total degrees awarded for Biochemistry in the academic year 2016-2017 through 2020-21, respectively. For UNM Main Campus: 6675, 6876, 6726, 6375 and 6185 total degrees for the academic year 2016-2017 through 2020-21, respectively. BMB, Biochemistry and Molecular Biology Department; UNM, University of New Mexico (Main Campus).

Likewise, the undergraduate degree recipients from 2018-2022 (the B.A. and B.S. undergraduate degree recipients) in the Biochemistry Program and on UNM Main Campus were analyzed by race/ethnicity (**Figure 4.9**). As shown in **Figure 4.9**, each year about 50% of the Biochemistry

and UNM Main Campus undergraduate degree recipients are either Hispanic, American India or from another URM category. As a Hispanic Serving Institution (HSI), our Biochemistry Program attracts a large Hispanic population, which has increased from 31% in 2016-2017 to 49% in 2020-2021. The Hispanic degree recipients from UNM Main Campus displayed a similar trend through the years with a slight increase from 39% in 2016-2017 to 43% in 2020-2021. Comparing Biochemistry and UNM Main Campus degree recipients, we've observed a higher number of Asian degree recipients, with percentages reaching to 22% in academic year 2017-18 in our Program. In contrast the percentage of degrees awarded to Asian students was lower for UNM Main Campus (maximum 4%). The number of American Indian degree recipients was higher on UNM Main Campus (with an average of 8%) compared to recipients from the Biochemistry Program.

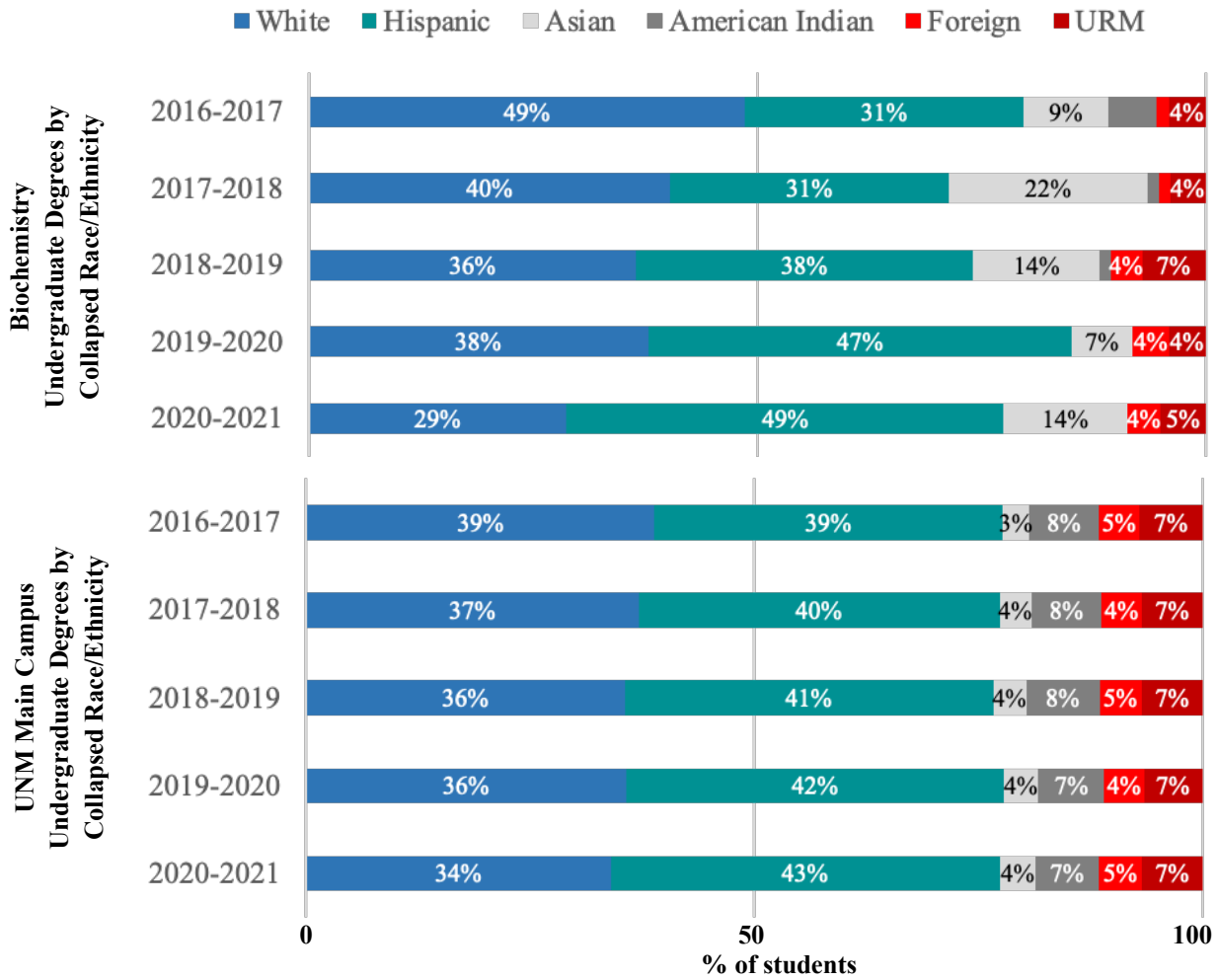


Figure 4.9 Undergraduate degrees recipients by race and ethnicity

The percentage of the Biochemistry (top graph) and UNM Main Campus (bottom graph) undergraduate degree recipients by collapsed ethnicity are represented for the academic years from 2016-2017 to 2020-2021. The total number of degrees recipients correspond to: 74, 77, 85, 74 and

80 total degree recipients for Biochemistry in the academic year 2016-2017 through 2020-21, respectively. For UNM Main Campus: 6675, 6876, 6726, 6375 and 6185 total degree recipients for the academic year 2016-2017 through 2020-21, respectively (as shown in **Figure 4.8**). URM: Under-Represented Minorities, including African American, Native Hawaiian and Two or More Races. F: fall semester.

4D: Advisement Practices *Discuss the unit's advisement process for students, including an explanation of how the unit has attempted to improve or address issues regarding its advising practices and to ensure inclusiveness and equity in advising.*

UNM's biochemistry Program is housed within the College of Arts & Sciences (A&S), and we have two A&S advisors (Amanda Cook and Keelan O'Riley) appointed for the Biochemistry major. These advisors arrange a mandatory sophomore-year orientation for students who have declared biochemistry as their major. This orientation outlines the suggested course sequence for the advanced major courses, discusses independent research opportunities students can consider, and explains the various campus offices and resources that can help students succeed as they progress through the Program. The A&S advisors are also available to meet one-on-one with students; they support students from initial matriculation at UNM through graduation including (1) all aspects of academic progress with regard to admission, registration, holds, and transfers; (2) all coursework related to pre-requisite courses required before declaring a major in Biochemistry; and (3) academic milestones required for timely graduation. The majority of our students take advantage of this opportunity for course schedule planning. The Biochemistry Program advisors base their advisement on an analysis completed by the College of A&S, known as the biochemistry advisement maturity matrix which is provided in **Appendix 4.2**.

Biochemistry Advisors at the College of Arts & Sciences (A&S)

Both of our advisors believe in a holistic, student-centered approach to student advising. They consider advising as a conversation, and no two conversations are the same. Successful advisement focuses on the individual students interests and needs as well as teaching students to advocate for themselves. They are specially assigned to the Biochemistry Program, and also to the Department of Chemistry, Mathematics, and Statistics. They assess academic level and advise on academic programs and changes, develop academic plans and class schedules, analyze applications, transfer evaluations, and transcripts for entry and exit from the university, and maintain appropriate records. They also coordinate academic functions such as assisting with curriculum planning, committee service, and guiding the work of assistants or work study students.

Amanda Cook, Sr. Academic Advisor. She is a Native New Mexican and received her B.A. in History from UNM in 2011. She has 5 years of experience working within UNM's Division of Enrollment Management and is happy to help students navigate UNM's many resources.

Keelan O'Riley, Sr. Academic Advisor. Keelan is from Albuquerque and has lived here all his life. He received his B.A. in Asian Studies in 2012 and is currently working for the English Department (since January 2023).

The academic advisement has been detailed in **Figure 4.10** using data obtained from the Office of Advisement (A&S College). Data includes students declaring biochemistry as a major that solicitate their service and
career counseling. **Figure 4.10** shows the percentage the students who have benefitted from each type of service. Our A&S advisors support students from orientation through graduation, however many of those students will change their major. The majority of our students receive a one-on-one advisement session.

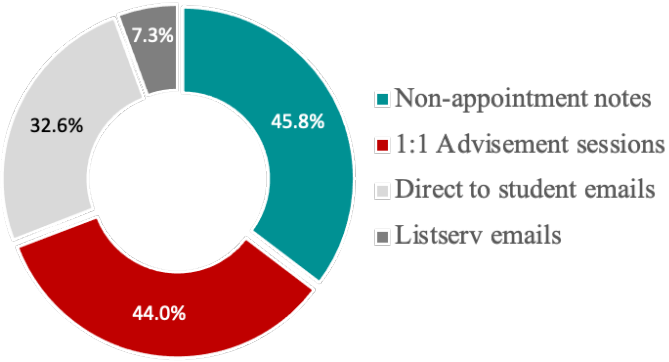


Figure 4.10 Type of advisement services for students declaring biochemistry as a major
The percentage of students from orientation to graduation declaring biochemistry as a major is represented regarding the type of counseling offered. "Non-appointment notes" refer to information or observations that are not related to a specific appointment or meeting. Data obtained from the Office of Advisement at College of Art and Sciences.

Additionally, the BMB Department has faculty that serve as career advisors for students. These faculty include our three lecturers (one of whom is the Undergraduate Program Director) and an assistant professor who serves as the Undergraduate Honors Research Program Director. Students are typically referred to these advisors after consultation with an A&S advisor. Our department-level advisors meet one-on-one with students to discuss topics like how students can get involved in research, what elective classes might best match their interests and career possibilities and planning. In 2022, we implemented the ÉLITE Career Mentoring Program to provide comprehensive career guidance to junior and senior biochemistry majors through engagement with peers and professionals. We anticipate extending the Program to include UNM students who show an interest in biochemistry and related majors (e.g., Biology, Chemistry, and Pre-Med). Program expansion will require additional resources to support programmatic and operational growth and continuous student success. Find more details in **Criterion 4E**.

Faculty Advisors

Dr. Laura de Lorenzo, Director of Undergraduate Program. Dr. de Lorenzo received her Ph.D. in Molecular Biology from the University of Seville (Spain) and the Plant Science Institute (CNRS, France) in 2008. Following her graduate work, she trained at the Spanish National Center of Biotechnology (CNB, CSIC) and at the University of Kentucky, KY. Her interests have been focused in transmitting her professional and personal experiences to others as a scientist, teacher, colleague and mentor. She joined the Department of Biochemistry and Molecular Biology as a Lecturer III in 2020. Dr. de Lorenzo is an excellent role model with a record of accomplishments in DEI and mentoring. Currently, she is the Program Director in the department, one of the Biochemistry Department advisors, and the founder and director of the ÉLITE Career Mentoring Program.

Dr. Tyrel Bryan, Director of DEI. Dr. Bryan received a Ph.D. in Chemistry from the University of New Mexico in 2014. Following his graduate work, he continued his training at UNM. He has been a Lecturer III in the Department of Biochemistry and Molecular Biology since 2018 and the Director of Diversity, Equity, and Inclusion for the department since 2020. He is also one of the biochemistry departmental advisors supporting biochemistry majors on course sequence, career planning and connects students with professionals.

Dr. Brett Manifold-Wheeler, Biochemistry Department Advisor. Dr. Manifold-Wheeler received a Ph.D. in Biomedical Sciences from the University of New Mexico in 2015. Following his graduate work, he continued his training at UNM. He has been a Lecturer III in the Department of Biochemistry and Molecular Biology since 2022. He started advising Biochemistry majors on course sequence and career planning in the spring of 2023 under the supervision of Dr. de Lorenzo and Dr. Bryan.

Dr. Curt Hines, Director of the Undergraduate Honors Research Program. Dr. Hines received a Ph.D. from the University of New Mexico School of Medicine in 2005. Following his graduate work, he trained in the Biosciences Division at Lawrence Berkeley National Laboratory, in Berkeley CA. He joined the Department of Biochemistry and Molecular Biology faculty in 2016. Dr. Hines is an Assistant Professor and the current Honors Research Program Director. He is responsible for advising Biochemistry majors on mentor selection, summer activities and identifying research opportunities abroad. **Appendix 4.3** is included in the information given to the students interested in research, and covers 1) how to find an undergraduate research lab, 2) helpful tips for conducting undergraduate research, 3) the application form needed to register for research credit, 4) the mentor agreement form, and 5) the grading policy for BIOC 497, BIOC 498 and BIOC 499.

Inclusiveness and Equity in Advising

The BMB Department advisors strive to foster an environment that is inclusive and responsive to our diverse student populations. We promote the growth of students including, but not limited to, those from under-represented populations, nontraditional pathways, and first-generation status. Our mission is to provide an appreciative and dedicated advising model to our students where we

create a safe and welcoming environment, utilize positive open-ended questions to draw out what they enjoy doing, their strengths, and their passions. We listen to each answer carefully before asking the next positive question. We help students formulate a vision of what they might become, and then assist them in developing their life and career goals.

We encourage our students to participate in the ÉLITE Career Mentoring Program. ÉLITE offers opportunities for professional development through engagement with peers and professionals. In ÉLITE, our motto is **"*Be ready, be confident, be positive*"**. We create positive environments where students feel valued, respected, and confident to discuss their career goals and aspirations.

4E: Student Support Services *Discuss any student support services that are maintained by the unit and evaluate the relevance and impact of these services on students' academic success.*

Students Support at the Biochemistry Department

Student advisement services within the department are provided by Directors de Lorenzo, Hines, and Bryan. These services include providing the necessary resources and information for students to make informed decisions, e.g., whether or not to pursue a degree in Biochemistry and which one, B.A. or B.S. Dr. de Lorenzo also assists advisees in managing their academic and professional careers related to the Program and is often sought out to advise on course options, sequence of courses, graduation requirements, and opportunities for lab experience (within or outside of BMB and UNM).

In our BMB Department, we also have various initiatives in place to assist students who may be struggling to stay on track. These include: (1) Encouraging students to form study groups, allowing them to review material and stay on track together, (2) Offering office hours for one-on-one tutoring to students who need extra help with their coursework, (3) Providing a mentorship program for students to network with experienced professionals in the field and receive guidance and support. At the university level, we have a variety of resource centers available such as the Student Support and Services Center (https://ssstrio.unm.edu), Center for Academic Program Support (CAPS, https://caps.unm.edu), CAPS Writing & Language Center (WLC, https://caps.unm.edu/services/writing-and-language-center/index.php), and Division of Student Affairs (https://studentaffairs.unm.eduthat), which offer additional support to students. Additionally, the university's Accessibility Resource Center (ARC, https://arc.unm.edu) provides counseling services to support students with mental health or personal issues that may be impacting their academic performance. We encourage students to reach out for help early on and make use of these resources when needed, and also to communicate with professors, academic advisors, and other support staff to find the best solution.

The department also has close ties to the **combined BA/MD Program** (https://hsc.unm.edu/medicine/education/ba-md/), which is designed to address the need for physicians in rural and under-served areas of New Mexico. Each year, 28 students who are broadly diverse in their background preparation are admitted from New Mexico high schools into the Program and receive a conditional admission to the School of Medicine (UNM SOM). The BA/MD Program supports one section of the introductory biochemistry non-majors' course (BIOC 423), which is a requirement for admission to the SOM. In addition, the BA/MD Program provides a teaching assistant, a supplementary instruction leader (SI), and covers ~60% salary of the faculty instructor teaching this course [Dr. Summer Hayek (2018-2022) and Dr. Brett Manifold-Wheeler (current)].

To increase the representation of URMs in medicine, the BMB Department in conjunction with the DEI Department of the School of Medicine facilitate matriculation of New Mexican Natives into SOM via the Premedical Enrichment Program (PrEP). The PrEP Program is a post-baccalaureate program that, if completed, will guarantee the student a spot in SOM for the following year. Dr. Tyrel Bryan is a mentor and instructor for the cohort (7 selected students). Part of the Program includes completing both BIOC 445 and BIOC 446 courses with a passing grade.

ÉLITE Career Mentoring Program at BMB

Additionally, the BMB Department has implemented a new **ÉLITE Career Mentoring Program** with the goal of connecting our students with professionals in order to guide their career decision-making and develop a professional network. This Program provides mentorship through professional development seminars where experts give advice, professional inspiration, and insights about various career paths in biochemistry and other fields. As part of the Program, the students map out their Career Plan (short, medium and long-term plan). The Program benefits in particular URM and first-generation graduates who tend to get left behind without appropriate mentoring and who represent 50% of UNM students. This Program was designed and developed by Dr. de Lorenzo and was launched this fall (see flyer in **Appendix 4.4**).

For growth of the ÉLITE Career Mentoring Program, we plan to establish peer advising connections. The current biochemistry student cohort will be Peer Advisers of students in the incoming cohort. They will provide guidance for course selection, extracurricular activities, and general tips for fruitfully completing the ÉLITE Program. To stablish long-lasting relations and help biochemistry students pursue their career goals we will introduce the concept of Alumni Advisers connecting students with alumni in the health sciences and research fields. Alumni Advisers will offer advice and networking opportunities.

To reach out to more students, we are developing an online platform where students can access information and resources related to academic advising, career counseling, and career

opportunities, as well as to connect students with mentors. This platform also will have ÉLITE Program news and updates to stay informed about the Program.

Currently, we utilize a variety of recruitment methods to ensure that all eligible students have the opportunity to participate in the ÉLITE Program:

- School recommendations. The A&S and biochemistry advisors proactively offer the Program to all junior and senior biochemistry students and strongly encourage participation of those they believe would benefit the most.
- Self-referral. Students have the option to express interest in the Program and sign up independently.
- Recruitment events. The first day of classes, BMB faculty inform students about the Program and provide information on how to sign up.
- Social media and digital platforms. Recruitment campaigns are launched on our social media channels and via email to reach out to a broader audience and make it easy for students to sign up.

At the completion of the ÉLITE Program, the students are requesting to fill out a survey to evaluate the mentoring activities, outcomes, and effectiveness (**Appendix 4.5**). Response rates for this survey were 91%. Here, we show a summary of our participant demographics (**Figure 4.11**), mentoring activities evaluation (**Figure 4.12**), program satisfaction (**Figure 4.13**), and mentoring outcomes (**Figure 4.14**); other results can be found in **Appendix 4.6**. Our first 2022 ÉLITE cohort was composed of 11 students, junior and senior BMB students, with a higher representation of females (**Figure 4.11**). 50% of the group consisted of URM students (mainly Hispanic students, **Figure 4.11**, right panel).

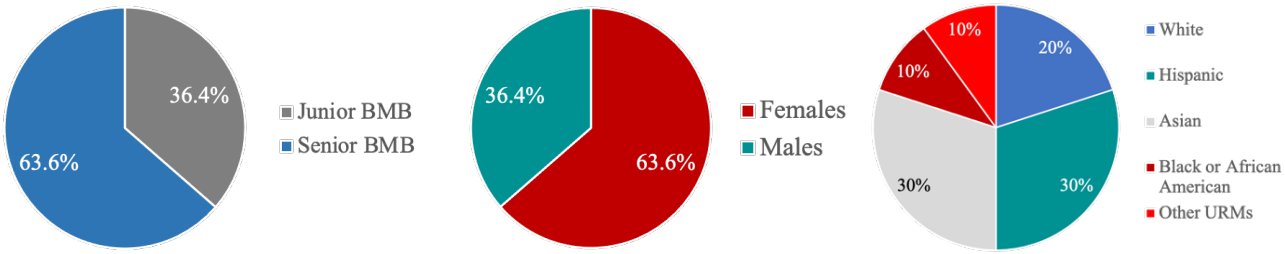


Figure 4.11 ÉLITE Career Mentoring Program data
The participants in the ÉLITE Program represented by the level of the undergraduate education (left panel), by gender (middle panel) and by race and ethnicity (right panel). These data have been collected from the ÉLITE final survey (see **Appendix 4.5**) from the 2022 ÉLITE cohort.

The duration of the Program was 12 weeks, with a one-hour mentoring seminar each week (from September to December). The majority of our participants believed that the program duration was just right, but some of them believed that it was too short (see **Appendix 4.6**). We had excellent

participation in our mentoring seminars, with an average of 82% each week. The mentoring activities were evaluated following these criteria: (1) accessibility and interaction with the ÉLITE Mentors, (2) satisfaction with the professional advising received, and (3) the interaction with our mentor after their mentoring seminars. As a result, 60% of our participants were "very satisfied" with the accessibility and interaction with our mentors versus the 40% that chose the "satisfied" category (**Figure 4.12,** left panel). Regarding satisfaction with the professional advising received, 60% of our BMB student participants were "very satisfied" versus 40% that were "satisfied" (**Figure 4.12,** middle panel). Other categories including "dissatisfied" and "very dissatisfied" were not chosen by our students. In general, all our participants contacted up to three mentors after they attended to the mentoring seminars (**Figure 4.12,** right panel).

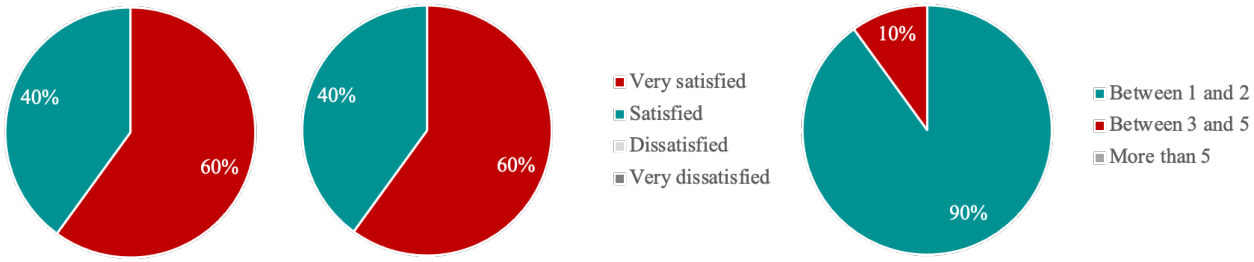


Figure 4.12 Mentoring activities evaluation
The pie charts show student satisfaction with (left panel) the accessibility and interaction with the ÉLITE Mentors, (middle panel) the professional advising received, and (right panel) the number of Mentors that the students contacted after their Mentor Seminars. These data were collected from the ÉLITE final survey (see **Appendix 4.5**) from the 2022 ÉLITE cohort.

Student satisfaction in the Program was evaluated using the following criteria: (1) their overall experience, (2) recommendation to their peers, (3) how the ÉLITE Career Mentoring Program helped them to be ready, confident and/or think positively about their professional career, and 4) whether the 2022 ÉLITE cohort adjusts or changes their short, medium and/or long-term plans after their learning experience in the ÉLITE Career Mentoring Program. As a result, 100% of our student participants had an excellent experience at the ÉLITE Program (**Figure 4.13 A**) and 100% would recommend it to their peers (**Figure 4.13 B**). For the 2022 ÉLITE cohort, the Program was highly effective in helping students to be ready, confident and think positively about their professional future (70% of the students feel that the Program helped them to be ready, confident and positive, **Figure 4.13 C**). During the ÉLITE Program, they prepared their professional career plans with their short, medium, and long-term plans; the actionable steps to fulfill their goals; and the deadline to accomplish their plans. They revised and presented it at the conclusion of the Program. In this context, we also evaluated if the Program helped them to adjust or change their initial short, medium and/or long-term plans, and in general all the participants adjusted or changed some of their professional career plans (**Figure 4.13 D**).

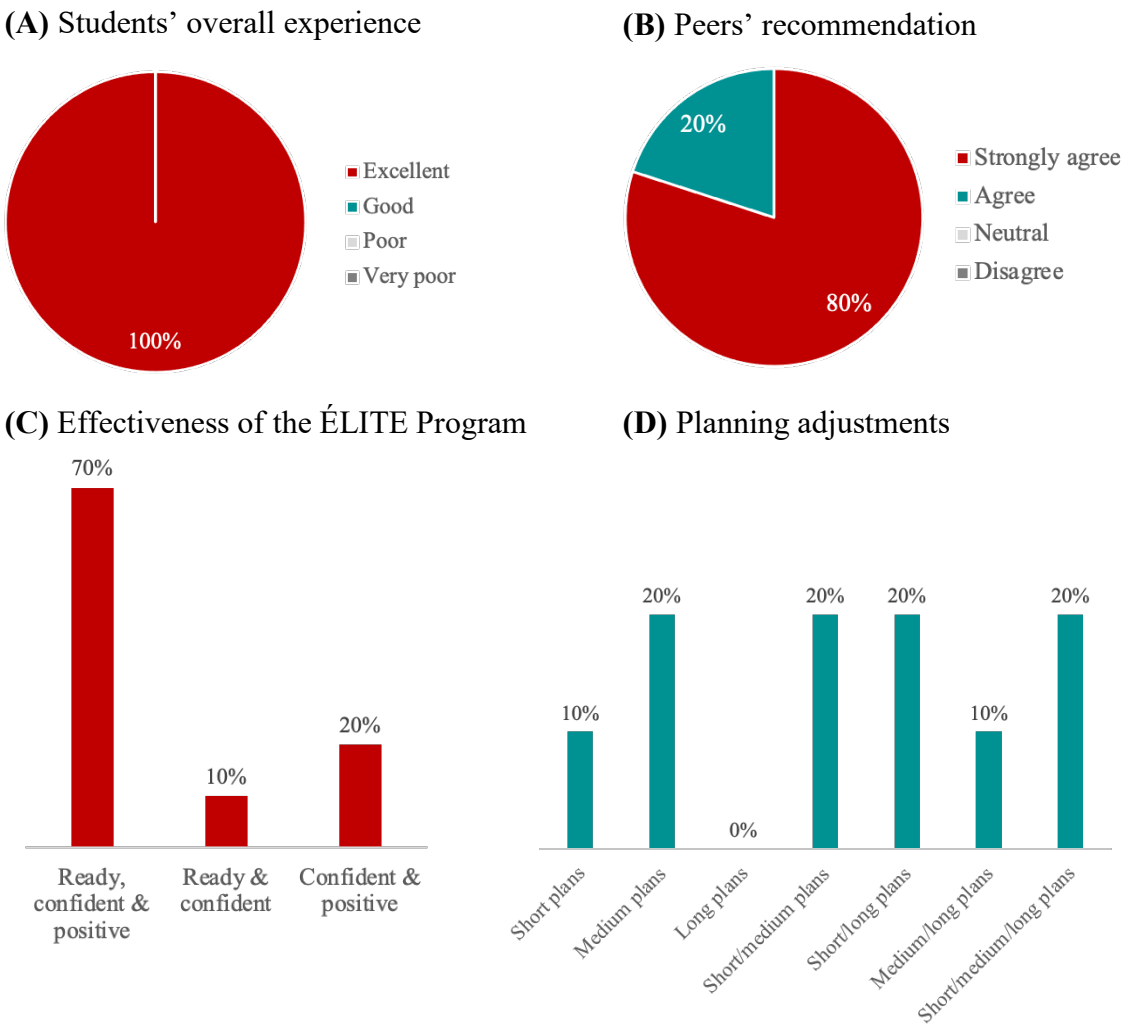
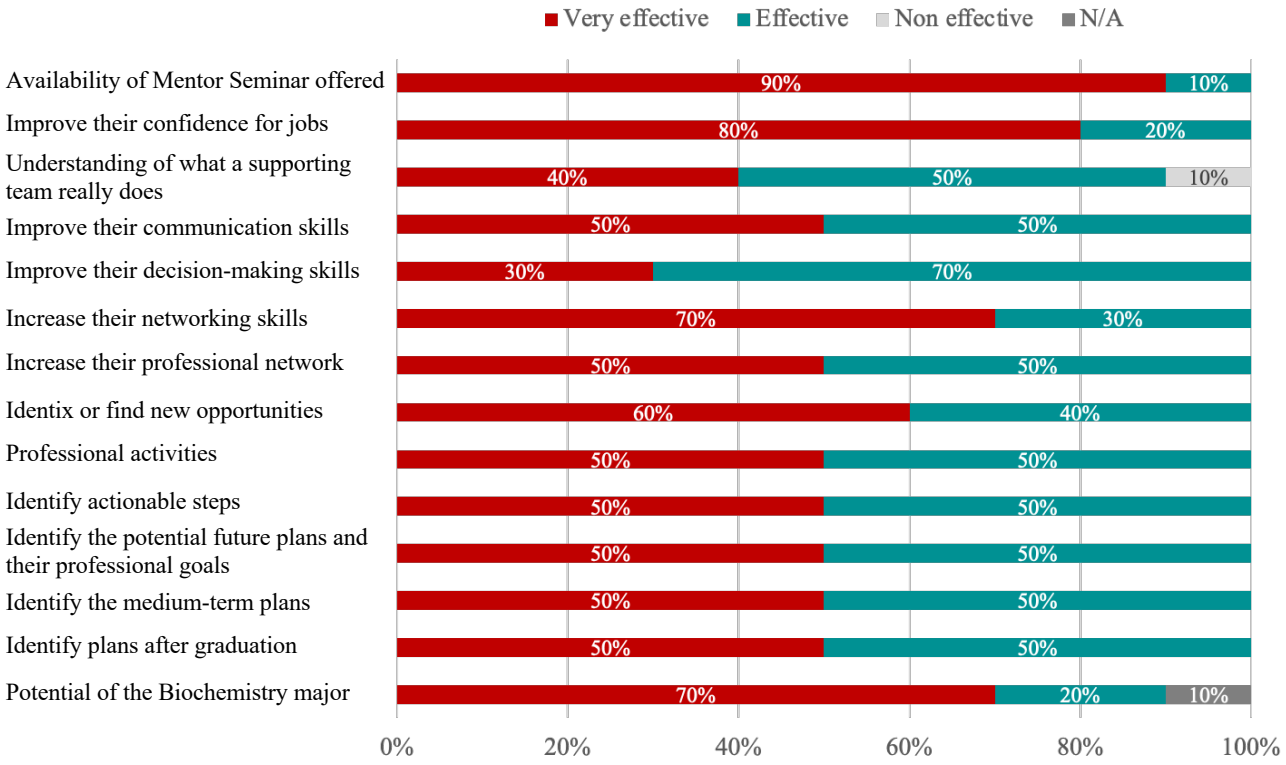


Figure 4.13 ÉLITE Career Mentoring Program students' satisfaction
(A) the pie chart shows the overall experience for the 2022 ÉLITE cohort in the ÉLITE Career Mentoring Program, **(B)** the pie chart shows if the students would recommend the ÉLITE Career Mentoring Program to their peers, **(C)** the bar graph shows how effective the "ÉLITE Career Mentoring Program" was at helping the 2022 ÉLITE cohort be ready, confident and/or think positively about their future professional career, and **(D)** the bar graph shows the percentage of students that adjusted or changed their short-, medium- and/or long-term career plans after participating in the ÉLITE Career Mentoring Program. These data were collected from the ÉLITE final survey (see **Appendix 4.5**) from the 2022 ÉLITE cohort.

The ÉLITE Program outcomes are represented in **Figure 4.14**. In general, for all of our participants the ÉLITE Career Mentoring Program was "very effective" or "effective" at helping the students reach their goals.

(A) *How effective was the ÉLITE Career Mentoring Program at achieving the following objective?*



(B) *How effective was the ÉLITE Career Mentoring Program at helping you?*

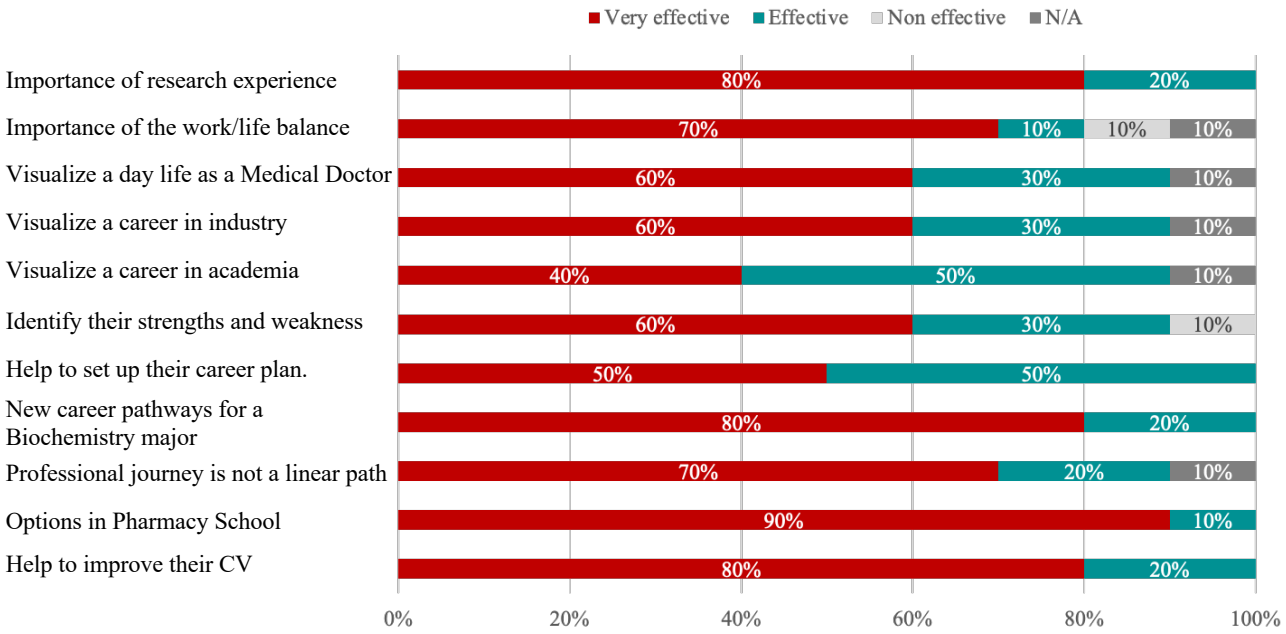


Figure 4.14 ÉLITE Career Mentoring Program outcomes

The percentage of students that considered the Program "very effective", "effective" or "not effective" at different topics. The Program was evaluated to consider whether the Program helped to **(A)** achieve the students' goal or **(B)** helped the students in different aspect of their career

development and discovery. These data were collected from the ÉLITE final survey (see **Appendix 4.5**) from the 2022 ÉLITE cohort. N/A is for students that did not attend that specific mentoring seminar.

Student Support at the University

Several of our past students have taken advantage of UNM wide pipeline resources/programs that are designed to support and increase the diversity, equity and inclusion of the students. These programs are described below including a brief introduction and a link to the webpage. Some of these programs are detailed in **Criterion 6E**. Superscript numbers in parentheses for each program represent the program affiliation and other information pertinent to the accreditation. Numerical (1) identifies programs affiliated with UNM, (2) identifies programs affiliated with UNM Health Science Center (HSC), (3) identifies programs with a focus on recruiting first generation students and Under-represented Minorities (URM), including gender, racial and ethnic groups under-represented in STEM, individuals with disabilities, and individuals with disadvantaged backgrounds.

a) **Ambassadors** [1,2,3]: The Ambassadors program is an undergraduate program for students from economically or educationally disadvantaged backgrounds. The program helps students matriculate into the next level of education on their road to becoming health professionals (https://hsc.unm.edu/diversity/programs/community/ambassadors.html).

b) **New Mexico Clinical Education Program (ClinED)** [1,2,3]: Multi-week summer program focused of gaining clinical experience working with rural and/or underserved populations (https://hsc.unm.edu/diversity/programs/community/boss.html).

c) **First Gen Proud**: Support group to celebrate first-generation college student success through the College Enrichment Program (CEP) [1,3]. This comprehensive student support service focuses on the advancement of 1st generation, low income, and/or students from rural areas (https://firstgen.unm.edu).

d) **Peer Learning Facilitator (PFL)** [1,3]: The PFL program helps train undergraduate students from a variety of backgrounds to facilitate an active and collaborative learning environment with the instructor (https://stemgateway.unm.edu/peer-learning-facilitators/index.html).

e) **Center of Support, Advocacy, Community** [1,3]: The linked webpage can be used to find the many support groups offered at UNM to nurture our diverse community. The following support communities can be found here: Accessibility Resource Center (ARC), African American Student Services (AASS), American Indian Student Services (AISS), Asian American Pacific Islander Resource Center (AAPIRC), El Centro de la Raza, LGBTQ resource Center, LoboRESPECT Advocacy Center (Title IX), Veteran and Military Resource Center and Women's Resource Center (https://students.unm.edu/find-your-pack/resource-centers.html).

f) **Maximizing Access to Research Careers (UNM MARC) Program** [1,3]: The MARC program is aimed at increasing the number and competitiveness of URM in graduate programs (http://www.marcatunm.org).

g) **Undergraduate Pipeline Network (UPN)** [2,3]: The UPN summer research experience is a program that fosters research experience and facilitates preparation for post-baccalaureate education by supporting scholars financially and through one-on-one faculty mentoring (https://hsc.unm.edu/medicine/education/reo/undergraduate/upn/).

h) **Undergraduate Research Experience in Biomedical Sciences (UREBS)** [1,2,3]: UREBS is an undergraduate program that allows students to experience research in labs across UNM for academic credit (https://hsc.unm.edu/medicine/education/reo/undergraduate/urebs/).

i) **Undergraduate Health Science Enrichment Program (UHSEP)** [1,2,3]: UHSEP is a multi-week summer program for first year undergraduate students with an interest in health careers (https://hsc.unm.edu/diversity/programs/community/uhsep.html).

j) **U.S. & Global Diversity and Inclusion** [1, 3]: The undergraduate degree at the University of New Mexico has a three-credit hour requirement on U.S. & Global Diversity and Inclusion that is fulfilled through completion of a DEI approved University of New Mexico course (https://gened.unm.edu/us-global-diversity-requirement.html).

4F: Graduate Success *Discuss the success of graduates of the program by addressing the following questions:*

- *How does the unit measure the success of graduates (i.e., employment, community engagement, graduate studies, etc.)?*
- *What are the results of these measures?*
- *Discuss the equity of student support and success across demographic categories.*

How Does the Unit Measure the Success of Graduates?

Each year prior to graduation, the Undergraduate Biochemistry Program Director requests students complete an exit survey dedicated to gaining useful insights on the student perspectives of our department (**Appendix 4.1**). In 2019, this survey was improved to acquire information to better the Program (*as suggested by the last APR reviewer team*). Response rates for this survey are typically between 60-82%. The survey covers a variety of topics related to student satisfaction, achievements, and career plans. This information has been invaluable in tracking the success of our students, areas of excellence, and areas of growth.

Opportunities for research, programs and utilization of student support are routinely highlighted in all of our courses. Although we support each student in our department equally; students that choose to participate in UNM and Biochemistry programs (including research opportunities) tend to see more opportunities due to the direct contact between the student and the mentoring faculty. To increase engagement and equity in access to support, we have recently implemented our ÉLITE Career Mentoring Program dedicated to enhancing career exploration and opportunities (see **Criterion 4E**). We have information pertaining to the success initially expressed in our graduation

survey as well as any student support opportunities utilized, but to better understand the connection between the two we plan on surveying students after graduation to track continued success.

We measure the success of BMB graduates regarding the following criteria:

(1) Student undergraduate experience satisfaction.

Students' satisfaction with BMB professors:

- Students' satisfaction with the accessibility of BMB professors.
- Students' satisfaction with the BMB professors apparent care if students were learning adequately.
- Students' satisfaction with how BMB professors cared about students.

Students' satisfaction with A&S lower courses and the Biochemistry Program:

- Students' satisfaction with the preparation received in the lower division A&S courses outside of BMB, but required by the major (i.e., Math, Biology, Chemistry, Physics).
- Students' satisfaction with the preparation received in the BIOC 445-446 sequence for success in the upper division BMB courses.
- Students' satisfaction with the extent and quality of exposure to laboratory experiences as related to Biochemistry and Molecular Biology (BIOC 448L course).
- Students' satisfaction with the intellectual challenge of course offerings in BMB.
- Students' satisfaction with the depth and breadth of course offerings in BMB.
- Students' satisfaction with the availability and flexibility of required courses.

(2) Student achievement.

- Students with Dual Degree, Double major or Certificate Program.
- Students with a minor.
- Students with leadership roles.
- Students with honors and/or awards.

(3) Student career plans.

- Students accepted into graduate school
- Students accepted into health professions (HP).
- Students accepted into medical school at UNM.
- Students accepted into medical schools (schools other than UNM).
- Students planning to attend graduate school, medical school, etc. in the next 2-3 years.
- Students planning a career that does not involve an advanced degree (pursing other careers).

(4) Community engagement and extracurricular experiences.

What Are the Results of These Measures?

Quantitative and qualitative measures were collected from the graduation exit survey regarding all the aspects mentioned in the above section (2019-2022 period).

(1) Student undergraduate experience satisfaction.

We evaluated the overall undergraduate experience of the graduating senior students taking into consideration two aspects: (1) students' satisfaction with BMB professor and (2) students' satisfaction with A&S lower courses and the Biochemistry Program.

The majority of seniors evaluated were highly satisfied with their BMB professors (**Figure 4.15**). About 60% of our students were always satisfied with the accessibility of the BMB professors, their apparent care if students were learning adequately and how BMB professors cared about students. About 32% of students expressed an "often" satisfied regarding these aspects. A very low percentage of students reported a "sometimes" satisfied. Levels of satisfaction generally increased from 2019 to 2022 (except in 2020 during the pandemic). Since 2019, the level of satisfaction regarding the accessibility of the BMB professor increased 13%; satisfaction regarding the apparent care faculty showed the students were learning adequately increased by 18%; and student satisfaction regarding whether BMB faculty cared about the students in general increased 22% (considering the "always" category).

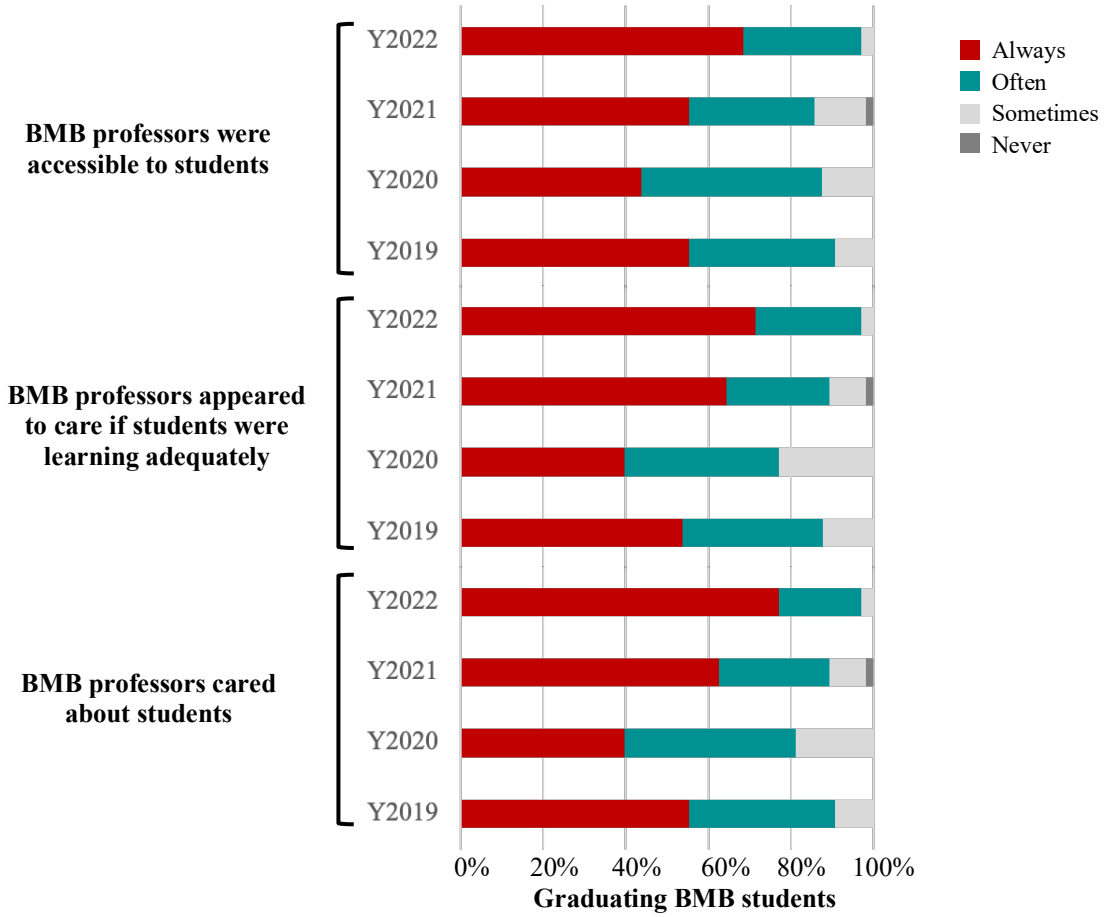


Figure 4.15 Student satisfaction with BMB professors

The accessibility of BMB professors, their apparent care if students were learning adequately and how BMB professors cared about students were evaluated using the following options for students

to choose from on the survey: always (cherry color), often (teal color), sometimes (light grey color), and never (dark grey color). The number of students participating in each survey correspond to 65 students in 2019, 48 students in 2020, 56 students in 2021, and 35 students in 2022. These data were collected from the graduation exit survey from 2019 to 2022.

Graduating seniors were given the option to provide additional comments on the survey related to BMB professors who inspired them or had an exceptional effect on their overall experience in BMB. A selection of the many thoughtful qualitative comments is provided below:

"Dr. Curt Hines was really inspiring this semester, with engaging lectures and a beautiful course design. He really made me interested in cancer biology, bringing the giant field of cancer research under the microscope for us to understand better."

"Dr. Adolphi was an incredible professor! Her class presentations were always organized and followed a logical structure which made them easy to follow. She was available during designated office hours and was always willing to meet by appointment. I appreciated that she helped make the topics we learned in the classroom applicable by organizing tours of the flow cytometry facility, fluorescent microscopy facility, and medical examiner's office. Outside of the classroom, it was evident that she cared about her students, wanted them to succeed, and was willing to support us in any of our future endeavors."

"Dr. Meilian Liu had a great impact on me and pushed me to excel in all areas of my life and in academia. She was and always will be my biggest role model."

"Dr. Laura de Lorenzo Barrios is very knowledgeable about the materials she teaches and she always cares about her students and always makes sure we understand everything. She is always helpful and responsive every time I ask her for help about class."

"Dr. Laura de Lorenzo was amazing and very supportive during our classes. Dr. McCormick was an exceptional lecturer. I learned so much from them and they inspired me to be passionate about my field."

"Dr. Tyrel Bryan was my BMB instructor for 3 straight semesters, and his enthusiasm and knowledge in the field was motivating for me to continue with my own learning."

"Tyrel Bryan had a huge impact on me and inspired me in this field. This was due to his character and how much he cared about his students and their well-being but also his teaching methods and abilities as a professor. I truly learned so well from him and his teaching style and really enjoyed being his student. The topics he taught and the way he taught them further inspired me and excited me in this field."

"Dr. Summer Hayek had an exceptional effect on my experience. Although I never took any of her courses, I was a TA for her and she was great to talk to about my future plans and directions. She genuinely cared more for her students deeply and was happy to talk life and future plans."

"Dr. Raj Shah was very motivating, because he presented his lectures with a strong focus on patient outcome and treatment delivery. For this reason, the biochemical side of his lectures seemed very applicable to what we may be expected to do as physicians."
"Dr. Andy Hu: Dr. Hu was an exceptional professor that I thoroughly enjoyed having in Biochemistry of Diseases I and Topics course: Cell Death. I loved the structure and teaching style of Dr. Hu. Dr. Hu encouraged students to always be better and try harder and I feel that he overall helped me grow in my education, as a leader, and helped me prepare for life beyond college. I highly recommend Dr. Hu as a professor and Cell Death as a course."

"Dr. Osgood was amazing. She was the most helpful and friendly professor I have ever had."

"Dr. Garver and Dr. Rosenberg were beyond some of the best professors I had in the BMB program. I appreciated Dr. Rosenberg's passion for teaching and learning to think as a scientist and Dr. Garver's flexibility and willingness to teach the subject material in a variety of different learning styles. My favorite topics in biochemistry were taught by Dr. Rosenberg, but I also found the topics Dr. Garver taught extremely fascinating after taking the course with him."

We also evaluated the satisfaction of our students regarding the A&S lower division courses and their experiences in the Biochemistry Program (**Figure 4.16**). The majority of seniors evaluated were satisfied with their undergraduate education experience at A&S and BMB. The graduating students were satisfied with the preparation received in the lower division A&S courses outside of BMB, but required by the major (i.e., Math, Biology, Chemistry, Physics), which has increased through the years (from 82% in 2019 to 91% in 2022 with regard to "strongly" and "somewhat" satisfied. The students also were highly satisfied with the preparation they received in the BIOC 445-446 sequence to set them up for success in the upper division Biochemistry courses. This satisfaction was maintained across the years but with a decrease during the pandemic time (2020-21). One of the lowest points of satisfaction was the extent and quality of exposure to laboratory experiences as related to Biochemistry and Molecular Biology. However, we observed an increase in satisfaction by 10% in 2022 compared to 2019. In 2021, only 55% of the students expressed satisfaction, possibly as consequence of the online teaching instruction required during the pandemic. Regarding the intellectual challenge of course offerings in BMB, students reported being highly satisfied noted by an increase of 13% since 2019. Students have been consistently the most satisfied with the depth and breadth of course offerings in BMB across these years (about a 70% satisfaction rate across the years). The criteria that was highly improved was satisfaction regarding the availability and flexibility of required courses when the students needed them, with an increase of 21% in satisfaction (in 2019 only 45% of students were satisfied and in 2022 66% of students were satisfied). However, flexibility and availability continue to be a challenge in our Biochemistry Program.

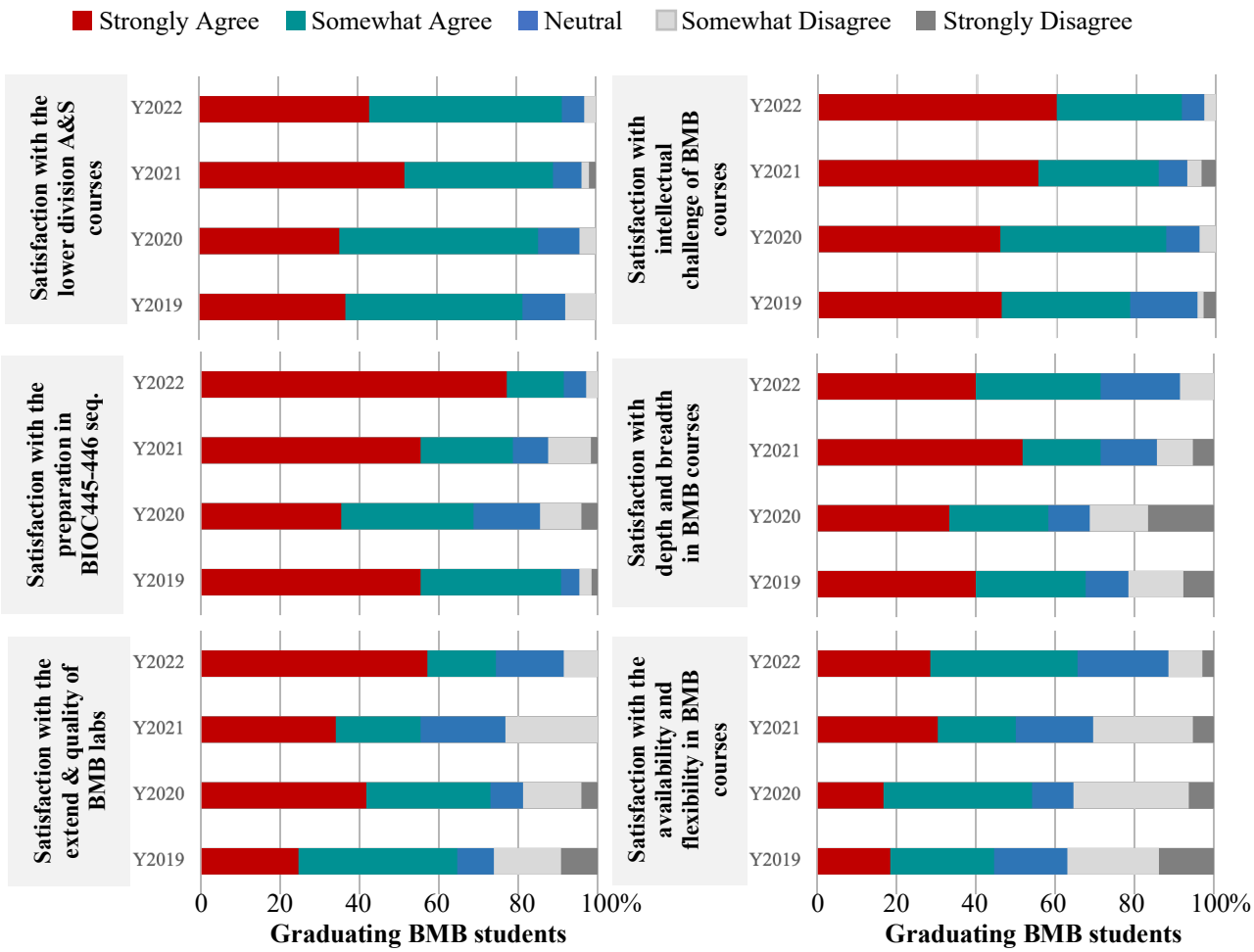


Figure 4.16 Student satisfaction with A&S lower division courses and the Biochemistry Program

Student satisfaction with the preparation received in the lower division A&S courses outside of BMB, their satisfaction with the preparation received in the BIOC 445-446 sequence, satisfaction with the extent and quality of exposure to Biochemistry laboratory experiences, satisfaction with the intellectual challenge, depth and breadth of course offerings in BMB, and their satisfaction with the availability and flexibility of required courses were evaluated using the following options for students to choose from in the survey: strongly agree, somewhat agree, neutral, somewhat disagree, and strongly disagree. The number of students participating in each survey correspond to 65 students in 2019, 48 students in 2020, 56 students in 2021, and 35 students in 2022. These data have been collected from the graduation exit survey given to students from 2019 to 2022.

Graduating seniors were given the option to provide additional comments on the survey regarding the MOST beneficial aspect of their undergraduate experience in BMB. A selection of the many qualitative comments is provided below:

"Being able to think critically in the upper-level courses where we had to bring in all of the knowledge from our prereqs in order to succeed."

"The lab experience gained from the Biochemical Methods course was especially impactful to me as someone lacking formal research experience outside of school."

"Learning how to think critically and problem-solve were emphasized in most, if not all the courses. I also appreciated the community aspect with my peers in the higher-level courses.
Being able to interact with professors outside of class and having the opportunity to learn more about their research."

"The curriculum of the program I felt really prepared me well. BIOC 445 and 446 were very interesting and challenging and taught me so much that has remained with me. I also found the topics, biochemical methods and biochemistry of disease classes very informative teaching me amazing curriculum, interesting topics of study and hands on, relevant lab experience and techniques. What has made all of these so amazing is the amazing educators that I have had in the program."

(2) Student achievement.

The Biochemistry Program does not require any second major or minor. However, a large percentage of our students pursue a second major or minor in a different subject. The most popular second majors include, but are not limited to Spanish, French, Biology, Psychology, and Health, Medicine, and Human Values (HMHV/BA-MD). Less frequent majors, but also chosen by our students are include Computer Sciences, Philosophy, Sociology, Sociology & Spanish, Statistics, and Women's Studies (Race & Social Justice). The number of Biochemistry graduates with a dual degree/double major increased 43% from 2018 to 2022 (**Figure 4.17**). About 50% of our students receive a minor in additional disciplines such as Art, Chemistry, Chinese, Dance, HMHV, History, Interdisciplinary Studies, Japanese, Management, Mathematics, Military Studies, Music, Nutrition, Philosophy, Population Health, Psychology, and Spanish. These data were collected from the graduation exit survey (see **Appendix 4.1**) from 2019 to 2022.

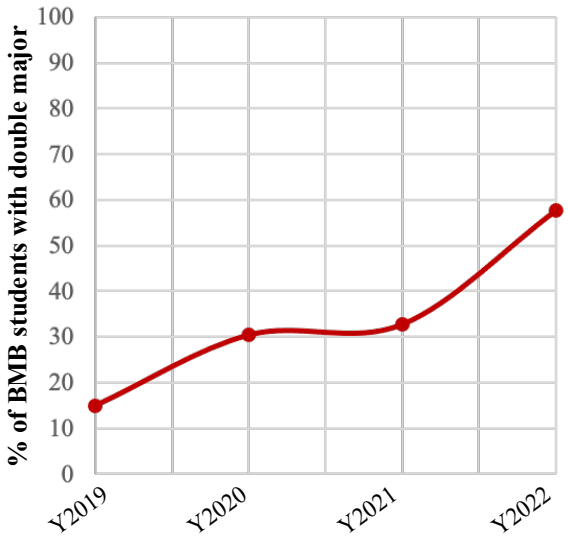


Figure 4.17 BMB graduating students holding a double major
The percentage of Biochemistry students holding a double major across the years is shown (2019 to 2022 period).

The creative works of our graduating students have been recognized by different scholarships, awards and honors through curricular and extracurricular activities. In the 2019-2022 period, an average of 52% of our students received additional honors & awards (e.g., UNM Presidential Merit Scholarship, UNM Regents Scholarship, NIH MARC Research Scholarship), (**Figure 4.18**). Likewise, a number of our Biochemistry students have been involved in leadership opportunities through curricular and extracurricular activities (e.g., President of UNM's Mortar Board Senior Honor Society, Dean's List, Vice President of STEM at UNM). The number of students who took on leadership roles increased 40% in 2022 compared to 2019 (**Figure 4.18**). A table with details about the type of awards/honors and leadership opportunities, as well as, the percentage of student recipients of each specific opportunity is appended as **Appendix 4.7**. These data were collected from the graduation exit survey (see **Appendix 4.1**) from 2019 to 2022.

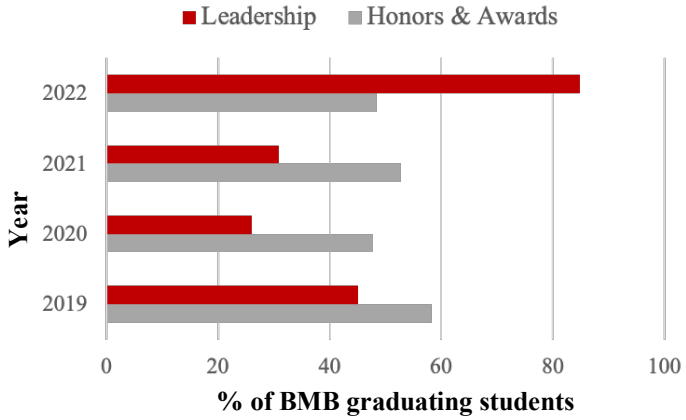


Figure 4.18 Student opportunities
Percentage of students who received honors and awards (grey bars), and percentage of students who took on leadership roles (cherry bars) through curricular and extracurricular activities (from 2019 to 2022).

Graduating seniors were given the option to provide additional comments on the survey regarding the most important skills they learned from the Biochemistry Program. A selection of the many qualitative comments is provided below:

"The most important skills I have learned are definitely efficient study skills as well as interesting and relevant curriculum. I also learned very important and necessary lab skills and scientific writing skills. BIOC 445 and 446 were great for teaching me very relevant material that I enjoyed and also forced me to learn good study habits as well as learning to see the bigger picture within the material. I would say that Biochemical methods was amazing for teaching me how to write scientifically by having us do the proposal and that the lab was the most beneficial lab I took in my entire undergrad, teaching us very useful, interesting and relevant lab skills and techniques."

"Problem solving skills and time management were the most important skills that I learned.
I liked that the BMB had a curriculum based in real-world scenarios and many of the topics, science, and labs we conducted prepared us for this. Our professors did a great job contextualizing the material and giving us the ability to understand a range of topics on a deeper level."

"The most important skill I have learned is likely the ability to integrate many different fields of science in order to answer complex problems. While this sounds obvious, being able to apply physical, chemical, and biological perspectives while troubleshooting a problem can be challenging without solid background knowledge in those fields."

(3) Biochemistry students career plans.

Figure 4.19 shows the results obtained after evaluating the graduation exit surveys from 2019-2022. The future plans of our graduating students were assessed regarding: (1) acceptance into graduate school, health professions (pharmacy school, Tufts-dental), and medical schools; (2) planning to attend graduate school, medical school, etc. in the next 2-3 years; and (3) planning a career that does not involve an advanced degree. These data have been collected from the graduation exit survey (see **Appendix 4.1**) from 2019 to 2022.

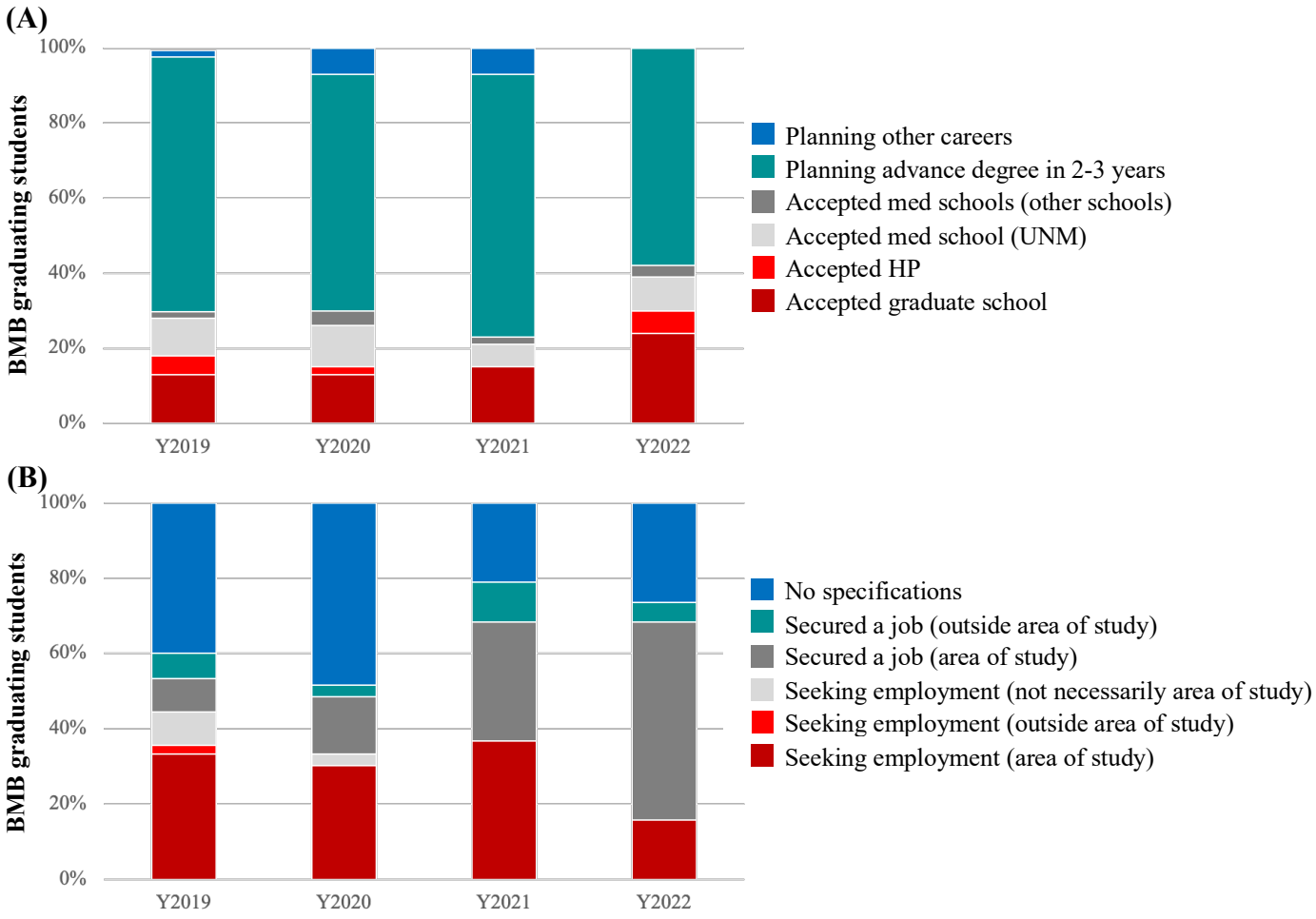


Figure 4.19 Future plans of BMB graduating students

(A) The graph illustrates the career paths chosen by our biochemistry students, including acceptance into professional schools, plans for obtaining an advanced degree within the next 2-3 years, or other career paths not involving an advanced degree. **(B)** The graph presents the career plans of biochemistry students who will pursue an advanced degree within the next 2-3 years,

represented by the teal bars in (A). The number of students participating in each survey correspond to 65 students in 2019, 48 students in 2020, 56 students in 2021, and 35 students in 2022. These data were collected from the graduation exit survey (see **Appendix 4.1**) from 2019 to 2022.

As seen from the above results (**Figure 4.19 A**), a large portion of our students matriculate into a graduate program after graduation. Thus, an average of 16.3% students are accepted into graduate school (with an increase of acceptance in 2022), an average of 4.3% students are accepted into health professions (i.e., pharmacy school, Tufts-dental), and an average of 12% of students are accepted into medical schools at UNM and across the country (the acceptance rate is stable in the 2019-2022 period). The BMB graduating students are accepted into graduate schools from different universities across the country, for example: UNM, CU-Denver, Scripps Research, Yale, Ohio State, CU-Boulder, BU, Rice, Harvard, U-Arizona, U-Wash, NYU, U of Oregon, uPenn, UC-Denver, uDenver.

Likewise, a large percentage of BMB graduating students plan to continue their education within 2-3 years after graduation. An average of 15% showed interest in being matriculated into a graduate program (PhD, MS), an average of 40% expressed interest in medical school, an average of 6% would like to pursue an MD/PhD program, and an average of 5.5% would like to go into health professions (PA, veterinarian school). However, the percentage of students who are planning a career that does not involve an advanced degree is lower in comparison with those pursuing an advanced degree. Although the graphs express statistics associated with traditional post-bachelorette programs; many of our students seek diverse programs ranging from business and law to engineering, chemistry and industry. As illustrated in **Figure 4.19 B,** there are several reasons why our students choose to take a gap year(s) before continuing their education:

(1) Gaining work or research experience. Many students take a gap year to gain experience in a healthcare setting or to conduct research in a field related to medicine. This helps them to become more competitive applicants and gain a better understanding of the field.

(2) Improving academic credentials. Some students choose to take a gap year to improve their grades or retake the Medical College Admission Test (MCAT) in order to increase their chances of being accepted into a medical school.

(3) Exploring other interests. Some students take a gap year to pursue other interests or passions before committing to the demanding and rigorous coursework of professional and graduate school.

(4) Finances. A gap year is also used to save money or pay off debts, which can make it easier to afford the high costs of the advanced education.

(5) Personal reasons. Some students take a gap year for personal reasons.

BMB Alumni Success

Our department is committed to continuous improvement and is currently developing a survey for our BMB alumni. The survey will provide valuable insights into the strengths and weaknesses of

our Program, and will help us to identify opportunities for improvement. In addition, we will understand how well our graduates are doing in the workforce and how our education prepared them for their careers.

The survey will include a range of questions to gather detailed feedback on different aspects of the Program, such as the relevance and usefulness of the curriculum, the quality of instruction, and the level of support received from faculty and staff. It will also ask graduates about their current occupation, their enrollment in graduate or professional school, any awards, honors, or recognitions they have received for their work, how the Biochemistry degree has helped them in their career, and if there are any specific skills or knowledge areas that they feel were particularly valuable or lacking in their education. We will have a comprehensive view of the alumni's experiences and the impact of our Program on their career and professional development, for the first time. The survey results will be analyzed and shared with the department and the college to inform future program improvements.

(4) Community engagement and extracurricular experiences.

Our students also participated in several community engagement and extracurricular experiences during their undergraduate career, for example:

- A&E (dance groups, painting, sewing, guitar).
- Air Force ROTC.
- Church organizations.
- Clubs (Model UN, UNM Pre-medical/Dental Society, Honors societies, STEM initiatives, Chemistry Club, Filipino Student Org).
- Fraternities & sororities.
- Leadership & mentorship roles.
- Outdoor activities (rock climbing, hiking).
- Outside employment.
- Piano (both playing & teaching).
- Resident advisors.
- Shadowing: research, medical/scribing, Office of the Medical Investigator at UNM HSC (OMI).
- Sports (volleyball, baseball, hiking, fishing, swimming, tennis, basketball, martial arts, frisbee, powerlifting, jiu-jitsu, softball, spike ball).
- Teaching assistants & Tutors (BMB, Chemistry, Student Learning Assistance at Center for Teaching and Learning).
- Volunteering (Native Health Initiative, DEI, Crisis centers, Make-a-Wish, Big Brothers Big Sisters (BBBS), Roadrunner food bank, hospice centers, rural hospitals, children's hospitals, COVID clinics, fire station, elementary schools, homeless shelters, trafficking victims support services, refugee organizations).

Criterion 5. Faculty

The faculty (i.e., continuing, temporary, and affiliated) should have appropriate qualifications and credentials and be suitable to cover the curricular requirements of each degree/certificate program.

5A: Composition *After completing the Faculty Credentials Template (Appendix 5.1), discuss the composition of the faculty and their credentials (i.e. proportion of senior versus junior faculty, proportion of women and under-represented faculty, etc.). Provide a link to the faculty vitae.*

The Faculty Credentials Template for our current faculty is included as **Appendix 5.1**. Faculty earned their doctorates from leading institutions with long-standing traditions of rigorous training in all facets of Biochemistry and Molecular Biology inquiry. **All faculty members, included in the appended table, have a 100%-time commitment to the Biochemistry Program.** The *curriculum vitae* for our current faculty may be found in this link Biochemistry APR Spring 2023.

Current BMB Faculty

Currently, the UNM BMB Department consists of 12 faculty members (including the Chair), all of whom contribute to our undergraduate mission in a teaching, advisement, and/or research capacity. The BMB faculty includes two full tenured professors (one retired in January 2023 and is currently a faculty working retiree), two associate tenured professors, five assistant tenure-track professors, and three lecturers (level III) not on the tenure track. The department welcomed a new assistant professor, Dr. Nathan Zaidman, in the tenure-track in January 2023. Another assistant professor, Dr. Olga Ponomarova, in the tenure-track who will join us in March 2023.

Our faculty members are mainly junior. Currently 33.4% of the faculty are at the level of professor & associate professor, and 66.7% are assistant professors & lecturers at level III (including the two new hires). The composition and credentials of our faculty are summarized below (**Table 5.1**).

Table 5.1 Composition of BMB faculty and their credentials

Faculty's name	Area of expertise	Rank		
		Category	Junior / Senior	Track
Dr. Karlett J. Parra	Cellular pH regulation & V-ATPase and proton pumps	Professor	Senior	Tenure track
Dr. Vallabh (Raj) Shah	Health services & molecular epidemiology			
Dr. Natalie Adolphi	Forensic radiology	Associate Professor		
Dr. Meilian Liu	Adipose tissue biology & metabolic diseases		Junior	

Dr. Xue Xiang	Iron metabolism	Assistant Professor		
Dr. Curt C. Hines	Breast/breast tumor microenvironment			
Dr. Mark A. McCormick	Biology of aging			
Dr. Nathan Zaidman	Renal physiology			
Dr. Olga Ponomarova	Architecture and function of central metabolic pathways			
Dr. Laura de Lorenzo	Genomics & bioinformatics	Lecturer III		Non-tenure track
Dr. Tyrel Bryan	Protein structure/function			
Dr. Brett Manifold-Wheeler	Novel COVID/viral diagnostics research and development			

The BMB Department has a diverse set of credentials comprising Biochemistry, Chemistry, Biology, Genetics and Genomics, Molecular Biology, Physiology, Physics, and Clinical and Translational Medicine. The average time since receiving a PhD degree within the department is 17.7 years (with a maximum of 39 years and a minimum of 7 years). The composition of our department compliments the curriculum requirements associated with our degree Program. We strive to have a diverse faculty body who is capable of teaching the courses offered and supporting student learning according to department and ASBMB learning objectives.

The BMB Department strives to support and encourage diversity among its faculty members to create and promote an inclusive and supportive environment. In this context, currently the BMB Department includes 41.7% female and 58.3% male faculty members. Of them, 33.3% are under-represented faculty belonging to Hispanic and American Indian. **Figure 5.1** displays the diversity of the BMB faculty. Diversity data on Biochemistry and Molecular Biology (BMB) faculty was obtained from the BMB Office.

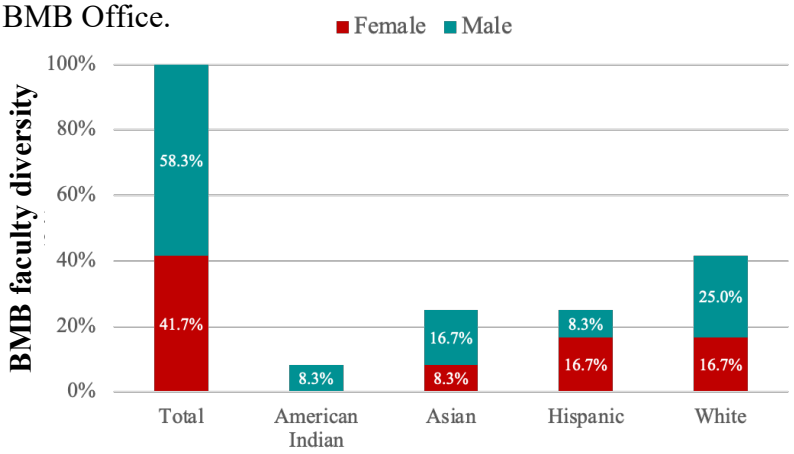


Figure 5.1 Diversity of the current BMB faculty members (FY 2023)
The bar graph shows the current BMB faculty diversity percentages in relation to gender and ethnicity. The current faculty count stands at 12. Data was obtained from the BMB Office.

BMB Faculty in the FY 2017-2023 Period

The rapid growth of the Biochemistry Program has required more resources to continue to provide a program focused on excellence. In general, about 50% of the faculty over the last seven years have been junior-career faculty. The number of faculty full professors has been consistent since 2017 (two faculty members), and the number of faculty associate professors has fluctuated from four (in FY 2017 to 2020) to two faculty members (in FY 2023). The demographics of the BMB Department have changed due to recruitment of new faculty, faculty retirements, and separations from the HSC and university since the last Academic Program Review in 2015. We have recruited an excellent cadre of junior faculty members. They include five tenure track faculty (two assistant professors will start in January and March 2023) and three lectures at level III. There are two full professors, including the Chair (Dr. Parra). Two faculty members were promoted to associate professor with tenure (2018; 2019) and one to a Distinguished Professor (2018). We expect three faculty to be promoted to the rank of associate professor and one to full professor between 2023 and 2026. The rank distribution of BMB faculty members over the last seven years is shown in **Figure 5.2**, and **Appendix 5.2**.

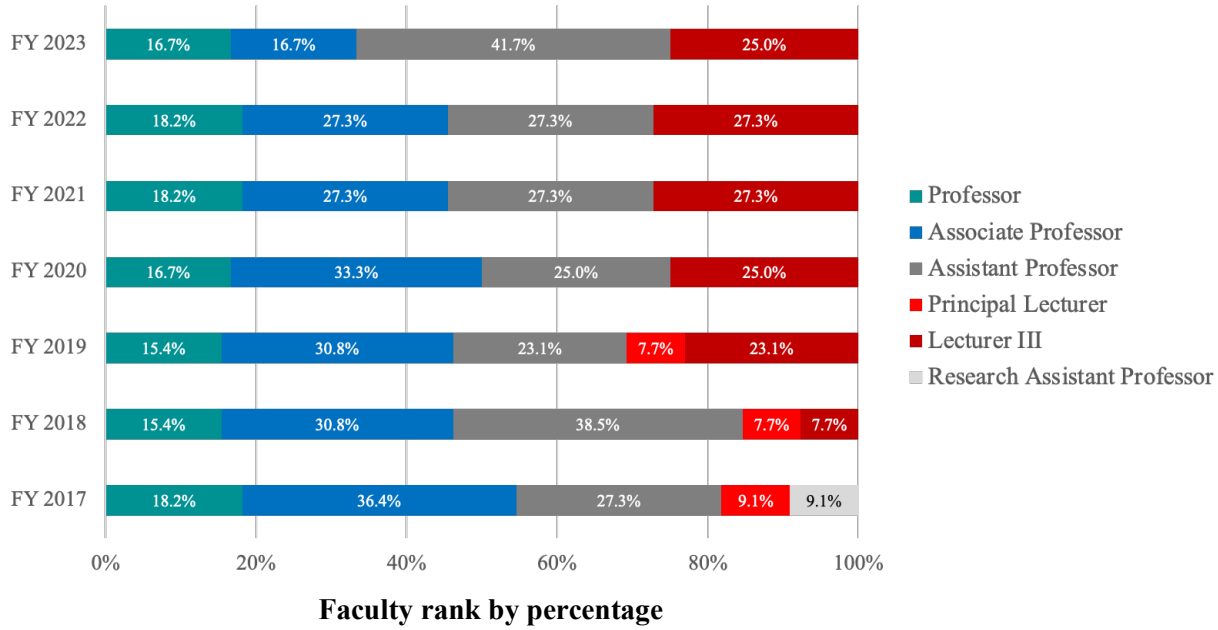


Figure 5.2 Biochemistry and Molecular Biology Department faculty distribution by rank

The bar graph shows the BMB faculty percentage in relation to faculty rank (FY 2017-2023 period). This includes full, associate and assistant professors in the tenure-track, and principal lecturer, lecturer and research assistant professors not on the tenure track. The number of faculty members ranges between 11 and 13. The faculty were 11 in FY 2017 and FY 2021 - 2022, 12 in FY 2020 and FY 2023, and 13 in FY 2018 - 2019. See **Appendix 5.2** for more details (promoted, retired and resigned faculty during this period).

Between FY 2017 and 2023, the diversity of the BMB faculty have changed significantly. This is summarized in **Figure 5.3** that displays diversity in relation to gender and ethnicity. As showed in **Figure 5.3 A**, faculty from URM groups increased 15% during this period. Ethnic diversity was 18% in FY 2017 (Hispanic). It is 33% in FY 2023 (25% Hispanic and 8% American Indian). In terms of gender, there are more male faculty than female faculty in the department (**Figure 5.3 B**). The trend lines (dotted) show similar representation of both genders in FY 2017-2018 with a discrepancy in gender representation towards FY 2022-2023.

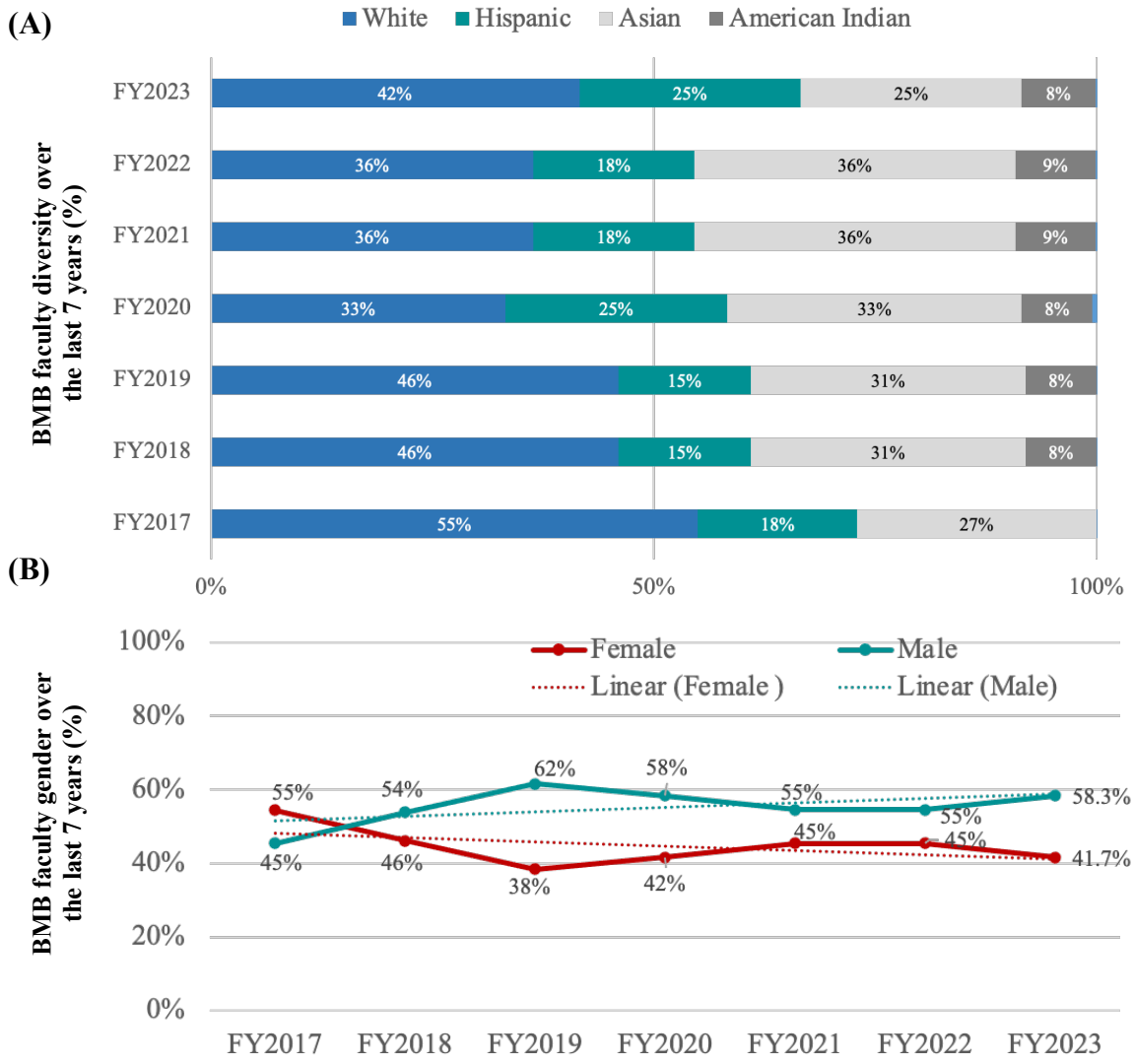


Figure 5.3 Diversity of the BMB faculty members during the FY 2017-2023 period
(A) BMB faculty diversity on the basis of ethnicity. **(B)** Faculty diversity on the basis of gender. The total number of faculty members is as follows: 11 faculty in FY 2017 and in FY 2021 - 2022, 12 faculty in FY 2020 and FY 2023, and 13 faculty in FY 2018 - 2019. Data include the Chair and was obtained from the BMB Office.

Supporting the University's Goal to Hire More Diverse Faculty

Our department has carefully crafted job descriptions in order to attract diverse applicants. We ensured that a diverse pool of candidates is represented in our first interviews (Zoom) and invited to visit campus to conduct in-person interviews. The BMB Department strives to create a diverse culture of inclusive excellence. Our recent faculty recruits (currently in the department) include one American Indian faculty (male) and two Hispanic faculty (one female and one male) out of the last 8 faculty hired (37.5%). The level of success with regard to increased diversity has been possible because we have invested time into creating DEI awareness and seamlessly integrate diversity into every aspect of our culture. The Chair not only has engaged in conversations about DEI and anti-racism with BMB faculty and students, but she also includes one DEI-related case study discussion in every agenda of the monthly department faculty meetings. By all evidence, our faculty and search committees have followed the best practices of identifying, hiring, and recruiting a diverse body of faculty including individuals from URM groups in science careers.

Assessment of Faculty Turnover in the BMB Department

Evaluation of faculty attrition at the BMB Department is crucial for maintaining the overall success and stability of the institution. The Office of Faculty Affairs and Career Development at the School of Medicine regularly assesses faculty retention in order to identify and address any issues related to turnover. The **Figure 5.4** provides the faculty attrition rate (including resignations and retirements) for the BMB Department compared to other departments at the SOM. The BMB Department has a low faculty resignation and attrition rate among its faculty members. This can be attributed to various factors such as a positive work environment, fair pay, good support and resources, and a sense of satisfaction and fulfillment among faculty members. This low faculty attrition rate has several positive implications for the university, such as a stable and experienced faculty, lower costs for recruiting and training new faculty, and a higher quality of education for students.

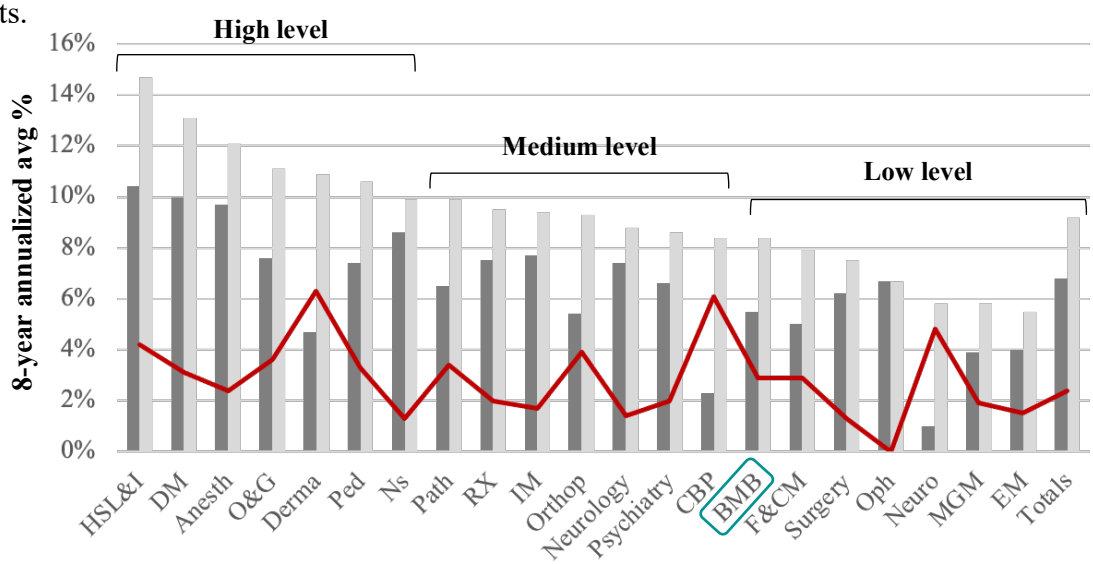


Figure 5.4 Analysis of the 8-year average annual faculty resignation and attrition rate in the BMB Department

The graph presents the analysis of the 8-year average annual faculty attrition in the BMB Department, including retirements and resignations, as compared to other departments at the School of Medicine at UNM. The data in dark grey bars represents resignations, light grey bars attrition, and a red line non-avoidable attrition. The information was sourced from the SOM Office of Faculty Affairs and Career Development. HSL&I, Health Sciences Library and Informatics; DM, Dental Medicine; Anesth, Anesthesiology; O&G, Obstetrics & Gynecology; Derma, Dermatology; Ped, Pediatrics; Ns, Neurosurgery; Path, Pathology; RX, Radiology; IM, Internal Medicine; Orthop, Orthopedics; CBP, Cell Biology & Physiology; BMB, Biochemistry & Molecular Biology; F&CM, Family & Community Medicine; Oph, Ophthalmology; Neuro, Neurosciences; MGM, Molecular Genetics & Microbiology; and EM, Emergency Medicine.

5B: Course-Load *Explain the process that determines and assigns faculty course-load (i.e., how many courses do faculty teach per semester, how does the unit determine faculty assignment to lower division vs. upper division courses, etc.). Describe the faculty-to-student and faculty-to-course ratio, and any impacts this has on unit success.*

The department Chair allocates faculty teaching, research and service participation. Generally, the Chair consults with the Undergraduate Program Director regarding the faculty teaching assignments who offers education expertise. Over the last seven years (FY 2017-2023), the BMB Department has had three Program Directors: Dr. Marcy Osgood (FY 2008-2019), Dr. Summer Hayek (FY 2020-2022) and Dr. Laura de Lorenzo (FY 2023, current). Over the last seven years, the BMB Department has had two Research Program Directors, Dr. Chien-An Hu (FY 2017-2022), and Dr. Curt Hines (FY 2023, current).

The teaching distributions are based on faculty rank, available FTE, Program demands (13-14 undergraduate courses), ASBMB accreditation requirements, and the undergraduate medical program and BA/MD Program expectations. Faculty members share the teaching assignments of the BMB Department in proportion to "available effort" as defined by the BMB FIBCI policy. The BMB policy states: "*Available effort is the fraction of total FTE that is not committed to administrative posts, release time for sponsored research or assigned activities*." If the FTE in any area is increased or decreased during the year, yearly assignments are revised proportionately. The teaching FTE is calculated according to the UNM Faculty Handbook, which states that 1.0 FTE corresponds to 18 cr/year for a 9-month contract, and according to the SOM policy that estimates 2,400 hr of undergraduate medical education per 1.0 FTE (12-month appointment). **Appendix 5.3** includes BMB Teaching Expectations for Faculty in the tenure track. Table **5.2** summarizes the BMB faculty education FTE allocation during the FY 2017-2023 period.

Table 5.2 BMB faculty education FTE allocation FY 2017 - 2023
The table shows the BMB faculty education FTE. The names in bold represent current faculty (FY 2023).

Faculty's name	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023
Tenure Track							
Dr. Vallabh Shah	0.12	0.07	0.1	0.075	0.105	0.1	0.12
Dr. Meilian Liu	0.1	0.1	0.133	0.127	0.23	0.33	0.35
Dr. Natalie Adolphi	0.31	0.167	0.167	0.058	0.226	0.18	0.25
Dr. Xue Xiang	N/A	0.1	0.1	0.08	0.107	0.125	0.145
Dr. Curt C. Hines	0.1	0.1	0.1	0.086	0.141	0.123	0.18
Dr. Mark McCormick	N/A	0.1	0.1	0.1	0.122	0.132	0.152
Dr. Nathan Zaidman	N/A	N/A	N/A	N/A	N/A	N/A	0.1
Dr. Olga Ponomarova	N/A	N/A	N/A	N/A	N/A	N/A	0.1
Dr. Robert A. Orlando	0.697	0.721	0.489	0.24	1	N/A	N/A
Dr. Martina Rosenberg	0.614	0.595	0.568	N/A	N/A	N/A	N/A
Dr. Marcy Osgood	0.439	0.381	N/A	N/A	N/A	N/A	N/A
Dr. Chien-An Hu	0.63	0.563	0.415	0.26	0.542	N/A	N/A
Non-Tenure Track							
Dr. Laura de Lorenzo	N/A	N/A	N/A	N/A	0.83	1	0.83
Dr. Tyrel Bryan	N/A	N/A	0.83	0.83	0.83	0.9	0.9
Dr. Brett Manifold	N/A	N/A	N/A	N/A	N/A	N/A	1
Dr. Summer R. Hayek	N/A	N/A	0.83	0.83	0.83	0.83	N/A
Dr. William S. Garver	0.212	N/A	N/A	N/A	N/A	N/A	N/A
Dr. Cheryl Sensibaugh	N/A	N/A	0.83	N/A	N/A	N/A	N/A
Dr. Colleen A. Fordyce	0.15	N/A	N/A	N/A	N/A	N/A	N/A

Tenured faculty members conducting biomedical research who lack external funding are expected to increment the *minimum* teaching assignments proportionally to the number of years unfunded (see **Table 6.2** in **Criterion 6A**).

Every BMB faculty member in the department contributes to the undergraduate Biochemistry Program through teaching (both tenure track and non-tenure track faculty). Lecturers III (non-tenure track) teach core courses for the biochemistry major (BIOC 445, BIOC 446 and BIOC 448L) as well as internal upper-level electives in their area of expertise (BIOC 495-001 and BIOC 495-002). Each Lecturer III teaches two large (> 50 students), one small (< 50 students) and two laboratory sections per year. Our Lecturer III faculty members have mentoring duties associated with the UNM SOM PrEP (Premedical Enrichment Program), BA/MD Program, and MDH CUREs program, respectively. Every faculty member on the tenure track teaches upper-level internal electives course(s) for undergraduates (BIOC 451, BIOC 463 and BIOC 464) according to their research areas of expertise. Also, tenure track faculty have major teaching responsibilities

in the medical school program and the Biomedical Sciences Graduate Program (BSGP). Four BMB faculty members (Dr. Parra, Dr. Shah, Dr. Liu, and Dr. Xue) teach courses in the six-week intensive GI, Nutrition and Metabolism block (GINM) of the SOM. Two faculty members (Dr. Hines and Dr. McCormick) contribute to BSGP didactic instruction. Specifically, the BMB Department is responsible for the "Introduction to R and RNA-sequencing analysis" course (BIOM 505), and contributes to the "Cancer Biology" (BIOM 515), "Experimental Design and Methods in Molecular and Cellular Biosciences" (BIOM 522), and "Advanced Molecular Biology" (BIOM 507) courses.

Each incoming BMB cohort is approximately 70-80 students. This allows twelve faculty per ~150 students (approximate summation of junior and senior level students). This averages to a ~14:1 student to faculty ratio. Course enrollment for required junior level Intensive Biochemistry is ~80 students per class (two successive courses taught by the same instructor). The courses are instructed by the same lecturer for continuity. Our non-major Biochemistry course has two large sections 125:1 and one small section ≤ 50:1 (student: instructor); all non-major courses are taught by the same lecturer. Student to faculty ratio for electives and laboratory courses are ≤ 50:1. Intentionally, the laboratory sections (2-3 sections offered per semester) are small with sixteen students each for a 16:1 ratio. The faculty gets support from teaching assistants and staff. Teaching assistants are available to help faculty in the two intense biochemistry courses (BIOC 445 and BIOC 446), five internal upper-level electives (BIOC 451, BIOC 463, BIOC 464 and BIOC 495-002/001), and three biochemistry courses for non-majors (BIOC 423). One teaching assistant is assigned for each ~50 students (one teaching assistant covers a maximum of 10 hours). For small courses, one teaching assistant is shared between courses with a maximum of five hours per course. For the Biochemical Methods laboratory course (BIOC 448L), a full-time Coordinator for Curriculum Development staff position was created to support the teaching load and the laboratory preparation (position created and filled since 2018). The faculty-to-course yearly ratio is around 1:0.4 - 1:1 for tenure track faculty depending on the rank and research effort protected by extramural research grants. It is 1:4 for lecturers. These ratios are optimal to support our student body learning and allow faculty to enjoy teaching while conducting research and other duties.

The individual faculty assignments are allocated on the basis of departmental and School of Medicine priorities. The Chair meets with each faculty member in the fall (lecturers) and spring (tenure track faculty), to conduct annual evaluations and discuss their annual action plans for the next year. Individual action plans include teaching (faculty course evaluations are included in **Appendix 5.4**), service, committee assignments, and/or goals for research (grant submissions, peer-reviewed publications, scientific presentations, etc.). In general:

- The non-tenure track faculty members in the BMB Department are expected to offer high-quality course(s) taught by evidence-based pedagogies; maintain faculty qualifications; and maintain and expand resources/infrastructure for education.

- The tenure track faculty members in the BMB Department are expected to develop and maintain strong research programs; contribute high-quality instruction to the department teaching responsibilities including undergraduate, graduate, and/or health professions; and serve in committees at the department, the School of Medicine, and/or the HSC level.

Several faculty members have administrative leadership appointments that are crucial to the interdisciplinary and administrative needs of the School of Medicine and the BMB Department. As of FY 2023:

- Dr. Laura de Lorenzo, Director of the Undergraduate Biochemistry Program (0.17 FTE).
- Dr. Tyrel Bryan, BMB Director of Diversity Equity and Inclusion (0.1 FTE).
- Dr. Curt Hines, Director of Undergraduate Honors Research Program (0.13 FTE).
- Dr. Meilian Liu, Director of UNMHSC Cardiovascular & Metabolic Signature Program (0.05 FTE).
- Dr. Natalie Adolphi, Director of the Center for Forensic Imaging (0.20 FTE).

As a reference, we have included the information used for FTE estimations per course (**Appendix 5.3**), extramural funding level of our tenure track faculty since the last APR (**Table 6.1**, see **Criterion 6**), estimations for minimum teaching assignments allocated to tenure track faculty (**Table 6.2**, see **Criterion 6**), and FTE distributions in education, research and service (**Appendix 5.5**). All of the above-mentioned criteria are considered by the Chair when allocating the faculty education, service, and research assignments.

After the last APR in 2015, we recruited lecturers who teach the majority of the undergraduate courses offered in the Program to maximize student learning. The faculty compensation for educational activities comes exclusively from unrestricted funds, which allow faculty to have more stable teaching loads. Consequently, teaching loads of the lecturers are constant and teaching loads of the research faculty were reduced since the last APR. The research faculty have been successful at securing research grants, publishing in high impact journals, and developing strong research programs and collaborations in accordance with their tenure track status (**Appendix 5.5**). The tenure track faculty members participate in institutional and/or departmental standing committees and task forces, often non-standing. These include BMB faculty search committees, BSGP steering and curriculum review committees, BSGP thesis committees, BSGP qualifying exam committees, the School of Medicine admissions committee, the School of Medicine research and education advisory committee, the School of Medicine DEI committee, BA/MD Program committees, and the UNM healthy aging grand challenge leadership committee, among others. The criteria for faculty promotion in the School of Medicine and the BMB Department is excellence in education (lecture and tenure tracks) and research (tenure tracks), and competence in service.

5C: Professional Development & Service *Describe the professional development and service activities (conference presentations, committees, community engagement, memberships, etc.) for faculty within the unit, including how these activities are used to sustain research-related agendas, quality teaching, and students' academic/professional development at the undergraduate and graduate level. Describe what measures the department takes to ensure appropriate support, mentoring, workload and outcomes for faculty of color and members of groups that are traditionally under-represented in your field.*

Professional Development

The BMB Department is dedicated to maintaining high standards in both scientific research and biochemical education. The department encourages and sponsors participation in professional development programs using institutional funds every year. The following are representative trainings completed the last four years (# of faculty):

- Association of American Medical Colleges (AAMC) Leadership Development Seminar (3).
- Executive Leadership in Academic Medicine (ELAM), sponsored by the SOM (1).
- UNM School of Medicine (SOM), Faculty Mentoring Development (6).
- NIH grant writing: ASBMB (1), AAMC (3), American Society of Cell Biology (ASCB) (1), HSC R1GOR* (3).
- NSF Professional Development Program: ASCB (1).
- Center for the Improvement of Mentored Experiences in Research (CIMER), Train the Trainer (3).
- Achievement in Medical Education Program (AMEP) (6).
- Course-based Undergraduate Research Experience (CURE) Program (1).
- HSC Biomedical Sciences Graduate Program Mentor training (4).

*The Chair of the department, Dr. Parra, is one of the five co-directors and co-founders of the new NIH grant writing program offered by the Health Sciences Center (HSC). The program, R1GOR, is a 6-month long intensive course designed to help researchers and scientists develop the skills necessary to secure funding from the National Institutes of Health.

Annually, ample funding is allocated for faculty professional growth. These funds are utilized to support faculty development and enhance their success, including:

	FY 2022	FY 2023 to date	FY 2024 estimate
Trainings and workshops	$ 2,615.04	$ 5,262.71	$ 5,500.00
Editorial services (grants, manuscript, accreditation, etc)	$ 1,000.45	$ 3,346.17	$ 7,000.00
Support for publication costs in high impact journals (IF >7)	$ 4,000.00	$ -	$ 6,000.00

The UNM SOM Office of Faculty Affairs and Career Development and the Office of Continued Learning and the Learning Environment Office (LEO) offer a repertoire of workshops for faculty that cover topics from leadership to teaching/education and diversity/equity/inclusion. Additional opportunities are offered through the HSC and UNM Main Campus. Sabbatical leave is available to any faculty with tenure or in the last year of the probationary period (1) after three years of full-time service: up to six months at 2/3 contract salary; and (2) after six years of full-time service without a sabbatical: up to six months without reduction in contract salary and up to one year at 2/3 contract salary. After completion, the faculty must return to the University for a period at least as long as the duration of the leave. In 2008, Dr. Raj took a sabbatical leave as Fulbright Scholar to conduct research at the Karolinska Institute in Sweden. The last three years, two BMB faculty members, Dr. Hu and Dr. Adolphi, expressed interest in taking sabbatical leave. They received full support from the department Chair, but ultimately decided to postpone their plans. No other faculty members have expressed interest in taking one at this time.

Currently, the Chair assigns one to three mentors to each new junior faculty member in the department. The faculty mentors share experience, expertise, and advice and guide the junior faculty member in multiple domains of career development. These include, but may not be limited to the following: advise on the development of teaching skills, help in the development of independent research and in the identification of funding mechanisms, facilitate professional networking within and outside of the institution, share requirements for academic advancement, guide in the management of career challenges of particular relevance to women and URM faculty, share strategies for success and advancement within the institution, school, or department, with attention paid to formal as well as informal measures of success, and overall help in career planning including short-, mid-, and long- term goals. Some faculty members also serve as mentors or participate in mentorship programs outside of the university. For example, Dr. de Lorenzo is a member of an international peer mentoring group, launched by INFAHE, which includes leaders from various universities and companies worldwide, including Spain, Portugal, and Sweden. Dr. Xue participates in the reverse mentoring program (LEAD), launched by Federation of American Societies for Experimental Biology (FASEB). These external mentorship experiences not only help to boost their interpersonal skills, but also enhance their leadership abilities, while providing diverse learning opportunities.

Service Activities

Our faculty are involved in service to the research and educational communities in UNM and at national, state, community and local levels. Service is an opportunity to shape and advance the mission and goals of our department, and an essential component of a long-term professional trajectory centered on commitment to the University, society, and our profession.

(1) Service to the Institution. Service is essential to the proper functioning and future well-being of our department and UNM. Without the active participation of faculty in different activities the department cannot adapt to the ever-changing needs of students, the community, and society as a

whole. The strength of the department relies on the commitment of faculty to act as a community of interdependent members rather than as a body of independent individuals. Service at the program, division, college and university levels helps generate new initiatives as well as sustain, build, and/or promote existing, academic endeavors. Examples of the involvement of BMB faculty in institutional services include but are not limited to:

- University programs to enhance equal opportunity or cultural diversity. BMB faculty are Diversity, Equity, and Inclusion representatives for the Autophagy, Inflammation and Metabolism (AIM) Center. They serve as leaders for the CTSC Workforce Development at UNMHSC, participate in the UNM Women of Color gatherings sponsored by the UNM Office for Equity and Inclusion, help organize the HSC Women History Month activities, and represent BMB in the School of Medicine DEI Committee.

- University programs to support research initiatives. The BMB faculty has lead roles in the HSC signature research programs (director), the AIM Center (executive committee), and UNM Successful Aging Grand Challenge grant. They review grants for the Research Allocation Committee of the School of Medicine, CTSC and Cancer Center. They organize seminars for HSC CMBD seminar series and the AIM Center, among others.

- University programs to support education initiatives. Our faculty reviews student applications and conduct interviews of the student candidates as part of the BSGP admissions committee and the School of Medicine admissions committee. They serve in many thesis and dissertation advisory committees for the HSC BSGP and inform students of career opportunities in A&S orientations, UNM STEM Day, and the BMB ÉLITE Program. They judge for student poster competitions at the BSGP Student Research Day and the Undergraduate Pipeline Network (UPN) UNM Symposium.

- Departmental initiatives. Our faculty members serve in faculty search committees for the BMB Department and other departments as well as take lead roles in several aspects of the BMB Department strategic plan and Biochemistry Program accreditation.

(2) Service to the discipline or profession. This service involves activities designed to enhance the quality of disciplinary or professional organizations. Our faculty are active members in their professional societies and contribute time and expertise to further their research fields. For example, they are executive board members, presidents elected, and/or vice-presidents for the American Aging Association, Chinese American Diabetes Association, Association of Medical and Graduate Departments of Biochemistry, and Sigma Xi Scientific Research Honor Society. They serve on the editorial board for professional journals, including the Journal of Biological Chemistry, and they are manuscript handling editors for Oncotarget and for Aging among others. They review manuscripts for nearly one hundred different scientific journals, and serve on grant review panels for NIH, NSF, the American Heart Association, many private foundations, and international agencies. They organize workshops, panels, and meetings in their respective professional fields, including the Gordon Research Conference, and serve in the Science Research Conferences Advisory Committee for the FASEB. Our faculty also serve in thesis committees and

are mentors for students in other universities in America (e.g., SUNY Upstate Medical University) and globally (e.g., University of Seville, Spain).

(3) Outreach to increase diversity in science careers. Our faculty is engaged in community outreach efforts. They perform outreach to URM undergraduate and post-bac students on behalf of the American Aging Association. They are FASEB MARC Faculty Peer Mentors for URM undergraduates and post-bac students. They are invited speakers in SACNAS on behalf of the American Society of Cell Biology (ASCB) and the UNM HSC DEI Office. They contribute to student recruitment efforts on behalf of the UNM BSGP in ABRCMS, participate in mentorship panels at the UNM Health Systems, and help promote awareness in diversity issues by contributing to efforts to develop DEI training courses and serving in the Women in BMB committee of the ASBMB.

(4) Outreach to improve the health of New Mexicans. Our faculty is engaging in community services with local cancer organizations and several NM pueblos. They give presentations at tribal organizations and set up informational booths during health fairs or other local functions; do blood pressure checks at different locations within these communities; distribute flyers and educate people on diabetes, hypertension, and kidney disease to make the community aware of the serious health problems associated with these diseases.

(5) Memberships. Our faculty are members of various scientific societies related to their area of expertise. On average, each faculty is a member of and/or is involved in four societies. These scientific communities are listed as follows:

Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)
American Aging Association
American Diabetes Association
American Federation for Medical Research
American Gastroenterological Association
American Heart Association (AHA)
American Physical Society (APS Physics)
American Physiological Society (APS)
American Public Health Association
American Society for Biochemistry and Molecular Biology (ASBMB)
American Society of Cell Biology (ASCB)
American Society of Nephrology (ASN)
American Statistical Association
Association of Medical and Graduate Departments of Biochemistry (AMGDB)
Association of Spanish Scientists in USA - ECUSA
Crohn's & Colitis Foundation of America
Data Visualization Society
Genetics Society of America
Gerontological Society of America

International Society for Forensic Radiology and Imaging
International Society for Magnetic Resonance in Medicine
International Society of Nephrology
New York Academy of Sciences
Sigma Xi Scientific Research Honor Society
Society for Healthcare epidemiology of America
The Society of Human Genetics

Diversity, Inclusion and Equity in the Workplace

The UNM School of Medicine is a national leader in diversity and has, over the course of the past year, implemented an institution-wide program of developing DEI advocates in every department. As a department, we strive to create a diverse culture of inclusive excellence and look forward to our continued engagement in DEI issues. Four faculty members (33.3%) are URM, including the Chair, Dr. Parra, and the Program Director, Dr. de Lorenzo who are excellent role models with a record of accomplishments in DEI and mentoring. Dr. Parra engages in conversations about DEI and anti-racism with BMB faculty (once a year meeting topic minimum). These meetings have been extended to students and postdocs and intentionally conclude with an action plan that we pursue. Most recently she added one DEI-related case study discussion to the agenda of the departmental monthly faculty meetings. These discussions create awareness and promote a culture of respect and inclusiveness in the department. In 2020, following one such meeting, we created a new BMB DEI Director position led by Dr. Bryan. We have also revised the Student Evaluations of Teaching (SET) to improve effectiveness by reducing biases (year two pilot project) and we now celebrate BMB faculty diversity on our webpage (https://hsc.unm.edu/medicine/departments/biochemistry/diversity1/).

To further facilitate growth of women and URM faculty in our department, the BMB sponsors faculty participation in national leadership and mentoring training workshops such as those offered by the AAMC and CIMER. Faculty integration in service activities to promote inclusiveness is an important part of growth for each individual and for the Program as a whole. As mentioned above, department faculty are encouraged to participate in every level of service including memberships, committees, and attendance to facilitate collaborations. Faculty are also encouraged to attend conferences such as SACNAS that are aimed at increasing participation of URM groups in science careers.

Beyond BMB, Dr. Parra co-led the UNM SOM Chairs' workgroup for addressing gender issues towards a zero-tolerance culture for harassment in 2020. In 2021, she oversaw development of a bystander interventions training that uses role playing to advance inclusivity for the UNM Clinical and Translational Science Center. She is now overseeing development of a train-the-trainer version of this course. This year, Dr. Parra has been appointed DEI Director for the Phase II

Autophagy, Inflammation and Metabolism (AIM) Center of Biomedical Research Excellence (https://hsc.unm.edu/medicine/departments/genetics-microbiology/aim-center/).

Additionally, the University of New Mexico has specific resources/programs that support and encourage faculty member diversity and inclusiveness. These resources/programs can be found below including a brief introduction as well as a link to the program/resource webpage:

(1) The Learning Environment Office (LEO): This office is working to address and prevent mistreatment. LEO is also engaged in broader cultural exchange work to ensure that all teachers, learners, and staff members have access to positive and inclusive learning and working environments. This office is located in the Health Science Center at UNM. LEO education initiatives include, for example, the Building Inclusive Environments Series, co-hosted with the UNM HSC Office of Diversity, Equity & Inclusion (https://hsc.unm.edu/medicine/education/leo/education-initiatives/building-inclusive-environments.html).

(2) Advance at UNM: Advance is an NSF-funded project to promote recruitment, retention, and promotion of women and minorities in STEM (https://advance.unm.edu).

(3) UNM Division of Equity and Inclusion National Center for faculty development and diversity: The UNM division of equity and inclusion has many programs focused on recruitment and retention of a diverse faculty including the Inclusive Excellence faculty Bridge Hiring Program, the Target of Opportunity (TOP) program, Faculty Hiring initiatives, and the UNM Dual Career Hiring Program (http://diverse.unm.edu/resources/faculty/index.html).

(4) Teaching Support at Center for Teaching and Learning (CTL): The Center provides programs and support to promote an inclusive community dedicated to building a positive learning/teaching environment (https://ctl.unm.edu/instructors/support/workshops/index.html).

(5) Health Science Center (HSC) Continuous Professional Learning (CPL): Multifaceted resources and support to facilitate professional development of healthcare providers and educators (https://hsc.unm.edu/medicine/education/cpl/learn/educ-dev-index.html). The training course "Teaching that Promotes Antiracism for Health Equity: Its Easier than you May Think" is one example of the DEI initiatives organized by the HSC CPL.

(6) Professional Ambassadors: Two-year program to support economically and/or educationally disadvantaged individuals to prepare them for their respective field through academic and cultural enrichment, student support activities and training on issues specifically affecting NM communities (https://hsc.unm.edu/diversity/programs/community/pro-ambassadors.html).

Criterion 6. Research, Scholarship, & Service

The unit should have structures in place to promote active engagement in research, scholarly, and creative works among the faculty and students (if applicable, differentiate for each undergraduate and graduate degree and certificate program).

6A: Policy & Faculty Workload *Describe the unit's approach to balancing expectations and commitments for teaching, research/scholarship/creative works and service, including mechanisms of support for the scholarly pursuits of faculty (e.g., course releases, shared research/creative facilities, start-up funding, etc.).*

In the BMB Department, the faculty workload is based on the faculty role, rank, and the percentage/level of effort in the different workload categories (e.g., research/scholarship/creative activities, teaching and mentoring, and service). Faculty member assignments are determined by the Chair of the department, Dr. Parra, following departmental policies and guidelines. The FTE allocations in education, research and service (FY 2017-2023) are summarized in **Appendix 5.5, Criterion 5**. The BMB Department expectation is that faculty hired in the tenure track (*researchers*) would generate external support to develop a sustainable research program. The research FTE is determined by faculty rank (pre-tenured faculty have protected time for research) and time protected by extramurally funded research projects. **Table 6.1** shows the time protected by research funding for faculty on the tenure track (FY 2017-2023 period).

Table 6.1 Research FTE allocation of tenured faculty and faculty on tenure track
Faculty's names in bold show active members of the BMB Department in FY 2023. Data are included for the FY 2017 – 2023 period.

Faculty's name	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23
Dr. Vallabh Shah	0.84	0.86	0.83	0.85	0.855	0.86	0.84
Dr. Meilian Liu	0.89	0.87	0.832	0.838	0.765	0.665	0.6
Dr. Natalie Adolphi	0.56	0.733	0.633	0.742	0.474	0.32	0.5
Dr. Xue Xiang	N/A	0.9	0.9	0.9	0.853	0.835	0.815
Dr. Curt C. Hines	0.9	0.89	0.89	0.884	0.809	0.847	0.69
Dr. Mark McCormick	N/A	0.9	0.89	0.87	0.838	0.828	0.778
Dr. Nathan Zaidman	N/A	N/A	N/A	N/A	N/A	N/A	0.9
Dr. Olga Ponomarova	N/A	N/A	N/A	N/A	N/A	N/A	0.9
Dr. Robert A. Orlando	0.244	0.159	0.421	0.67	0	N/A	N/A
Dr. Martina Rosenberg	0.276	0.345	0.362	N/A	N/A	N/A	N/A
Dr. Marcy Osgood	0.081	0.139	N/A	N/A	N/A	N/A	N/A
Dr. Chien-An Hu	0.21	0.297	0.445	0.6	0.318	N/A	N/A

The *minimum* contribution expected for extramurally funded, tenure track faculty members conducting research is typically 0.1 FTE (pre-tenure, years 1-3), 0.1 - 0.15 FTE (pre-tenure, years

4-6), and > 0.15 when tenured (FTE is dictated by funding level and departmental needs). The tenured faculty members who lack external funding to support their research incrementally increase their *minimum* teaching assignments proportionally to the number of years unfunded and evidence of progress made towards funding (e.g., grants scored). The *minimum* teaching FTE allocated to faculty on the tenure track (independent of other assignments) the last ~4 years is shown in the **Table 6.2**.

Table 6.2 Minimum teaching FTE allocated to tenured faculty and faculty in the tenure track
The table shows the research faculty teaching assignments relative to extramural funding.

Years unfunded (Tenured*)	**Minimum Teaching (FTE)**	
	Tenured (*)	Pre-Tenured
Up to 1 year	0.20	0.1
1 year	0.20	0.1
2 years	0.25	0.1
3 years	0.30	0.1
4 years	0.40	0.1-0.15
5 years	0.50	0.1-0.15
6 years	> 0.60	0.15-0.20

The BMB Department encourages and sponsors faculty participation in professional development initiatives to propel research and education, such as the AAMC NIH grant writing training (see **Criterion 5C**). To formalize and improve mentoring skills the department supports participation in evidence-based mentor training opportunities such as the CIMER train-the-trainer program and the NIH-funded Faculty Mentor Development Program offered by the School of Medicine. The BMB Department offers also grant editing to all members in the department, enables professional travel and/or other opportunities for professional growth, encourages collaborative projects (publications and grants) between junior and senior faculty, maintains committee memberships, promotes involvement in qualifying/thesis committees, fosters innovative and translational research, and guides efficient use of the support offered through the department and UNM (see **Criterion 6D**).

Shared Research/Creative Facilities

UNM provides a strong research environment. The UNM Health Sciences Center (HSC) is the state's largest healthcare, teaching, biomedical research and patient care organization and includes one of the leading National Cancer Institute (NCI) designated Comprehensive Cancer Research and Treatment Centers in the nation, the UNM Cancer Center. The UNM HSC Office of Research (http://hsc.unm.edu/research/), UNM Clinical & Translational Science Center (CTSC, http://hsc.unm.edu/research/ctsc/), UNM Cancer Center (http://cancer.unm.edu), and three Centers of Biomedical Research Excellence (COBRE) offer a diverse range of research

development and funding resources available to all faculty. Faculty and students have access to a wide array of Institutional Resources across the Health Sciences Center and Main Campuses. UNM shared resources include an Analytical and Translational Genomics facility, a Population Science Core, biostatistics, bioinformatics, electron microscopy, flow cytometry, fluorescence microscopy and cell imaging facilities, a human tissue repository, animal model housing and imaging facilities, a Clinical & Translational Science Center, human imaging facilities, a UV exposure facility, a clinical data warehouse, the Metabolism and Autophagy Cores, electron paramagnetic resonance spectroscopy, and an Integrative Molecular Analysis Core, among other research facilities.

6B: Scholarly & Creative Works *Describe the scholarly/creative works and research accomplishments of the faculty. Explain how these accomplishments support the quality of the unit and the key metrics that are used to measure achievement in this area (e.g., peer-reviewed publications, juried exhibitions, proposals submitted/funded, books published, etc.). Identify areas of strength for the unit as well as areas of growth and any plans or systems in place to increase productivity.*

The BMB Department maintains a high level of research activity that spans a broad range of biomedical disciplines and cutting-edge topics of high impact and importance. We currently have eight active research faculty within the department, one assistant professor recently joined the department (January 2023). We will have another assistant professor in March 2023. Research in the department is categorized into the following areas:

Breast/breast tumor microenvironment. Dr. Hines' laboratory is dedicated to defining the cellular and biochemical microenvironment of tissues and tumors; determining how cells coordinate and communicate to maintain tissue homeostasis; and deciphering how normal and tumor microenvironments alter cell phenotypes that led to tumor progression.

Areas of specialty:

- Breast cancer biology and microenvironment
- Primary cell models
- Multiparameter flow cytometry and cell sorting
- Bulk and single-cell RNA-sequencing analysis

Biology of aging. Dr. McCormick's laboratory is following several lines of ongoing research to uncover a more complete picture of conserved genes that can affect aging in multiple organisms including humans. They are using these results to build a deeper understanding of the underlying conserved biology of aging. They are also identifying drug targets, and drugs that can delay aging in the laboratory in multiple distantly related organisms. The goal of this research group is to find drugs that may also delay the onset of age-related diseases, and perhaps aging itself, in humans.

Areas of specialty:
- Aging
- Machine learning
- Data science

Health services & molecular epidemiology. Dr. Shah is a molecular epidemiologist with a broad background in clinical translational and community based participatory studies in minorities including Native American and Hispanic populations. He has carried out the original cross-sectional research in the Zuni Kidney Project with many secondary data analyses on disparity aspects of chronic diseases, in particular diabetes and chronic kidney disease and its complications.

Areas of specialty:
- Health service research (population science; American Indian and Hispanic populations
- Clinical translational research in diabetes, kidney disease and heart disease
- Molecular / genetic epidemiology (GWAS, epigenomics, microbiome, metabolomics)
- Health care policy and delivery with a home base care model, and metabolic and biochemical pathways in chronic diseases.

Iron metabolism and colon cancer. Dr. Xue's interests are to understand the role of cellular and molecular metabolism in gastrointestinal inflammation and cancer. Research in his laboratory aims to understand how micronutrients are essential in cancer cell growth through integrating cancer cell metabolism, oncogenic signaling and tumor-promoting inflammation.

Areas of specialty:
- Gastroenterology
- Cancer biology
- Iron metabolism
- Mitochondria

Adipose tissue biology & metabolic diseases. Dr. Liu has a longstanding interest in adipose biology and adipocyte physiology. She has devoted her research to the study of thermogenic programing and adipose tissue inflammation since she began her independent academic career in 2014. Her current studies mainly focus on adipose cell-cell signaling in the context of obesity and inflammation.

Areas of specialty:
- Obesity
- Diabetes
- Adipocytes
- Inflammation
- Cell signaling

Forensic radiology. Dr. Adolphi's research interests are focused on two main areas: (1) methods for assessing and improving the targeting and imaging of nanoparticles for therapeutic applications, from cancer to infectious disease, and (2) developing advanced imaging methods (MRI and CT) for forensic death investigation. She recently co-authored an introductory radiation biology textbook, and she is an inventor on two U.S. patents (both involving in vitro magnetic nanoparticle detection methods).

Areas of specialty:

- Post-Mortem medical imaging
- Magnetic resonance
- Magnetic detection

Cellular pH regulation & V-ATPase and proton pumps. Dr. Parra's research interests are the functions and assembly of V-ATPase proton pumps with emphasis on the mechanisms that (1) sustain nutrient and cellular pH homeostasis and (2) link glucose metabolism and V-ATPase function. Major goals include 1) defining the contributions of V-ATPase-mediated pH homeostasis in health and disease; 2) identifying V-ATPase-dependent pathways and cellular events that could be used to selectively target V-ATPase pumps to control processes relevant to disease; and 3) establishing the molecular mechanisms that regulate activity and assembly of V-ATPase proton pumps.

Areas of specialty:

- Glucose metabolism
- Protein structure-function
- Membrane proteins
- Yeast biology

Adhesion G Protein Coupled Receptor Physiology. Dr. Zaidman's research is focused on the physiological roles of adhesion G protein coupled receptors (aGPCRs). His lab is currently studying several aGPCRs in the context of renal physiology and aims to discover their physiological significance and the mechanisms of endogenous activation. Their research goals are to discover novel signaling pathways that are critical to the maintenance of kidney function and human health.

Areas of specialty:

- Epithelial physiology
- Renal Physiology
- Cell signaling

Current faculty research interests, selected examples of their peer-reviewed scholarly work and selected research funding are provided in **Appendix 6.1**, as well as in their *curriculum vitae* in Biochemistry APR Spring 2023.

Research Accomplishments of the Faculty

The BMB research faculty are involved and engaged in strong and highly significant biomedical research projects. Their accomplishments are evidenced by the successful performance in different research aspects and measures that the department use for assessing the quality and broader impact of their scientific and scholarly research. The BMB Department uses the following key metrics to measure research achievement:

(1) Peer-reviewed publications
(2) Citations, h-index and i10-index
(3) Presentations (oral and poster)
(4) Proposals funded
(5) Grant and manuscript reviews
(6) Others: juried exhibitions, chair meetings and/or chair of sections of meetings, editorial boards and administrative (work with professional societies)

1) Peer-reviewed publications. The number of peer-reviewed publications in the department has been constant over the last seven years, with two peaks in the number of publications in FY 2017 and FY 2021, as illustrated below. Since FY 2017, the BMB faculty have published 176 peer-reviewed articles total (see **Appendix 6.2** for a list of the journals). The average number of peer-reviewed publications per year is 25 (not considering the FY 2023).

Notably, the impact of their publications has increased dramatically since 2019. The BMB faculty is publishing an unprecedent number of high impact original research articles in prestigious journals, including *N. Engl. J. Med, Nature Communication, Cell Reports, The Journal of Cell Biology, eLife, Autophagy, Science, Science Translational Medicine, PNAS, J. Exp. Med., Mucosal Immunology, Development, Molecular Cell Biology and Cell Metabolism.* The BMB faculty published 11 high impact articles (7 > IF > 74) with an average impact factor (IF) of 20.77 in 2020 and published 10 articles with IF >7 in 2022.

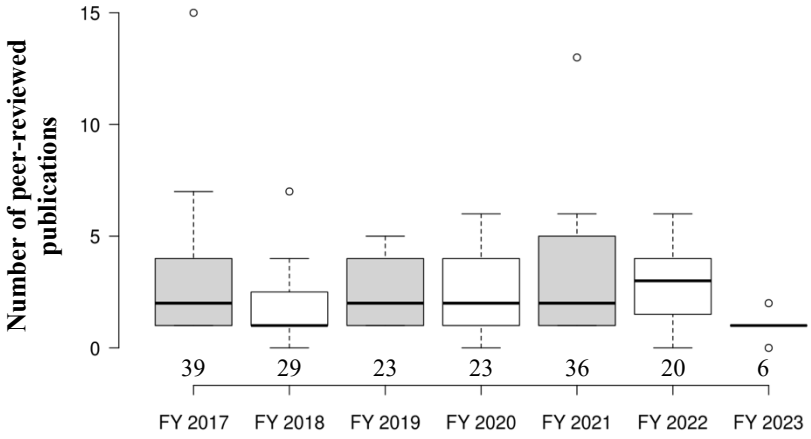


Figure 6.1 Number of peer-reviewed publications

The boxplot graph shows the number of peer-reviewed publications in the BMB Department (FY 2017-2023 period).

(2) Citations, h-index and i10-index. The high-impact research published by our faculty has led to a steady increase in the number of citations, h-index and i10-index values received by our department as depicted in **Figure 6.2**. The h-index is calculated by taking into account the number of publications and the number of citations that each publication has received. The i10-index represents the number of articles an author has published that have received at least 10 citations.

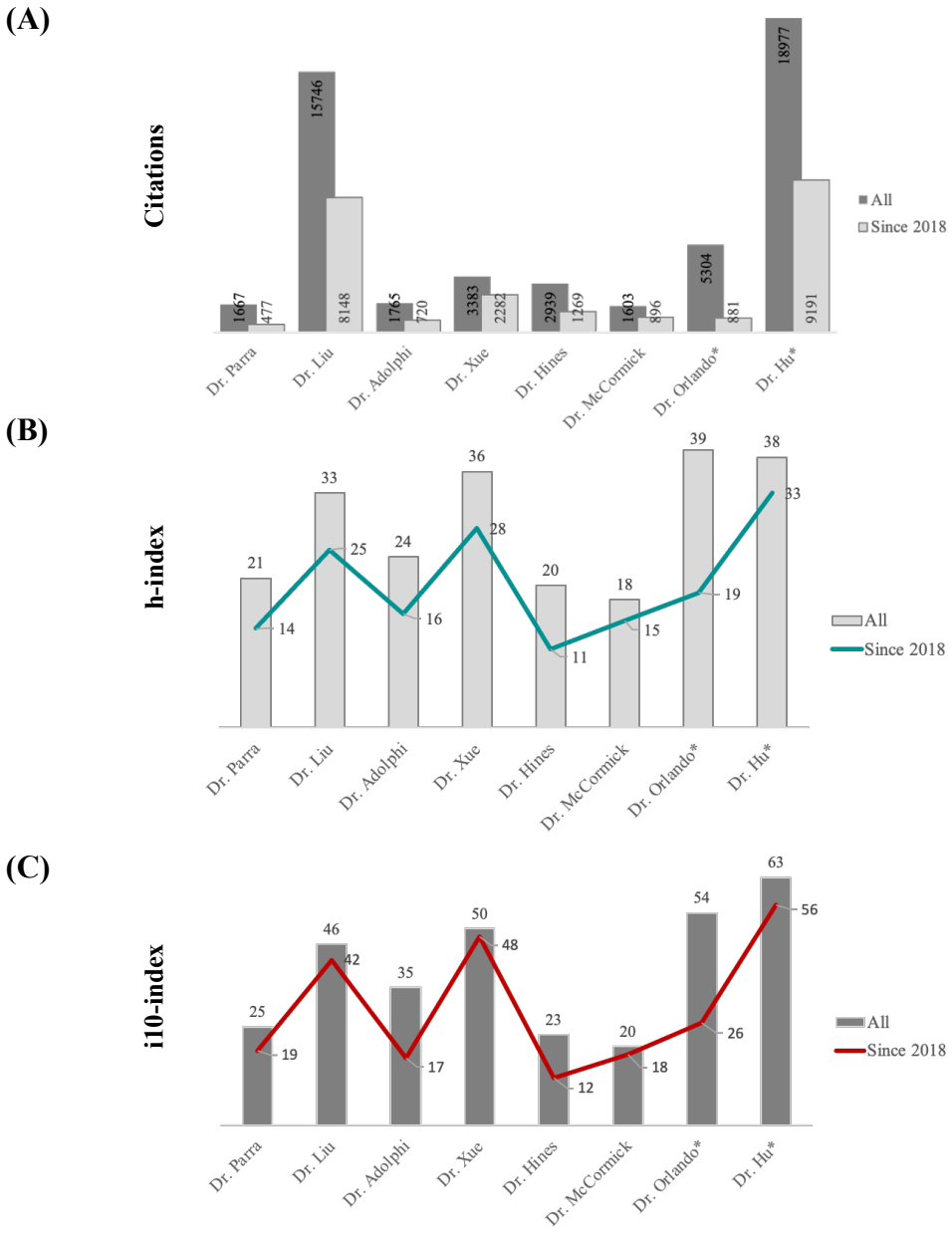


Figure 6.2 Total citations, h-index and i10-index

(A) The bar chart represents the number of citations received by each faculty member in our department. The dark gray bars represent all citations, while the light gray bars show citations received since 2018. The vertical numbers denote the citation count. **(B)** The chart displays the h-index value for each faculty member in our department. Vertical bars represent the overall h-index, while the teal line displays the h-index value since 2018. Horizontal numbers indicate the

h-index. **(C)** The chart shows the i10-index value for each faculty member in our department. Vertical bars represent the total i10-index, while the red line displays the i10-index value since 2018. Horizontal numbers indicate the i10-index. Current faculty members are identified by their names, retired faculty members are indicated by an asterisk (*). The data was obtained from Google Scholar for faculty members with profiles, and was accessed in February 2023.

(3) Presentations (oral and poster). The BMB faculty and students are very active at disseminating their research findings in many local, national and international scientific meetings every year. During the period of 2017-2023, on average, 4.4 trainees (**Figure 6.3 B**) and 10.7, 11.1, and 6 faculty members (**Figure 6.3 A**) gave oral presentations per year at local, national, and international conferences, respectively. Additionally, on average of 4.9 trainees and 3.3 faculty members presented posters each year, over the same period (**Figure 6.3 C**).

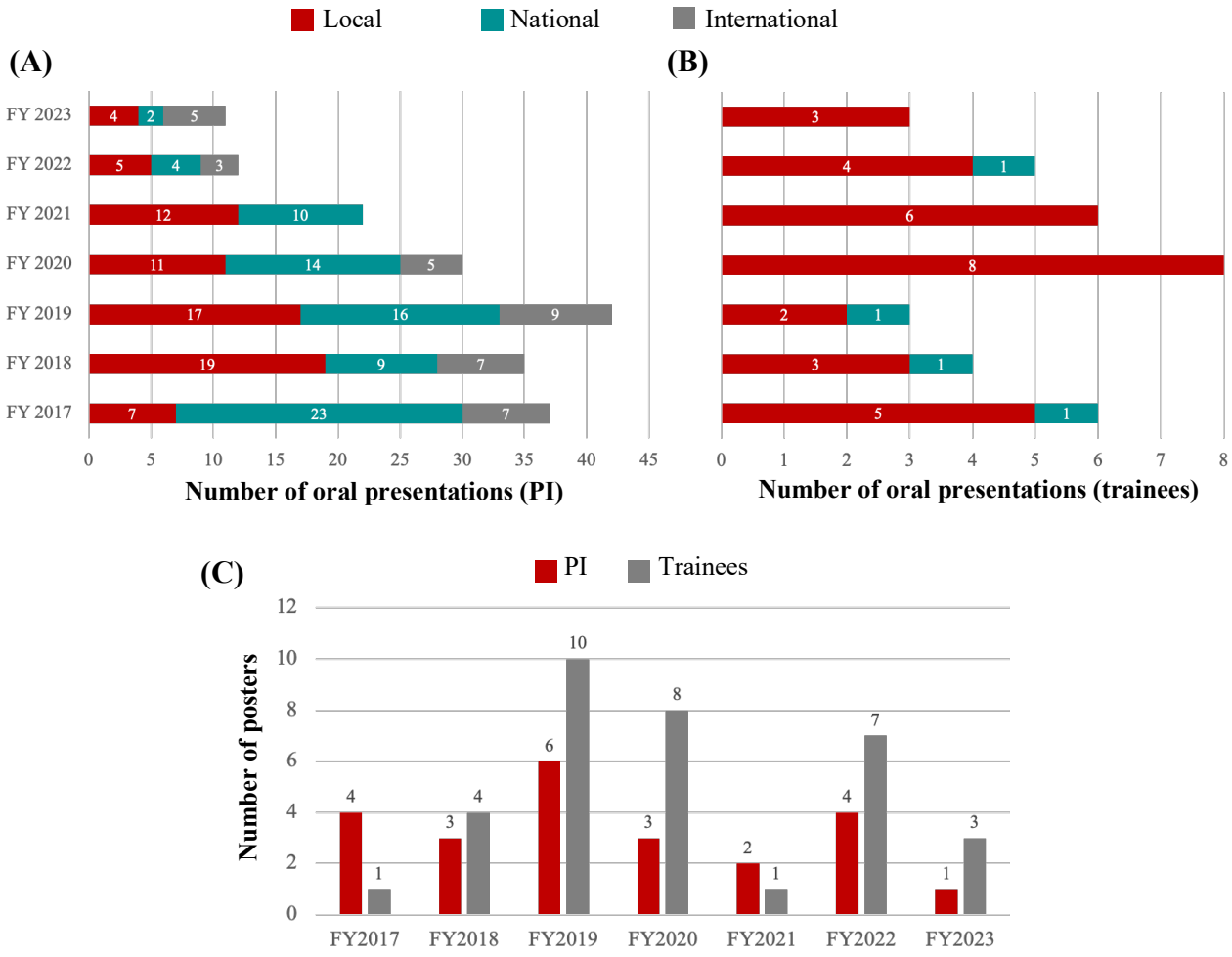


Figure 6.3 Oral and poster presentations

Number of oral presentations by **(A)** the principal investigators (PI) and **(B)** their trainees. **(C)** Number of poster presentations by the PI (red bars) and their trainees (grey bars).

(4) Research grant proposals awarded. The BMB faculty has been very successful securing extramural competitive research grant awards (**Figure 6.4** and **Figure 6.5)**. Their research programs have been continuously funded by a repertoire of agencies including federal agencies and private foundations, as well as internal pilot grant awards the last seven years. These sources include (among others):

- National Institute of Health (NIH).
- American Heart Association (AHA).
- American Diabetes Association (ADA).
- American Cancer Society (ACS).
- American Federation for Aging Research (AFAR).
- Crohn's & Colitis Foundation of America (CCFA).
- American Gastroenterology Association (AGA).
- National Institute of Justice (NIJ).
- Patient-Centered Outcomes Research Institute (PCORI).
- National Academy of Medicine.
- Norn Group, Longevity Impetus Grant.
- American Federation for Aging Research REBOOT Grant.
- Glenn Medical Foundation / American Federation for Aging Research Grant for Junior Faculty.
- University of New Mexico Comprehensive Cancer Center (UNM CCC).
- University of New Mexico, SOM, Research Allocation Committee (RAC).
- New Mexico IDeA Networks of Biomedical Research Excellence (NM-INBRE, NIH).
- New Mexico Autophagy, Inflammation, and Metabolism (AIM) Center of Biomedical Research Excellence (CoBRE, NIH).
- *New Mexico* Center for *Metals* in Biology and Medicine (CMBM) Center of Biomedical Research Excellence (CoBRE, NIH).

In general, the BMB Department and individual faculty members have been successful in securing external funding for research, fellowships, and pedagogical training. **Figure 6.4** shows the research grants awarded annually over the last six years (FY 2017-2022). During this period, the level of funding has varied (**Figure 6.5**). The highest level of funding during this time was granted in FY 2021 ($4.7 M). The same year, the number of grants funded increased to eleven (six federal grants, two state supported grants, and three foundation grants; **Figure 6.4**). The level of new grants awarded decreased significantly in FY 2022, which may be attributable to several factors. First, the BMB faculty was stretched thin as two faculty retired (2019, 2021) and our faculty had to take on additional responsibilities (teaching and service). Second, the BMB faculty led a faculty search which required time and effort that failed to produce a suitable hire. Third, numerous research interruptions during the COVID-19 pandemic surge (2020-2021) impacted their ability to get preliminary data required for their grants, which augmented emotional distress caused throughout the pandemic. To increase faculty extramural funding success, we are encouraging

faculty to participate in grant writing programs and take advantage of grant editing support and mock peer-review processes offered prior to grant submission (see **Criterion 5**).

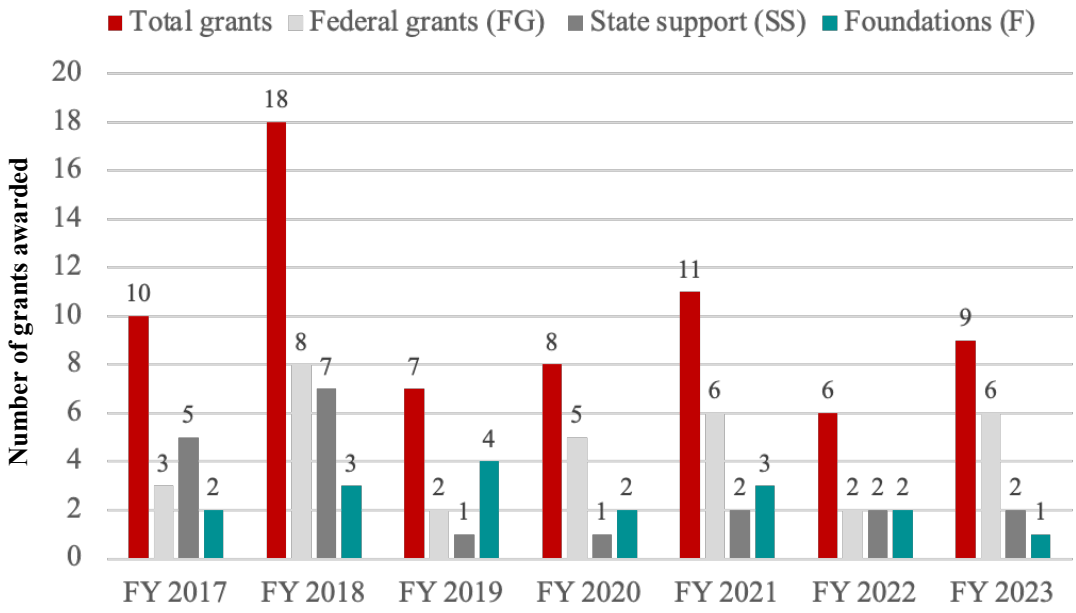


Figure 6.4 New grants awarded to the BMB Department faculty
The number of new research proposals funded by federal, state, and private foundations are shown for the FY 2017 - FY 2023 period. The horizontal numbers at the top of each bar denote the number of grants in each case.

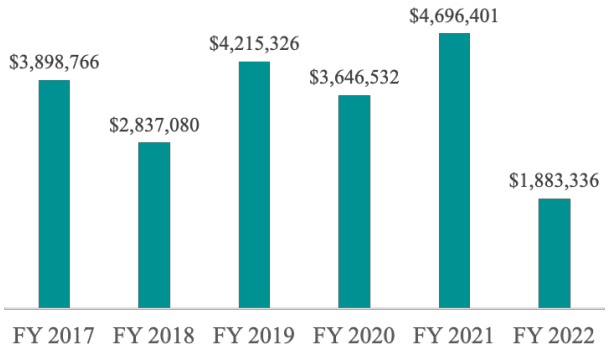


Figure 6.5 Extramural new funding acquired by the department each year
The bar graph shows the amount of extramural new funding received by the department each year through various sources such as federal grants, state support, and foundations. The graph includes data from fiscal years (FY) 2017 to 2022. Horizontal oriented numbers near the top indicate the total amount of grants per fiscal year. FY, fiscal year.

Areas of Strength and Growth for the Unit

Despite limited department resources, we have made important transformations through a clearly defined mission, vision, and strategic priorities. We have invested in research space renovations and equipment and recruited an excellent cadre of junior faculty members. Currently, we have a total of eight tenure-track faculty members, with one additional faculty member set to join our team in March 2023. We also have three faculty in the lecturer track. A strength of the BMB Department is its faculty; their commitment and dedication to advance the department research and education missions and the level of research grants awarded is notable. Funding has increased considerably in the last years (see **Criterion 6C**). Our success has been propelled by the remarkable impact of the BMB faculty peer-reviewed publications (many include students co-authors) and a growing number of productive research collaborations nationally and globally. Also, we have a strong commitment to professional development and scholarly activities such as serving on grant review panels, as manuscript reviewers, editorial board members, and chairing symposia and national meetings. As our culture of research excellence continues to thrive, the BMB faculty are making known to others that metabolism and metabolic disease (e.g., obesity, diabetes, cancer, aging) research at the UNM BMB Department is an active and productive area. Our efforts have been recognized. The BMB faculty has earned many university recognitions for their research (as well as educational) accomplishments since the last APR. These include two title awards: Regents Professor (2016) and Distinguished Professor (2018); an STC UNM Innovation Award (2016); an HSC Excellence in Research Award for Junior Faculty Research (2017, see **Appendix 6.3**; 2021, see **Appendix 6.4**), a UNM Excellence Award for Lecturers (2022); and a CURE Fellow (2022, see **Appendix 6.5**) award.

One of the challenges (but also an opportunity for growth) in the BMB Department is our limited ability to recruit new faculty to replace retirees. Particularly, we need to increase the number of women and URM faculty (see **Criterion 5A**). The BMB Department cannot offer competitive start-ups and lacks the budget for additional salary support. New faculty recruitment will be essential for retention of our current faculty to allow us to sustain this level of success without burnout. Another opportunity for growth is to advance translational research further by collaborating with the Clinical and Translational Science Center (CTSC) at UNM. Our faculty (for example, Dr. Liu) have begun submitting pilot study applications to the CTSC and growth in this area would be important to increase funding going forward.

6C: Research Expenditures *Provide the most relevant metrics (defined above in 6B) for the past 5 years and discuss any trends identified in these data. If applicable, include a summary of the unit's research-related expenditures and explain how external funding (identified by source such as federal grants, state support, private foundations, etc.) is used to support the goals of the unit, including supporting graduate students and undergraduates.*

The BMB Department is constantly working to fulfill an important piece of our mission: to engage in high-quality, innovative research that brings about the discovery, dissemination and application of knowledge (see **Criterion 6B**). The recent additions to our research and development equipment are one key aspect of our faculty research accomplishments. We have made the acquisition of research instruments a priority despite a limited operating budget.

- We have matched HSC equipment grant RFAs to purchase modern, high-end equipment (> $25,000) using departmental and faculty start-up funds. BMB has acquired 5 new instruments using this strategy over the last 5 years including a Promethion Metabolic Screening System, an EVOS FL Auto Cell Imaging System, a Multilabel Victor X3 Plate Reader, a ChemiDoc MP Imaging System, and a QuantStudio QPCR SYSTEM.
- We have also purchased equipment using departmental funds only. The department purchased a Milli-Q IQ 7005 Purification System this year to supply needed high-quality water to both the research and teaching labs.
- We have purchased small equipment with departmental funds and individual faculty contributions (for example, a Nanodrop).
- We have also used departmental funds to pay maintenance and service fee contracts.

Recruitment of new faculty also requires state-of-the-art research laboratory space. BMB remodeled six research laboratories (FY 2017-2023). The BMB Department has made strategic investments in faculty recruitment by providing research start-ups for five tenure-track faculty members in the assistant professor rank. However, due to a lack of funding for competitive start-up packages or salary support, the department is currently unable to recruit any further faculty. While this may not present a threat in the short-term, it is crucial for the department to replace retirees more in the next couple of years. Recruitment of new faculty is essential to maintain at least the same level of success and prevent faculty burnout. In addition to providing research start-ups for new faculty, the department offers financial support for faculty members to participate in grant writing, mentoring, and leadership development workshops. This support is intended to enhance the professional development of the faculty and provide them with the necessary resources to excel. These expenditures enabled us to achieve a high level of research productivity and faculty success that is recognized both within the University of New Mexico and beyond.

6D: Collaborations & External Partnerships *Provide an overview of the unit's collaborations across departments/colleges/campuses within UNM as well with external organizations, including research laboratories, community organizations and other institutions of higher education to develop research programs, community engaged research, and/or scholarly and creative works.*

The BMB Department's extraordinary team efforts have led to very positive outcomes. Productive

collaborations have led to peer-reviewed publications and new grant funding. A select number of these collaborations are summarized below.

Internal Collaborations

Our research faculty are engaged in collaborations with other BMB faculty (for example, Dr. Liu with Dr. Xue and with Dr. Hines), and with other departments at the Health Science Center and Main Campus. Thus, BMB faculty members collaborate with the following departments at UNM, among others:

- *Molecular Genetics & Microbiology (MGM) Department*: collaborations with Drs. Xuexian Yang, Michael Mandell and Vojo Derectic on adipocyte lipophagy, adipose tissue inflammation, and metabolic diseases; with Dr. Khiran Bhaskar on acceleration of circulatory and neurological aging due to wildfire exposures.
- *Cell Biology and Physiology Department*: collaborations with Dr. Helen Hathaway on "*in vivo"* cancer biology.
- *Internal Medicine Department*: collaborations with Drs. Eric Prossnitz, Mark Burge, Nathan Boyd and Eric Bartee on adipocyte lipophagy, adipose tissue inflammation, and metabolic diseases; with Dr. Manoocher Soleimani on nephrology; and with Dr. Tarun Rustagi and Mark Unruh on CKD disease in American Indian communities.
- *College of Pharmacy*: collaborations with Dr. Matthew Campen on the impact of microplastics on colorectal cancer, and on acceleration of circulatory and neurological aging due to wildfire exposures.
- *Departments of Pathology*: collaborations with Drs. Rama R. Gullapalli on qPCR analysis and David R. Martin on pathological scoring.
- *Departments of Surgery*: collaborations with Dr. Vinay Rai on human colorectal cancer tissue acquisition.
- *UNM Department of Anthropology and Western Michigan Homer Stryker School of Medicine*: collaborations with Dr. Heather Edgar and Dr. Shamsi Berry on creating the New Mexico decedent image database (nmdid.unm.edu).

National Collaborations

BMB researchers have active collaborations with researchers at other institutions, including among others:

- *Office of the Medical Investigator (OMI).*
- *University of Texas Health Science Center at San Antonio (UTHSA)*: collaborations with Feng Liu on fat hormone adiponectin and its signaling.
- *University of Texas Southwestern Medical Center (UTSW)*: collaborations with Dr. Philipp Scherer on fat hormone adiponectin.
- *City of Hope*: collaborations with Dr. Qiong Wang on the heterogeneity of adipocytes and with Dr. Wendong Huang on the regulation of immune cell activation by CaMKII.

- *University of Michigan*: collaborations with Dr. Ling Qi on metabolism; with Dr. Krishnan Raghavendran on laser capture microdissection; with Drs. Justin Colacino and Jason Spence on immunoassay; and with Dr. Yatrik Shah on metabolomics and cell signaling.
- *Havard University*: collaborations with Dr. Sheng Hui on colorectal cancer animal models.
- *Northwestern University*: collaborations with Dr. Hua Geng on colitis-associated colorectal cancer models.
- *University of Utah*: collaborations with Dr. Ellen Beswick on cell models.
- *Rutgers University*: collaborations with Dr. Bishr Omary on hypoxia signaling.
- *University of Pittsburg*: collaborations with Dr. Sadeesh Ramakrishnan on hypoxia signaling.
- *University of Washington*: collaborations with Dr. Alex Mendenhall on a couple of related projects focused on both aging and cancer, including caloric restriction, insulin signaling and Ras in neoplasia formation and survival, and systems biology of hallmarks of aging and organelles.
- *Mt. Sinai*: collaborations with Dr. Alan Seifert on the development of the post-mortem brain MRI protocol.

International Collaborations

BMB researchers have active collaborations with researchers at international institutions, including among others:

- *Zhejiang University (China):* collaborations with Drs. Ying Xiao and Zhangfa Song on enteroid culturing.
- *Central South University (China)*: collaborations with Dr. Xiang Wu on experimental colitis.
- *Fujian Medical University (China)*: collaborations with MM. Mingkun Zhan on inflammation.
- *Nanjing Red Cross Blood Center (China)*: collaborations with Mr. Libo Zhang on inflammation.
- *Nanjing Medical University (China)*: collaborations with Dr. Yu Fu on cancer biology.
- *Damanhur University (Egypt)*: collaborations with Dr. Muobarak J. Tuorkey on colorectal cancer.
- *University of Buenos Aires (Argentina)*: collaborations with Dr. Valentina Salzman on the effects of eisosomes on lifespan.
- *University of Tokyo (Japan)*: collaborations with Dr. Yohsuke Makino on forensic radiology.
- *Tokyo Medical and Dental University (Japan)*: collaborations with Dr. Kana Unuma on forensic pathology.

6E: Student Opportunities *Describe the opportunities for undergraduates and graduate students to be involved in research, innovation, discovery, scholarship, and creative works through curricular and extracurricular activities.*

One of the most important missions of the Department of Biochemistry and Molecular Biology is to provide a research experience for students majoring in Biochemistry. We have been deeply involved in mentoring with the goal of empowering young scientists to reach their full potential. Our faculty have extensive experience in developing and administering new research projects, motivating and involving students in their research projects, and collaborating with other researchers to produce high-quality publications and outcomes.

Over the past 4 years, we have increased student exposure to independent research opportunities. The number of participants has increased from 50% in the graduating class of 2019 to 76% in 2022. Moreover, many students who elected to do research are co-authors on peer-reviewed publications (scientific articles and/or book chapters).

Our department provides two in-program research opportunities:

(1) Undergraduate Research (BIOC 499): Students can take up to 6 credits of BIOC 499 throughout their college career (including summers), which allows for exploration of biochemical research in a flexible, informal environment. A written progress report is required during participating semesters.

(2) BMB Senior Honors Research Program (BIOC 497 and 498): Many BIOC 499 students transition into the BMB Honors Research Program. Students receive departmental research honors at graduation if they complete both BIOC 497 and 498 (3 credits each), maintain a GPA $\geq$ 3.2, write an honors thesis based on their research, and orally present their thesis at the annual BMB Departmental Research Day. Upon completion of the Honors requirements, a student will receive *Cum Laude*, *Magna Cum Laude*, or *Summa Cum Laude* honors in Biochemistry depending on the quality, quantity of effort and presentation of their research work and thesis. For each hour of credit, the student is expected to spend 3 to 4 hours per week in the laboratory. The student is required to meet, at minimum, once a week with the research mentor to discuss their progress.

Since 2019, 30.2% of our majors have participated in one of these opportunities. Each year 5-10 honors students defend their thesis.

In addition, we advertise and encourage our students to take advantage of the various external programs available for undergraduate research, many of which are in-house at UNM. The prominent programs at UNM include MARC, McNair/ROP, IMSD and UPN:

(1) Minority Access to Research Careers (MARC) Program: the MARC Program is funded by a competitive grant from the National Institutes of Health and offers research training and support to prepare undergraduate scholars for graduate school. The primary goal of this program is to increase the number and competitiveness of URM students engaged in biomedical

research by increasing the availability of research training opportunities. MARC supports talented UNM URM undergraduates with training that directly prepares them for careers in biomedical research. MARC supports students in various fields of research including biology, chemistry, cell and molecular biology, genetics, biophysics, mathematics, pharmacology, biochemistry, bioengineering, or computer science.

(2) Undergraduate Pipeline Network (UPN): The Undergraduate Pipeline Network summer research experience is designed to cultivate students' interest in research while helping them to acquire skills needed to apply for and succeed in post-baccalaureate education (https://hsc.unm.edu/medicine/education/reo/undergraduate/upn/). The program provides summer scholarships and students can choose from research in either Biomedical Science or Community-Based/Health Disparities. The program period covers 10 weeks and students participate in the program a minimum of 40 hours per week. Opportunities are included to increase students' competency in communication skills including using the data collected during their research to prepare presentations/poster presentations and preparing applications to graduate programs (writing the essay, interviewing skills). Students also increase their proficiency in working one-on-one with mentors and gain professional skills in research etiquette, ethical conduct of research, and being a member of a multi-disciplinary team. The UPN introduces students to career options in clinical and translational science. The students have the opportunity to observe research activities in different settings, such as within core facilities and within clinical and community-based settings, and are exposed to other facets of clinical and translational research that are different from the one to which they are assigned. Each year, UPN students, who are >75% under-represented in biomedical science, have demonstrably benefited from a research intensive and culturally grounded curriculum that values cultural identity while promoting development of science identity and paths for students to further their education and career opportunities in New Mexico and nationally. The inclusion of relevant peer mentors and role models further enables diverse students to develop their science identities within this supportive environment.

(3) Ronald E. McNair Scholars Program and the Research Opportunity Program (ROP): The mission of the University of New Mexico's Ronald E. McNair Scholars Program and the Research Opportunity Program (ROP) is to prepare high achieving undergraduate students for admission into graduate school to pursue master's and doctoral degrees. The McNair/ROP programs offer eligible students the opportunity to conduct faculty-mentored research as well as travel opportunities and support during the graduate application process. The McNair/ROP programs serve students who are first generation college students, from low-income backgrounds, and/or members of ethnic groups traditionally under-represented in graduate school. Members of the programs participate in numerous activities designed to prepare them for the rigors of graduate education. Scholars who complete the program have been admitted to and earned degrees from many well-respected universities throughout the world, including Harvard, Yale, Cornell, Columbia, UC-Berkeley, UW-Madison, Northwestern, Cambridge, and UNM.

Since 2019, 32.3% of our majors have participated in one of these external research opportunities. UNM's proximity to two National Laboratories provides ample internship opportunities for our students. Internships are advertised readily (through advisors and on social media). Since 2019, 18% of our majors have participated in an internship at one of the national labs.

Students' Outcomes from Undergraduate Research

The creative works of our graduating students have been recognized by different scholarships, awards/honors and leadership roles through curricular and extracurricular activities (**Figure 4.18** and **Appendix 4.7** in **Criterion 4F**). Our students participate in community engagement and extracurricular activities during their undergraduate career, these experiences are summarized in the **Criterion 4F**.

As mentioned above, undergraduate students also have the opportunity to participate in independent research experiences. They work closely with a faculty member, gain hands-on experience in research, explore their interest in science, are intellectually challenged, find out what it is like to do research, and get help on their applications to graduate/medical schools. Graduate and undergraduate students are co-authors on peer-reviewed publications (indicated with asterisks in our faculty's CVs). They disseminate their findings to the local and national research communities in oral and poster presentations (for example, attending meetings for SACNAS, ABRCMS, NM-IMBRE, etc.). The number of undergraduate student presentations (oral and posters) is shown in the **Figure 6.3 B** (oral) and **Figure 6.3 C** (posters). Creative work published and/or presented (oral/poster) by our undergraduate students while working in our research laboratories is highlighted in the **Appendix 6.6**. Owing to our faculty members high impact biomedical research, the majority of students who pursue matriculation into post-bac, graduate, and professional programs at graduation are accepted.

To evaluate student satisfaction with research experiences we use a departmental exit survey (**Appendix 4.1**). Graduating seniors are offered the option to provide additional comments on the survey regarding their research experiences. A selection of the many qualitative comments is provided below:

"I think the Senior Honors Research program was especially beneficial given the responsibility and depth of our projects. It gave me a better understanding of how to complete a project from start to finish as well as the skills required to manage and maintain a project."

"Incredible experience in which I gained knowledge on research techniques, writing, speaking in front of an audience, participating in weekly lab meetings and presenting new research in the field, and how to work as a team in academia. "

"My experience in both was fantastic. Both of these internships forced me outside of my comfort zone but taught me so much as an individual both academically and personally."

"I really enjoyed working in a research lab, conducting experiments, further investigating a specific area of research, and applying my biochemistry knowledge. It gave me an upper hand when I took Biochemical Methods having already been familiar with the lab techniques and technology."

Dissemination of Research Opportunities by BMB Faculty Members and Advisors

BMB faculty members disseminate research opportunities while attending orientations for majors, discuss their research focus, and distribute handouts that outline opportunities for research in the BMB Department (BIOC 497, BIOC 498 and BIOC 499) and other programs (UPN, MARC/U-RISE, Lane, ROP/McNair, etc. described above). We also outline work-study options to participate in research during orientation. The BMB faculty and graduate students have manned a table at UNM STEM fair. Student advisors distribute the BMB welcome letter to majors in which we encourage participation in research, as well as offer tips on how to find research labs and how to thrive in the lab setting. BMB faculty visit classrooms in our upper-level course BIOC 445 the first day of classes to provide information on research opportunities including lab openings. We also disseminate research opportunities for students through the A&S and BMB advisors and highlight student accomplishments on Instagram (instagram.com/unm_bmb). We have open houses with laboratory tours during BMB research day (annually in April) and integrate these with course schedules when feasible. Last but not least, we have revised the credit hours for undergraduate research to add flexibility and meet the students' needs and schedules. Many of these initiatives were interrupted during the pandemic. Now that in-person classes have resumed, BMB faculty and graduate students are restarting these activities as well as the ÉLITE Career Mentoring Program to motivate student research involvement.

Criterion 7. Peer Comparisons

The degree/certificate program(s) within the unit should be of sufficient quality compared to relevant peers. (If applicable, differentiate for each undergraduate and graduate degree and certificate program offered by the unit.)

7A: Analysis *Choose 3 peer departments from the Peer Comparison Template (Appendix 7.1) to contrast with the unit. After completing the Template for these departments, provide an analysis of the comparison. Please describe aspects of your program that are unique compared to these peers.*

- *The unit may choose to select an alternative peer institution designated by a relevant regional, national, and/or professional agency.*

We have selected a total of five programs for comparison, four of which are housed at Carnegie and designated R1 (very high research activity), and one of them is designated as R2. Of the five institutions, two of them are Hispanic-Serving Institutions (HSIs) and two are emerging HSIs. The **Table 7.1** lists our "peer" institutions.

Table 7.1 Peer institutions

	Carnegie R1	Public or Private	Hispanic-Serving (HSI)*	Minority Serving (MSI)
University of New Mexico	Yes	Public	HSI	MSI
University of Arizona	Yes	Public	HSI	No
New Mexico State University	Yes	Public	HSI	MSI
University of Utah	Yes	Public	No	No
University of Oregon	Yes	Public	Emerging HSI	No
Chapman University	No, R2 status	Private	Emerging HSI	No

*Hispanic-Serving Institutions (HSIs) are defined in Title V of the Higher Education Act as not-for-profit institutions of higher learning with a full-time equivalent (FTE) undergraduate student enrollment that is at least 25 percent Hispanic. The Emerging HSI status is given to institutions with at least 15 percent Hispanic enrollment.

The Peer Comparison Template (provide in the APR manual) comparing our unit with peer departments is included as **Appendix 7.1**. As seen in this table, in addition to choosing three departments for peer comparison, we have included additional programs for comparison. We have

included in this comparison the University of Arizona, New Mexico State University and Chapman University, whose programs are accredited by ASBMB. Likewise, we have included the University of Utah and the University of Oregon. Because undergraduate Biochemistry programs are often part of larger programs, it is difficult to obtain comparison data of size of program (undergraduate degrees awarded, student population, and number of faculty) and/or the relative "successes" of the program.

The BMB Department has been ASBMB accredited since 2015. From the collected data comparing UNM with our peer programs, the UNM BMB Department has the highest number of Biochemistry degrees awarded per university student body population at 0.34% (**Figure 7.1**). The closest institution with regard to the number of Biochemistry degrees awarded was the ASBMB-accredited Chapman University (0.28%) and the University of Utah (0.26%), both of which have dedicated Biochemistry programs. Although our Program is small in some aspects in comparison to other programs, our faculty have the ability to tailor teaching to maximize biochemical learning (both in the class and laboratory). Having a dedicated discipline allows our faculty and students to bond not only as mentors/mentees, but as fellow scientists with similar interests.

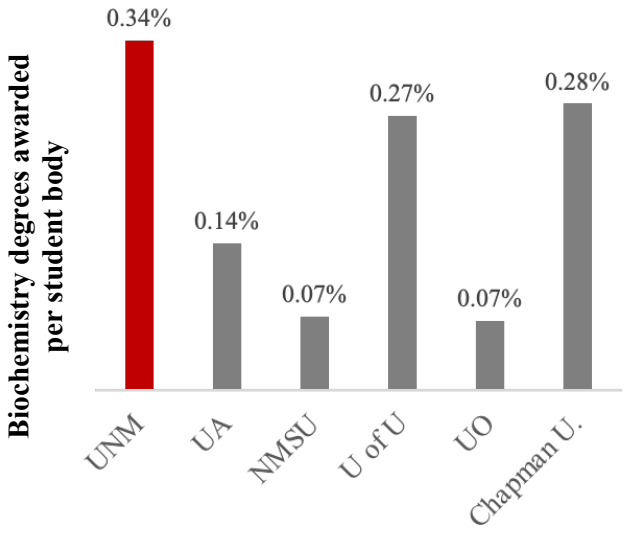


Figure 7.1 Biochemistry degrees awarded per student body
The percentage of Biochemistry degrees awarded per university student body population is shown. Data are detailed in the Peer Comparison Template table (**Appendix 7.1**). UNM, University of New Mexico; UA, University of Arizona; NMSU, New Mexico State University; U of U, University of Utah; UO, University of Oregon; and Chapman U, Chapman University.

Criterion 8. Resources & Planning

The unit should demonstrate effective use of resources and institutional support to carry out its mission and achieve its goals.

8A: Budget *Provide an analysis of the unit's budget, including support received from the institution and external funding sources.*

- *Include a discussion of how alternative avenues (i.e., summer bridge programs, course fees, differential tuition, etc.) have been explored to generate additional revenue to maintain the quality of the unit's degree/certificate program(s) and courses.*

The BMB Department faculty and staff are hired through the School of Medicine, which provides faculty compensation, as well as resources traditionally used to support fundamental programmatic activities (e.g., teaching assistantships and staff support), supplies for office, classroom, and laboratory instruction and instrumentation for the BIOC 448L course. The department Administrator (Heather Armstrong) and Accountant (Tyler Humble), in consultation with the department Chair (Dr. Parra), create a proposal for the budget every year, which is then reviewed in a meeting with the SOM Dean (Dr. Patricia Finn) and Finance Director (Kristin Gates). This is an open meeting that anyone can attend.

Instruction and General (I&G) funds are the only recurring revenue (unrestricted) of the department ($1.21 – 1.33 M, FY 2016 – FY 2022). Since FY 2016, the department receives tuition fees from each student enrolled in the BIOC 448L course. Thus, the undergraduate biochemistry laboratory generates $8,750 (average not including FY 2021) attributable to student laboratory fees (**Figure 8.1**). The Biochemistry Program tuition increased in the FY 2019 and FY 2020, however in FY 2021 the Biochemistry Program did not generate any tuition as a consequence of the COVID-19 pandemic and remote instruction.

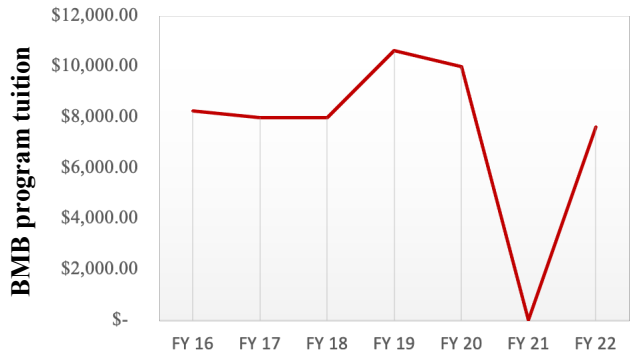


Figure 8.1 Undergraduate Biochemistry laboratory (BIOC 448L) fees
The fees for the undergraduate Biochemistry laboratory are shown from FY 2016 to FY 2022. FY, fiscal year.

The department also receives $14,079 in support through allocations from the BA/MD Degree Program for the instruction of the biochemistry course BIOC 423. However, this support is not additional revenue on the department's operating ledger; it is a reduced expenditure.

These unrestricted funds support a significant proportion of the total faculty compensation (on average 74.5%, FY 2016 – 2022, **Figure 8.2**). The remaining is funded by extramural (restricted) support which BMB has gradually increased (on average 25.5%, FY 2016 – 2022, **Figure 8.2**). The average BMB faculty research time supported by grants has been 30% since FY 2019. Many faculty are now extramurally funded (86% of the faculty in tenure track). Any additional unrestricted revenue is used to support the operational activities which are fundamental to the teaching and research missions of the department such as: TAs and laboratory supplies for the Undergraduate Biochemistry Program, instrument maintenance & service, staff salary, and new faculty start-up packages.

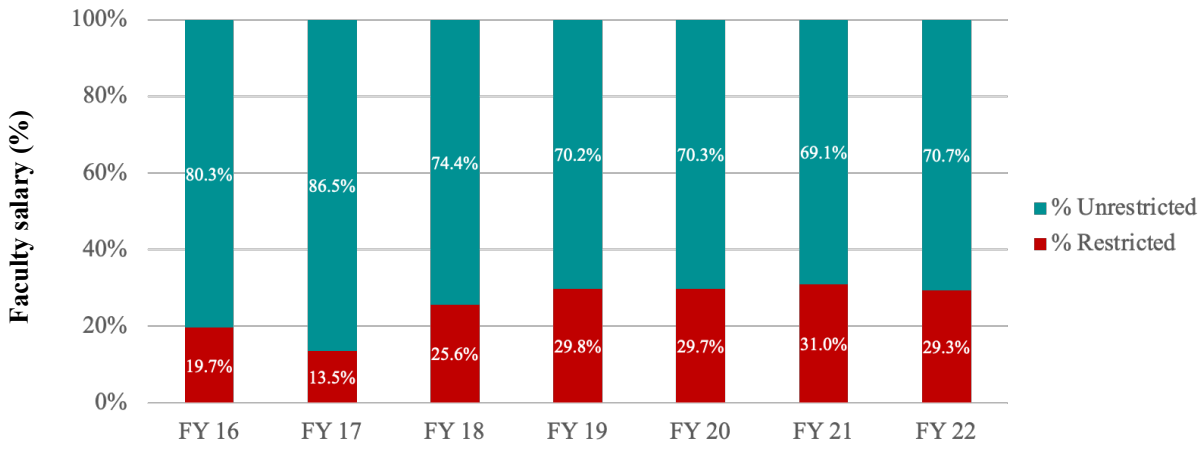
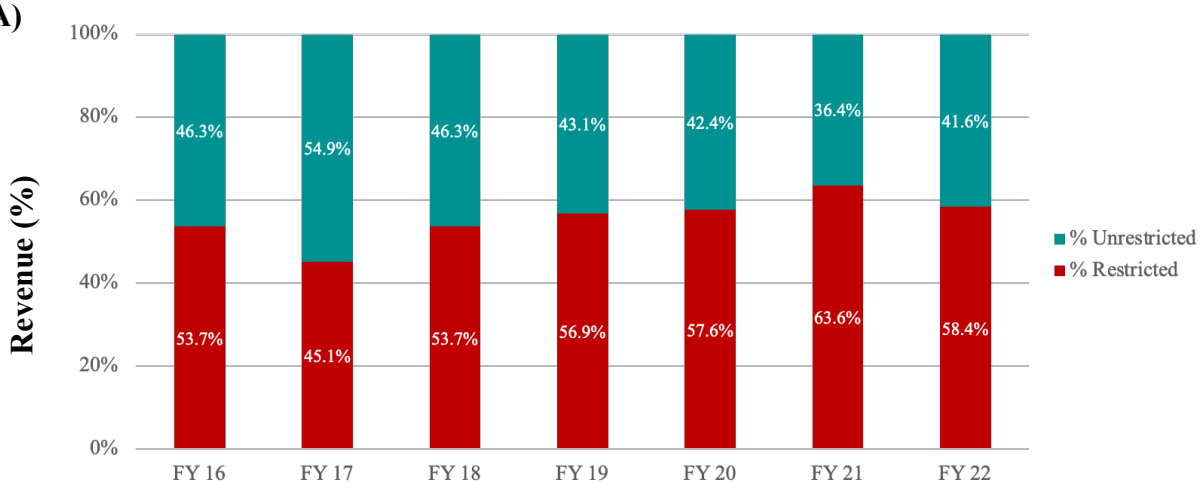


Figure 8.2 Restricted and unrestricted funds for faculty salary
Faculty salary divided into the percentage covered through restricted and unrestricted funds is shown from FY 2016 to FY 2022. FY, fiscal year.

The proportion of the total revenue from restricted sources is trending up with a marked increase seen from 45.11% in FY 2017 to 63.62% in FY 2021. Graph values are shown from FY 2016-2022 (**Figure 8.3**).

(A)



(B)

	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022
Unrestricted	$1,217,779.00	$1,238,472.00	$1,292,887.00	$1,340,530.00	$1,368,028.00	$1,297,939.00	$1,335,061.00
Restricted	$1,410,662.00	$1,017,625.00	$1,496,745.00	$1,767,589.00	$1,860,824.00	$2,270,222.00	$1,872,073.00

Figure 8.3 Revenue

(A) Restricted and unrestricted revenue percentages per fiscal year (from FY 2016 to FY 2022) is represented in the top bar graph, and **(B)** the corresponding revenue value is shown in the table underneath.

8B: Staff *Discuss the unit staff and their responsibilities (including titles and FTE). Include an overall analysis of the adequacy and effectiveness of the staff composition in supporting the mission and vision of the unit.*

Currently, the department office is staffed with three administrative personnel (**Table 8.1**) that provide secretarial and administrative support services for eleven full-time faculty.

Table 8.1 Administrative personnel in the BMB Department

Staff's name	Title	FTE
Heather E. Armstrong	Department Administrator R2	1.0
Tyler C. Humble	Accountant II	1.0
Galen E. Billings	Administrative Assistant III	1.0

The excellent support of the BMB staff who advance the mission and vision of the Biochemistry Program was recognized and awarded with the **2022 Mortar Board Award** by the Mortar Board Senior Honor Society Maia Chapter at The University of New Mexico (**Appendix 8.1**). This award is a significant recognition for their contribution to furthering the values of scholarship, leadership, and service at UNM and for their service to UNM students. Our Accountant II, Tyler

C. Humble, was nominated and awarded with the **2022 Dean's Staff Award** by the School of Medicine at UNM (**Appendix 8.2**). This award is a recognition of his contributions in helping to meet our mission of advancing the health of all New Mexicans, and the exemplary ways he models our core values of excellence, accountability, compassion, diversity, integrity, professionalism, ethical behavior, social responsibility, creativity, and innovation. Our department Administrator R2, Heather E. Armstrong, was awarded with the **2021 Outstanding Staff Award** by Provost James Holloway, in recognition to the extraordinary service provided to the Provost's units (**Appendix 8.3**).

Each staff member provides specific services to the department, enumerated as following:

HEATHER E. ARMSTRONG, Department Administrator R2.

Summary
Ms. Armstrong oversees and administers programs, strategies, and initiatives designed to develop, enhance, and support the missions of the BMB, a research-intensive academic department of the University, as measured by annual revenue and the number of faculty and staff. She also oversees all internal and external business activities, accounting and finance, grant administration, and human resources. She coordinates the administrative activities of the post-award contracts and grant functions of all units within the department. She coordinates facility and resource management, information services, and general department administration. She participates with the Chair and senior departmental faculty in strategic and operational decision making as a member of the department's leadership team. Her specific duties and responsibilities are outlined below.

TYLER HUMBLE, Accountant II

Summary
Mr. Humble performs advanced, multifaceted accounting and related functions in areas such as ledger maintenance and analysis, cost and/or financial analysis, fund reconciliation, posting, and inventory control. He also analyzes complex financial and operating data and prepares management reports, financial statements, and projections. He also assists faculty with research proposals. His specific duties and responsibilities are outlined below.

GALEN BILLINGS, Administrative Assistant III

Summary
Mr. Billings acts as the first point of contact for individuals and organizations outside the department. He performs and/or oversees a variety of associated administrative, fiscal, staff support, and planning activities, some of which require advanced or specialized knowledge and skills, such as budget administration and control, equipment, facilities, and inventory management, specialized recordkeeping and database management, and/or specified information-gathering

projects and tasks. He coordinates and facilitates meetings, program functions, and/or special events, as appropriate. He also trains and oversees other staff and/or students and hires student employees. He also processes all departmental payroll for 2R (bi-weekly pay) and 5R (monthly) grade employees.

8C: Advisory Board *If the unit has an advisory board, describe the membership, their charge, and discuss how the board's recommendations are incorporated into decision-making.*

In FY 2016, the BMB Department established a Chair Advisory Committee to provide recommendations for resource allocation and strategic planning. The committee was comprised of three senior faculty members: Dr. David Vander Jagt, who brought research expertise as the BMB Department Vice Chair; Dr. Marcy Osgood, who offered her knowledge in undergraduate medical education as the Assistant Dean; and Dr. Jeffrey Griffith, who provided his administrative expertise as the Senior Advisor to the Dean and former Executive Vice Dean and Biochemistry and Molecular Biology Chair. These individuals brought a well-rounded array of skills to the committee to support its mission.

The Chair of the BMB Department, Dr. Parra, is establishing an Advisory Board comprised of individuals with a deep understanding of the department to provide valuable input. The members will have the opportunity to contribute their expertise and offer recommendations to enhance students' experiences in learning, training, and career preparation. The goal is to continuously improve the Program to align with current career needs and trends, and ensure the success and relevance of the Biochemistry Program.

The Advisory Board will provide input on curriculum development, research initiatives, and resources, as well as support the development of partnerships with medical and health professionals' schools, and other academic and research institutions. Additionally, members will offer mentorship and career guidance to students, advocate for the Program within their professional networks, and stay informed about advancements in biochemistry to share insights with the department.

The Board consists of four faculty members from the BMB Department, Dr. de Lorenzo (Undergraduate Educational Advisor), Dr. Meilian Liu (Medical Educational and Research Advisor), Dr. Curt Hines (Undergraduate Honors Research Advisor), Dr. Tyrel Bryan (DEI Advisor). The Board also includes two alumni, Sarah Dallo who will offer her PhD career research perspective; and other who will offer the professional health perspective. One UNM faculty from a CAS department (TBD) and one external member. Members are expected to meet at least once annually during the summer, with a possible second ad hoc meeting if necessary.

Criterion 9. Facilities

The unit facilities should be adequately utilized to support student learning, as well as scholarly/research activities.

9A: Current Space *Provide an updated listing from UNM's current space management system of the spaces assigned to your unit (e.g., offices, conference rooms, classrooms, laboratories, computing facilities, research space, etc.). Discuss the unit's ability to meet academic requirements with current facilities.*

- *Explain if the unit has any spaces that are not documented in UNM's space management system.*
- *Explain the unit's unmet facility needs.*
- *If applicable, describe the facility issues that were raised or noted in the last APR. What were the results, if any?*

The Department of Biochemistry and Molecular Biology is mainly located within the Biomedical Research Facility (BRF; ground, first and second floors) and at the Reginald Heber Fitz Hall (second floor) buildings. It is located on the north side of campus, within the Health Sciences Center, School of Medicine at UNM, which is within walking distance of the UNM Main Campus. The **Table 9.1** (below) details the spaces assigned to our department (not included in the list of assigned space are classrooms and computing facilities).

Classroom Space

Ample classroom space is available on the Main Campus, reserved through the central scheduling office. The majority of classrooms are designed for lectures and can accommodate small groups of 20-30 students and classes as large as 150-250 students. Classroom space is also available to our department on the Health Sciences Center Campus. This space includes classrooms in the Biomedical Research Facility (room 203 and 218), and in the Domenici Center for Medical Education. These classrooms are fully equipped with modern educational amenities, including computer consoles, projection systems, document cameras, large LCD monitors, and mobile furniture allowing classroom organization for various learning styles.

Learning Studio Classrooms

The learning studio classrooms in the Collaborative Teaching and Learning Building (CTLB) were designed to enhance and enable collaborative learning centered on students. The BMB Department holds three of our courses in the CTLB classrooms (BIOC 423, BIOC 445, and BIOC 446). The room is arranged to facilitate group learning with the instructor working from the middle of the room to organize and facilitate student outcomes. The room includes two large screen projectors, wall mounted TVs, a 4x6 whiteboard per group (with access to additional small whiteboards), and fourteen 9-seat round tables to cater to group-supported learning. Similar learning studios can be reserved in Domenici Center for Medical Education.

Table 9.1 Spaces assigned to the Biochemistry and Molecular Biology Department
This table includes the department rooms, square footage, designated use and occupancy.

Building	Floor	Room	Assignable Sq Ft	Space Category	Space Sub Category	Space Type Name	Allocated Group Number	Allocated Group Percent
A0205 - Research Incubator Building (RIB)	01-First	184	287	300 - Office Facilities	3500 - Conference Room	35000 - Conference Room	801E	50%
A0211 - Reginald Heber Fitz Hall	02-Second	284	617	100 - Classroom Facilities	1100 - Classroom	11000 - Classroom		
		268	318	200 - Laboratory Facilities	2500 - Research/Non-Class Laboratory	25001 - Research Lab - Wet		
		252	331					
		256	332			24001 - HSC Research Lab - Wet		
		261	1,507					
		264	558					
		270	21	240 - HSC Organized Research	2400 - HSC Organized Research			
		272	68					
		274	58			24003 - HSC Research Support		
		276	471					
		276A	81					
		276B	32					
		249	311			31007 - Office - Administrative		100%
		251	184			31001 - Office - Faculty		
		253	120			31007 - Office - Administrative		
		254	71	300 - Office Facilities	3100 - Office	31007 - Office - Administrative		
		255	120			31001 - Office - Faculty		
		257	121			31001 - Office - Faculty		
		258	121			31000 - Office		
		259	120			31001 - Office - Faculty		
A0253 - Biomedical Research Facility		218	408	100 - Classroom Facilities	1100 - Classroom	11000 - Classroom		
	G0-Ground	G-21A	503	200 - Laboratory Facilities	2500 - Research/Non-Class Laboratory	25001 - Research Lab - Wet		
		G-20	149					
		G-20A	503			24001 - HSC Research Lab - Wet		
		G-21	147					
		G-23K	56			24003 - HSC Research Support		33%
		G-23L	266					15%
		G-23LCU1	16					
		G-23LCU2	16					
		G-23MCU3	28			24002 - HSC Research Lab - Dry		
		G-23MCU4	16					100%
		G-23MCU5	16					
		G-23MCU6	28					
		G-23MCU7	16					
		G-23MCU8	16					
		G-25	145					
		G-25A	504					
		G-27	155					50%
	02-Second	217	423	240 - HSC Organized Research	2400 - HSC Organized Research	24001 - HSC Research Lab - Wet	801A	
		220	150					
		220A	503					
		221	144					
		221A	502					
		223CU1	26					
		223CU2	28					
		223CU3	30			24002 - HSC Research Lab - Dry		
		223CU4	53					
		223CU5	48					
		223CU6	20					
		223CU7	47					
		223CU8	20					
		223K	55			24003 - HSC Research Support		
		224	148					
		224A	503			24001 - HSC Research Lab - Wet		
		225	145					
		225A	503					
	G0-Ground	G-23D	106		3100 - Office	31001 - Office - Faculty		100%
		G-23E	106					
		G-23F	106					
		G-23M	155		3150 - Office Service	31504 - Office Srvc - Circulation		
	02-Second	223	347					
		223C	106					
		223D	106					
		223E	106					
		223F	105	300 - Office Facilities				
		223G	105					
		223H	106		3100 - Office	31001 - Office - Faculty		
		223J	115					
A0260 - Pete and Nancy Domenici Hall	01-First	1112	92					
A0289 - Innovation, Discovery and Training Complex	02-Second	2102	201					
		2170	119	240 - HSC Organized Research	2400 - HSC Organized Research	24001 - HSC Research Lab - Wet		
		2175	15					
		2070	190	700 - Support Facilities	7150 - Central Computer Or Telco Srvc	71505 - Informatin Services - Sr		33%
		2090	131			71502 - Informatin Services - Tr		

Computing Facilities

- Departmental: None
- Institutional: The HSC Technology Support of the Health Sciences Library & Informatics Center provides support for core services to all Health Science Center (HSC) faculty and staff for standard HSC-owned and operated workstations.

Facility Issues that Were Raised or Noted in the Last APR

In the 2015 APR it was suggested that the department create/find/increase/share space for the teaching laboratory that is well-equipped with modern tools and equipment, and systematically maintained and upgraded (BMB did not have a designated space to teach a hands-on course). In the spring of 2016, a newly remodeled laboratory space was available for undergraduate courses, located in Fitz Hall, room 284 (North Campus). This laboratory space was assigned to the Biochemical Methods course (BIOC 448L), and allows us to teach two or three 4-hour laboratory sections per semester (16 students per section, 8 work stations). This laboratory has been equipped with modern biochemistry and molecular biology instruments to guarantee an effective and proper laboratory experience for our students, in alignment with the ASBMB requirements. The department has allocated a yearly budget to run, maintain and upgrade the teaching laboratory with modern tools and equipment. The equipment currently available to undergraduate students in the required biochemistry lab course BIOC 448L is listed in **Table 9.2**.

Table 9.2 Equipment available for Biochemical Methods course (BIOC 448L)

Equipment type	Number of students sharing piece of lab equipment in average lab section
Pipette set	2 students
Spectrophotometer	2 students
DNA electrophoresis apparatus	2 students
Protein electrophoresis apparatus	4 students using a protein electrophoresis apparatus with capacity for four gels (one group of 2 students run gel)
Western blot apparatus	16 students
Microcentrifuge	2 students
Thermocycler	16 students
Affinity chromatography units	1 student
pH meter	16 students
Free-standing shaker	16 students
Power supplies	4 students
(2) refrigerators	16 students
(1) -20ºC freezer	16 students
Microwave	16 students
Electroporator	16 students
Vortex mixer	2 students
Pipet aids (automatic and manual)	2 students

Standing incubator	16 students
Spin bench top microfuges	2 students
Water bath	16 students
Heat blocks	2 students
Chemical fume hood	16 students
Ice machine	16 students
Shaking incubator	16 students
Balances (top loading and analytical)	2 students
Sonicator	16 students

Recently, we have remodeled our research laboratories to provide our students with research opportunities while working with our research faculty. Specifically, the laboratories BRF G20-21, BRF 220-221 and BRF 224-225 at the Biomedical Research Facility are ready for this purpose.

9B: Future Space Needs *Discuss any future space management planning efforts related to the teaching, scholarly, and research activities of the unit. Include an explanation of any proposals that will require new or renovated facilities and how they align with UNM's strategic planning initiatives.*

- *Explain the potential funding strategies and timelines for these facility goals.*

Space Needs (FY 2024)

Room 218 in the Biomedical Research Facility requires an upgrade including a new TV monitor, audio/projection system, and furniture. This room is used for classroom activities related to the biochemistry teaching laboratory course (BIOC 448L), student-faculty mentoring and advising, research lab meetings, faculty meetings, BMB seminars, journal clubs, and grant writing clubs. The room is also used by other departments. This room also will house the computers and 3-D printers described below.

Alignment with UNM's strategic planning initiatives: Goal 2, to transform students experiences; and Goal 4, to create long-term sustainability and ensure the necessary resources are available. *Potential funding strategy:* We have made this funding request to the School of Medicine for FY 2024. At this moment, the Biochemistry Department does not have other imminent space needs as we have remodeled our biochemistry teaching laboratory space and research laboratories over the last seven years. Thus, we anticipate that funding for the request will be granted.

Technology Needs (FY 2024)

Computer classroom. A computer classroom will provide up-to-date educational experiences. This technology-rich space will equip our students with bioinformatics skills applied to biochemistry and omics. It will support current courses (in class and outside the scheduled class time), including the biochemistry laboratory, omics, and RNA coding and RNAseq. Importantly,

this resource is required to develop a new elective in molecular medicine which applies bigdata analytics (bioinformatics and omics) and biochemistry principles to understand human disease. Access to the latest technology and developing digital literacy are necessary tools to empower our students, but it missing in our biochemistry students' learning toolkit

Three-dimensional (3D) printers. 3-D printing will materialize many of the student's learning experiences and spike their creativity and innovation. It will be used to create physical models of biomolecules, such as proteins, nucleic acids and enzymes. They will visualize complex structures, conduct structure-function analyzes, and test hypotheses. The technology also enables the creation of custom-made models that can be tailored to specific teaching needs and student learning styles.

Alignment with UNM's strategic planning initiatives. Goal 2, student experience and educational innovation to transform student experiences by creating supportive, intellectually challenging, exciting environments to ensure the lifelong success, upward social mobility, and engagement of all learners. *Potential funding strategy.* We do not have a funding mechanism for this important initiative. Ideally, upgrade of the room BRF 218 would be in the fall of 2023. With this timeline, we plan to upgrade the space, computers, and printers for the Omics course in the spring semester of 2024.

Workforce Needs (FY 2025- 2026)

We have important programmatic and strategic faculty needs essential to improve, strengthen, and/or sustain a high-quality Program. We will have to fill two tenure track faculty vacancies within two-three years due to faculty retirements. These recruits are essential for the sustainable success of our faculty and Biochemistry Program going forward.

First, we need to *recruit* at least one junior faculty to replace retirees within two years. Faculty recruitment also will support growth of the ÉLITE Program to offer high quality career mentoring also to students in other UNM STEM programs. In addition, we will have the workforce to develop the new elective in molecular medicine described above. Faculty recruitment requires additional salary support and start-up funds. A considerable amount of these faculty retirees' salary is from extramural grants and other sources. In addition, we have to budget salary increases commensurate with AAMC compensation benchmarks for four faculty members who will be promoted to associate (3) and full (1) professors by FY 2025. Second, retiree faculty replacement is essential for *retention* of our stellar faculty team. We need to maintain a critical faculty mass to protect junior and mid-career faculty from getting stretched thin and to prevent faculty burnout, which that has been exacerbated by the COVID-19 pandemic.

Alignment with UNM's strategic planning initiatives. We aspire to recruit more women and URM faculty and build a more diverse faculty team. Building a diverse tenure track faculty workforce underpins the UNM 2040 inclusive excellence goal (goal 3). BMB's research is focused on

priorities that directly impact New Mexicans, including metabolic diseases such as cancer, diabetes, aging, obesity, and chronic kidney disease and are strongly aligned with the UNM 2040 goal to advance health care for all New Mexicans (goal 1). These diseases create a significant health burden for the state. Thus, a better understanding of their etiology and development of strategies to prevent and treat them will meet a critical need of the state. Moreover, these faculty positions will enhance teaching and create more opportunities for student research thus helping to build an effective, sustainable biomedical research workforce. Increasing (or at least maintaining) the size of the faculty, will be essential to have a sustainable department that continues to offer high-quality teaching and produce high-impact research. Increased funding for faculty positions will allow the department to build on its strengths in team-science and community engagement and allow development of new collaborations for current faculty members. This will increase the research opportunities for undergraduate students and allow the department to expand on its successful research programs in metabolism and metabolic disease to new, promising associated avenues of research. *Potential funding strategy.* We do not have the necessary funding. We will submit a request for support to the SOM in FY 2025.

Conclusion. Strategic Planning

Discuss the unit's strategic planning efforts going forward to improve, strengthen, and/or sustain the quality of its degree programs (if applicable, differentiate between undergraduate and graduate). Address all criterion, including but not limited to: student learning outcomes, curriculum, assessment practices, recruitment, retention, graduation, success of students/faculty, research/scholarly activities, resource allocation, and facility improvement.

Conclusion

In conclusion, the BMB Department has made important transformations with a clearly defined mission and vision, and strategic priorities despite limited resources. The Biochemistry Program learning goals and student outcomes are aligned with the ASBMB core concepts, including upholding the highest standards of quality and innovation in BMB education. Our department continues to thrive in the research area, offering students hands-on research experience in a culture of excellence and in alignment with the ASBMB requirements. As we strive to make research-based and inquiry-based learning the normal learning mode at UNM we propose the following strategic plan to maximize student learning experiences and outcomes, which is a primary goal of the Program. The strategic plan builds on our strengths and details opportunities for growth going forward.

Undergraduate Biochemistry Strategic Plan

GOAL: BUILD THE WORKFORCE OF NEW MEXICO BY PROVIDING A PREMIER EDUCATION.

Strategy 1: *Maintain all ASBMB requirements to be reaccredited in 2029.*

Tactics

- Continue to offer high-quality courses taught by evidence-based pedagogies.
- Maintain faculty qualifications:
  - Increase faculty participation in medical and graduate education and committees.
  - Maintain high-quality national/international scholarly activities.
  - Increase success rate of external grants.
  - Maintain participation in career development/mentoring workshops.
  - Promote high quality faculty mentoring.
  - Promote BMB involvement in UNM's Biomedical Sciences Graduate Program (BSGP).
  - Implement best practices for retaining existing faculty and recruiting new faculty to build a more diverse faculty team.
- Maintain and expand resources/infrastructure for both education and research (for example, start computer classroom with 3-D capability, develop molecular

medicine upper division elective course that uses bigdata analytics, create scholarships of excellence, etc.).
- Promote Biochemistry undergraduate involvement in research training programs at UNM.
- Promote undergraduate biochemistry honors student research with better public relations and communication.
- Evaluate student outcomes from BMB undergraduate research including Honors Program (BIOC 497, 498 and 499).
- Develop communal rubrics and performance benchmarks that can be used to assess SLOs #2, #3, and #4 throughout a variety of student assignments for the undergraduate electives (BIOC 451, 463, 464 and 495) and the Biochemical Methods course (BIOC 448L).
- Elaborate on UNM assessments for continuous improvement, and evaluate DEI initiatives annually.
- Maintain (and update as needed) the exit student's survey to evaluate BMB students' success.
- Design and distribute a new alumni survey to keep track of student post-graduation career paths.
- Evaluate the impact of the ASBMB accreditation in the Biochemistry Program.

Metrics

- Reaccreditation will be achieved in 2029.

Strategy 2: *Implement curricular modifications of the undergraduate pre-requisite lower division courses, if needed.*

Tactics

- Evaluate the impact of the curricular changes recently implemented in undergraduate Biology and Chemistry and Chemical Biology programs (spring 2023).
- Evaluate the content of revised biology courses to assess suitability for the biochemistry majors' degree (spring 2023).
- If necessary, implement curricular changes required for maintaining high-quality biochemistry education in alignment with new course offering (spring 2023).

Metrics

- Revisions will be implemented in ASAP.

Strategy 3: *Maintain high-quality ÉLITE Career student Mentoring Program*.

Tactics

- Continue to offer high-quality seminars, workshops, and student experiences.
- Increase Program visibility through national presentations, HSC communications, announcements, BMB website, and social media.

- Increase participation of biochemistry students in the ÉLITE Program by tailoring the program to students' needs, career aspirations, and offering flexible times and locations.
- Increase alumni participation by soliciting participation and sharing success stories and testimonials from past participants in the BMB newsletter.
- Introduce the concept of *Peer Advisers* and *Alumni Advisers* to help to support biochemistry students pursue their career goals stablishing long-lasting relations.
- Design assessment measures and develop performance benchmarks to evaluate Students Learning Outcomes (SLO#5, career plans).
- Identify and pursue internal and external funding mechanisms for program growth by getting administrative/digital support and increasing participating faculty and alumni).
- Monitor student post-graduation career paths using the alumni survey.

Metrics

- Over (1-5) years, demonstrate an increase in participation, and post-graduation career success (e.g., type of jobs, pursuing post-graduate education, career satisfaction, etc.).

Strategy 4: *Continue to improve our student majors' ASBMB exit exam scores*

Tactics

- Offer multiple review sessions, supplementary study materials, and individualized assistance.
- Communicate explicit student expectations for the exam.
- Continue departmental funding yearly for students to take the exam.
- Support practice and coaching for students to help them prepare for the exam.
- Increase students' participation by communicating exam benefits and rewarding successful participation in the ASBMB exit exam.

Metrics

- Over (1-5) years, demonstrate an increase in scores.

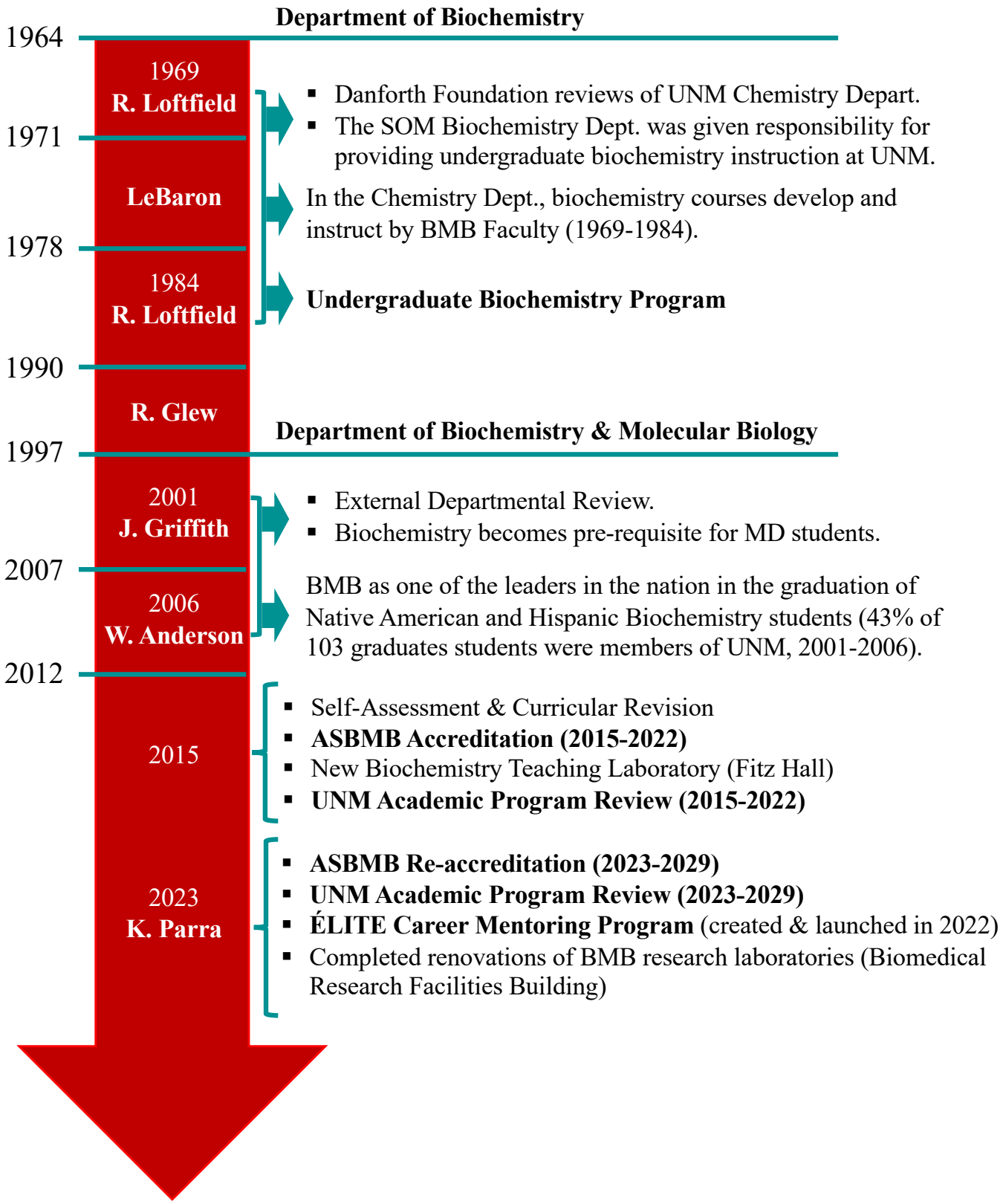
Appendices 1

Appendix 1.1 Milestones 2023

Appendix 1.2 Department of Biochemistry and Molecular Biology organizational structure diagram

Appendix 1.3 ASBMB accreditation letter

Appendix 1.1 Milestones 2023



Appendix 1.2 Department of Biochemistry and Molecular Biology organizational structure diagram

UNM President
Garnett S. Stokes

HSC Executive Vice President (EVP) & Chief Executive Officer (CEO)
Douglas Ziedonis, MD, MPH.

UNM Provost & Executive Vice President for Academic Affairs
James Holloway, PhD.

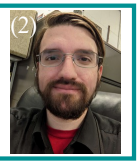
Dean of Health Sciences Center SOM
Patricia Finn, MD.

Interim Dean of Arts & Sciences
Arash Mafi, PhD.

Dept. of Biochemistry & Molecular Biology, Chair
Karlett Parra, PhD.

OFFICE

(1) Heather Armstrong, Administrator.
(2) Galen Billings, Administrative Assistant III.
(3) Tyler Humble, Accountant II.



Faculty

Lecturer III

(1) **Laura de Lorenzo**, PhD.
Director, Undergraduate Program.

(2) **Tyrel Bryan**, PhD.
Director, DEI.

(3) **Brett Manifold-Wheeler**, PhD.

Assistant Professor

(1) **Curt Hines**, PhD.
Director, UG Research Program.

(2) **Xue Xiang**, PhD.

(3) **Mark McCormick**, PhD.

(4) **Nathan Zaidman**, PhD.

(5) **Olga Ponomarova**, PhD.

Associate Professor

(1) **Meilian Liu**, PhD.
Director, UNMHSC Cardiovascular & Metabolic Signature Program.

(2) **Natalie Adolphi**, PhD.
Director, Center for Forensic Imaging.

Professor

(1) **Karlett Parra**, PhD.
Chair.

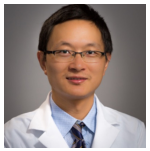
(2) **Vallabh (Raj) Shah**, PhD.
Distinguished and Regents' Professor.

Appendix 1.2 Department of Biochemistry and Molecular Biology organizational structure diagram (continuation)

Hines Lab

Graduate Students
-Katelyn Alvarez

Undergraduate Students
-Tristan Oper
-Alice Rindestig



Xiang Lab

Post-doctoral Fellow
-Zhaoli Liu, PhD

Research Technician
Lavanya Goodla, PhD

Graduate Students
-Mariella Arcos Padilla
-Luke Villareal

Medical students
-Aaron Kao

Undergraduate Students
-Teagan Yan

McCormick Lab

Graduate Students
-Christine Robbins
-Olivia Heath
-Blaise Mariner

Undergraduate Students
-Alexander Achusim
-Izabelle Chavez
-Brendan Sanders
-Jackson Taylor (postbac)

Liu Lab

Scientist
-Xin Yang, PhD

Post-doctoral Fellow
-Xing Zhang, PhD

Graduate Students
-Chunqing Wang
-Que Le
-Sara Arenas

Undergraduate Students
-Ahmad Soueidan

High School Students
-Kevin Wang

Adolphi Lab

Post-doctoral Fellow
-Roberto Maselli, PhD

Technologists
-Kethery Haber
-Dolores Melancon

Appendix 1.3 ASBMB accreditation letter

American Society for
Biochemistry and Molecular Biology
6120 Executive Blvd., Suite 400
Rockville, Maryland
20852-4905

January 6, 2023

Professor Karlett Parra
915 Camino De Salud NE
MSC08 4670.
Albuquerque, NM, 87131

Dear Professor Parra:

Thank you for your application for ASBMB program accreditation. We are pleased to inform you that the ASBMB has accredited your program for the **FULL seven-year term, through December 31, 2029.** Your renewal application will be due in October of 2029.

Aspects of your application that were considered particularly noteworthy included:

- Availability of Elite Career Mentoring program
- A strong roster of faculty, many of whom have completed postdoctoral studies
- Use of inquiry-based components in courses
- Submission of a well-rounded application

We continue to identify ways in which the review process can be improved in both substance and execution. In particular, we would appreciate receiving more information on the following topics as part of your next renewal application:

- How ASBMB accreditation has impacted your program moving forward

Additionally, please note that sections of the application may be modified slightly each year by the accreditation sub-committee. When it is time to apply for renewal, please be sure to use the latest version of the application to ensure all components are adequately addressed.

We encourage you to share this good news with your university community and stakeholders. If you are contemplating the release of an article, blog post or press release, please know that the ASBMB is very interested in helping to promote it. We ask that you send a copy to Allison Frick, multimedia and social media content manager, at africk@asbmb.org. If you send a tweet, please tag @ASBMB in it, and we'll retweet you.

Again, we thank you for your application and congratulate your program on receiving accreditation. We look forward to working with you in the future.

Sincerely,

John T. Tansey for the ASBMB department/program accreditation steering group

Appendices 2

Appendix 2.1 Approved external upper division electives

Appendix 2.2 Road map for B.A. and B.S. in Biochemistry

Appendix 2.3 Major coursework template

Appendix 2.1: Approved External Upper Division Electives

*Note: Students may also petition for a new or previously unconsidered elective to be granted "external elective" approval by providing the course syllabus to the undergraduate program director for review.

BIOL 404: Human Microanatomy (3 credits)

BIOL 406: Medical Entomology (3 credits)

BIOL 412: Developmental Biology (3 credits)

BIOL 419: Developmental Neurobiology (3 credits)

BIOL 425: Molecular Genetics (3 credits)

BIOL 429: Molecular Cell Biology (3 credits)

BIOL 445: Biology of Toxins (3 credits)

BIOL 446: Laboratory Methods in Molecular Biology (4 credits)
Includes 5 hours/week laboratory time → 75 laboratory contact hours

BIOL 450: General Virology (3 credits)

BIOL 451: Microbial Ecology (3 credits)

BIOL 456: Immunology (3 credits)

BIOL 482L: Parasitology (4 credits)
Includes 3 hours/week laboratory time → 45 laboratory contact hours

BIOL 490: Biology of Infectious Organisms (3 credits)

BIOL 492: Introductory Mathematical Biology (3 credits)

BIOL 497: Principles of Gene Expression (3 credits)

BIOL 498L: Genome Editing (4 credits)

CHEM 421: Biological Chemistry (3 credits)

CHEM 425: Organic Chemistry of Biological Pathways (3 credits)

CHEM 457: Environmental Chemistry (3 credits)

CHEM 469: Characterization Methods for Nanostructure (3 credits)

CHEM 471: Chemistry and Physics at the Nanoscale (3 credits)

CBE 499: Biodesign: The Process of Innovating Medical Technologies (3 credits)

CBE 499: Adaptable Design for the Community (3 credits)

BIOM 505: Introduction to Biocomputing (3 credits)

BIOM 505: Scientific Writing (3 credits)

BIOM 509: Principles of Neurobiology (3 credits)

BIOM 510: Physiology (3 credits)

BIOM 515: Cancer Biology (3 credits)

BIOM 522: Experimental Design & Methods in Molecular & Cellular Biosciences (3 credits)
BIOM 532: Neurochemistry (1 credit)

PHRM 576: Cellular & Molecular Pharmacology (3 credits)
PHRM 580: General Toxicology (3 credits)

Appendix 2.2 Road map for B.A. and B.S. in Biochemistry

COLLEGE OF ARTS & SCIENCES

4 year Roadmap
Bachelor of Arts - Biochemistry

Semester One:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 1215/1215L	X	4	4		4		C	Gen Ed Physical Sci
MATH 1430 or MATH 1512	X	3	3		3		C	Gen Ed Math
ENGL 1110	X	3			3		C	Fulfills Gen Ed Choice
General Education Requirement		3			3		C	Visit gened.unm.edu
First Year Experience Course		3					D-	Visit firstyear.unm.edu
Total:		**16**	**7**	**0**	**13**	**0**		
Required: Attend New Student Learning Workshop								***(within the 4th to 12th week)***

Semester Two:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 1225/1225L	X	4	4				C	
MATH 1440 or MATH 1522		3	3				C	
BIOL 2110	X	4	4				C	
ENGL 1120	X	3			3		C	Gen Ed Communication
General Education 2nd Language	X	3			3		C	Req for major admission
Total:		**17**	**11**	**0**	**6**	**0**		
Recommended: One on One Advisement visit - Enhanced Degree Audit skills/individualized planning.								

Semester Three:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 301/303L	X	4	4			4	C	
PHYS 1230/1230L		3	3				C	
BIOL 2410	X	4	4				C	
General Education Communication	X	3			3		C	Req for major admission
General Education Requirement		3			3		C	Visit gened.unm.edu
Total		**17**	**11**	**0**	**6**	**4**		
Recommended: Visit Career Services								

Semester Four:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 302/304L	X	4	4			4	C	
PHYS 1240/1240L		4	4				C	
CHEM 2310C		4	4			4	C	
General Education Requirement		3			3		C	Visit gened.unm.edu
General Education Requirement		3			3		C	Visit gened.unm.edu
Total		**18**	**12**	**0**	**6**	**8**		
Required: Transition to Major Status/Attend Departmental Orientation								***(within the 4th to 12th week)***

Semester Five:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC 445	X	4	4			4	C	**Fall Only**
CHEM 315		4	4			4	C	
Upper Division Elective		3				3	D-	
Elective Any Level		3					D-	
Elective Any Level		1					D-	
Total		**15**	**8**	**0**	**0**	**11**		
Recommended: Departmental Check-In								

Semester Six:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC 446	X	4	4			4	C	**Spring Only**
Upper Division Elective		3				3	D-	
Elective Any Level		3					D-	
Elective Any Level		3					D-	
Elective Any Level		2					D-	
Total		**15**	**4**	**0**	**0**	**7**		
Required: Attend Graduation Planning Workshop & Apply for graduation								***(within the 4th to 12th week)***

Semester Seven:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC Elective		4	4			4	C	
BIOC Elective		3	3			3	C	
Upper Division Elective		3				3	D-	
Upper Division Elective		3				3	D-	
Elective Any Level		3					D-	
Total		**16**	**7**	**0**	**0**	**13**		
Recommended: Departmental Check-In / Senior Advisement Visit								

Semester Eight:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC Elective		3	3			3	C	
Upper Division Elective		3				3	D-	
Total		**6**	**3**	**0**	**0**	**6**		
Recommended: Senior Advisement Visit						***Visit Graduation Fair***		
****Additional credit hours may be required for Scholarships - please consult with a Financial Aid representative***								
Degree Total		***120***	***63***	***0***	***31***	***49***		

The New Mexico General Education Curriculum (31 units)

Communication: (6 credit hours)
Mathematics: (3 credit hours)
Physical and Natural Sciences: (4 credit hours)
Social and Behavioral Sciences: (3 credit hours)
Humanities: (3 credit hours)
Second language: (3 credit hours)
Arts and Design: (3 credit hours)
Student Choice: (6 credit hours)

Arts and Sciences College Minimum Requirements

Total credit hours = 120
300/400 level credit hours = 48
Minimum credit hours taught in A&S = 90

University Residence Requirements

Minimum hours = 30

Senior standing = 15 past 92

At least 50% of Major
At least 25% of Minor

Minimum graduation GPA = 2.00

Keep in mind that minimum grades on road map are for individual coursework only. Students must maintain a minimum of a 2.0 cumulative grade point average for admission to and graduation from the College of Arts and Sciences. Minimums listed for the individual courses do NOT meet the cumulative minimum. Scholarships will have different requirements. Please see your advisor for questions.

For more information see the catalogue at www.unm.edu

Career Opportunities and Pathways

Health care professions (medicine, dentistry, veterinary medicine, public health)
Research in biomedicine
Research in food science, pharmaceuticals, bioengineering
Environment toxicology
Scientific patent law

For more information visit
https://career.unm.edu/students--alumni/arts--sciences.html

Suggested Minors/ 2nd majors/ Upper Division Electives:

Biochemistry majors are not required to have minor but may choose add an optional minor depending on interests and career goals.

Important Notes

This is a sample roadmap. Variations can be considered with your advisor.

1. None of the Biochemistry courses can be taken until students complete Organic Chemistry II (Chem 302) & Genetics (Biol 2410).
2. BIOC 445, BIOC 451, BIOC 463 and BIOC 495 (Topics: Proteins, Evolution & Secondary Metabolism) are only offered in the Fall semesters.
3. BIOC 446, BIOC 464 and BIOC 495 (Topics: Omics) are only offered in the Spring semesters.
4. None of the upper level Biochem electives or BIOC 448L can be taken until successful completion (C or better) of BIOC 446.
5. Students are required to take 9 hours of BIOC electives 3 hours may come from approved external electives (see advisor)

Contact Information

Major Advisor: Please visit http://artsci.unm.edu/advisement/advisors-by-major.html

Email: biochemadvise@unm.edu Website: loboachieve.unm.edu

Faculty Advisor: Laura de Lorenzo Barrios; Tyrel Bryan; Brett Manifold-Wheeler Email: LdeLorenzoBarrios@salud.unm.edu; tlbryan@salud.unm.edu; bmanifold-wheeler@salud.unm.edu

College Website: http://artsci.unm.edu/advisement/index.html Website: bmb.unm.edu

COLLEGE OF ARTS & SCIENCES

4 year Roadmap
Bachelor of Science - Biochemistry

Semester One:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 1215/1215L	Y	4	4		4		C	Gen Ed Physical Science
MATH 1430 or MATH 1512	Y	3	3		3		C	Req for major admission
ENGL 1110	Y	3			3		C	Fulfills Gen Ed Choice
General Education Requirement		3			3		C	Visit gened.unm.edu
First Year Experience Course		3					D-	Visit firstyear.unm.edu
Total:		**16**	**7**	**0**	**13**	**0**		
Required: Attend New Student Learning Workshop								***(within the 4th to 12th week)***

Semester Two:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 1225/1225L	Y	4	4				C	
MATH 1440 or MATH 1522		3	3				C	
BIOL 2110C	Y	4	4				C	
ENGL 1120	Y	3			3		C	Gen Ed Communications
General Education 2nd Language	Y	3			3		C	Req for major admission
Total:		**17**	**11**	**0**	**6**	**0**		
Recommended: One on One Advisement visit - Enhanced Degree Audit skills/individualized planning.								

Semester Three:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 301/303L	Y	4	4			4	C	
PHYS 1230/1230L		3	3				C	
BIOL 2410C	Y	4	4				C	
General Education Requirement		3			3		C	Visit gened.unm.edu
General Education Requirement		3			3		C	Visit gened.unm.edu
Total		**17**	**11**	**0**	**6**	**4**		
Recommended: Visit Career Services								

Semester Four:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
CHEM 302/304L	Y	4	4			4	C	
PHYS 1240/1240L		4	4				C	
CHEM 2310C		4	4			4	C	
General Education Requirement		3			3		C	Visit gened.unm.edu
Total		**15**	**12**	**0**	**3**	**8**		
Required: Transition to Major Status/Attend Departmental Orientation								***(within the 4th to 12th week)***

Semester Five:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC 445	Y	4	4			4	C	**Fall Only**
CHEM 315		4	4			4	C	
Upper Division Elective		3				3	D-	
Elective Any Level		3					D-	
Elective Any Level		1					D-	
Total		**15**	**8**	**0**	**0**	**11**		
Recommended: Departmental Check-In								

Semester Six:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC 446	Y	4	4			4	C	**Spring Only**
Upper Division Elective		3				3	D-	
Elective Any Level		3					D-	
Elective Any Level		3					D-	
General Education Requirement		3			3		D-	Visit gened.unm.edu
Total		**16**	**4**	**0**	**3**	**7**		
Required: Attend Graduation Planning Workshop & Apply for graduation								***(within the 4th to 12th week)***

Semester Seven:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC Elective		4	4			4	C	
BIOC Elective		3	3			3	C	
Upper Division Elective		3				3	D-	
Upper Division Elective		3				3	D-	
Elective Any Level		2					D-	
Total		**15**	**7**	**0**	**0**	**13**		
Recommended: Departmental Check-In / Senior Advisement Visit								

Semester Eight:	Critical Course	Credit Hrs.	Major	Minor or 2nd Major	Gen Ed	Upper Div.	Min. Grade	Notes
BIOC Elective		3	3			3	C	
BIOC 448L		3	3			3	D-	
Elective Any Level		3					D-	
Total		**9**	**6**	**0**	**0**	**6**		
Recommended: Senior Advisement Visit								***Visit Graduation Fair***
****Additional credit hours may be required for Scholarships - please consult with a Financial Aid representative***								
Degree Total		***120***	***66***	***0***	***31***	***49***		

The New Mexico General Education Curriculum (31 units)

Communication: (6 credit hours)
Mathematics: (3 credit hours)
Physical and Natural Sciences: (4 credit hours)
Social and Behavioral Sciences: (3 credit hours)
Humanities: (3 credit hours)
Second language: (3 credit hours)
Arts and Design: (3 credit hours)
Student Choice: (6 credit hours)

Arts and Sciences College Minimum Requirements

Total credit hours = 120
300/400 level credit hours = 48
Minimum credit hours taught in A&S = 90

University Residence Requirements

Minimum hours = 30
Senior standing = 15 past 92

At least 50% of Major

At least 25% of Minor

Minimum graduation GPA = 2.00

Keep in mind that minimum grades on road map are for individual coursework only. Students must maintain a minimum of a 2.0 cumulative grade point average for admission to and graduation from the College of Arts and Sciences. Minimums listed for the individual courses do NOT meet the cumulative minimum. Scholarships will have different requirements. Please see your advisor for questions.

For more information see the catalogue at www.unm.edu

Career Opportunities and Pathways

Health care professions (medicine, dentistry, veterinary medicine, public health)
Research in biomedicine
Research in food science, pharmaceuticals, bioengineering
Environment toxicology
Scientific patent law

Suggested Minors/2nd Majors/Upper Division Electives:

Biochemistry majors are not required to have a minor but may choose to add an optional minor depending on interests and career goals.

Important Notes

This is a sample roadmap. Variations can be considered with your advisor.

None of the Biochemistry courses can be taken until students complete Organic Chemistry II (Chem 302) & Genetics (Biol 2410).

BIOC 445, BIOC 451, BIOC 463, & BIOC 495 (Proteins, Evolution & Secondary Metabolism) are only offered in the Fall semesters.

BIOC 446, BIOC 464, & BIOC 495 (Omics) are only offered in the Spring semesters.

None of the upper level Biochem electives or BIOC 448L can be taken until successful completion (C or better) of BIOC 446.

Students are required to take 9 hours of BIOC electives - 3 hours may come form approved external electives (see advisor)

Contact Information

Major Advisor: Please visit http://artsci.unm.edu/advisement/advisors-by-major.html
Email: biochemadvise@unm.edu Website: loboachieve.unm.edu

Faculty Advisor: Laura de Lorenzo Barrios; Tyrel Bryan; Brett Manifold-Wheeler Email: LdeLorenzoBarrios@salud.unm.edu; tlbryan@salud.unm.edu; bmanifold-wheeler@salud.unm.edu

College Website: http://artsci.unm.edu/advisement/index.html Website: bmb.unm.edu

Appendix 2.3 Major coursework template

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	BIOC-445	BIOC-446	BIOC-448 L				
Required / Elective	✔ R E	✔ R E	✔ R E	R E	R E	R E	R E
If elective, % of BMB students taking the course							
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	I ✔	I ✔	✔ A	I A	I A	I A	I A
1.2 Catalysis	I ✔	I ✔	I ✔	I A	I A	I A	I A
1.3 Coupling	I ✔	I ✔	✔ A	I A	I A	I A	I A
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I ✔	I ✔	I ✔	I A	I A	I A	I A
2.2 Structure	I ✔	I ✔	I ✔	I A	I A	I A	I A
2.3 Function: Small mol.	I ✔	I ✔	I ✔	I A	I A	I A	I A
2.4 Function: Interact.	I ✔	I ✔	I ✔	I A	I A	I A	I A
2.5 Dynamics	I ✔	I ✔	I A	I A	I A	I A	I A
2.6 Regulation	I ✔	I ✔	I ✔	I A	I A	I A	I A
2.7 Physical basis	I ✔	I ✔	✔ A	I A	I A	I A	I A
2.8 Measuring S/F	I ✔	I ✔	I ✔	I A	I A	I A	I A
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	I ✔	I A	I ✔	I A	I A	I A	I A
3.2 Central dogma	I ✔	I A	I ✔	I A	I A	I A	I A
3.3 Cell division	✔ A	I A	✔ A	I A	I A	I A	I A
3.4 DNA metabolism	I ✔	I A	I A	I A	I A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	I ✔	I ✔	I ✔	I A	I A	I A	I A
4.2 Comprehension	I ✔	I ✔	I ✔	I A	I A	I A	I A
4.3 Community	I ✔	I ✔	I ✔	I A	I A	I A	I A
Evolution							
1 Significance	✔ A	I A	I A	I A	I A	I A	I A
2 Mechanisms	✔ A	I A	I A	I A	I A	I A	I A
3 Natural selection	I A	I A	I A	I A	I A	I A	I A
4 Molecular basis	I ✔	I ✔	I A	I A	I A	I A	I A
Homeostasis							
1 Biological need	I A	I ✔	I A	I A	I A	I A	I A
2 Steady state processes	I ✔	I ✔	I ✔	I A	I A	I A	I A
3 Quantifying	I ✔	I ✔	I ✔	I A	I A	I A	I A
4 Control mechanisms	I ✔	I ✔	✔ A	I A	I A	I A	I A
5 Cellular & organismal	I A	I ✔	I A	I A	I A	I A	I A
Other							
Communication	☑	☑	☑	☐	☐	☐	☐
Teamwork	☑	☑	☑	☐	☐	☐	☐
Labs	☐	☐	☑	☐	☐	☐	☐
Safety	☐	☐	☑	☐	☐	☐	☐
Responsible conduct of research	☑	☑	☑	☐	☐	☐	☐

Appendix 2.3 Major coursework template (continuation)

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	BIOC-451	BIOC-463	BIOC-464	BIOC-495-001	BIOC-495-002		
Required / Elective	R ✔	R ✔	R ✔	R ✔	R ✔	R E	R E
If elective, % of BMB students taking the course	33%	85%	85%	33%	33%		
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	I A	I ✔	I ✔	I ✔	I A	I A	I A
1.2 Catalysis	I A	I ✔	I ✔	I ✔	I A	I A	I A
1.3 Coupling	I A	I ✔	I ✔	I ✔	I A	I A	I A
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I ✔	I ✔	I ✔	I ✔	I ✔	I A	I A
2.2 Structure	I ✔	✔ A	✔ A	I ✔	I ✔	I A	I A
2.3 Function: Small mol.	I A	I ✔	✔ A	I ✔	I ✔	I A	I A
2.4 Function: Interact.	I A	I ✔	I ✔	I ✔	I ✔	I A	I A
2.5 Dynamics	I A	I ✔	I ✔	I ✔	I A	I A	I A
2.6 Regulation	I A	I ✔	I ✔	I ✔	I ✔	I A	I A
2.7 Physical basis	I A	✔ A	I ✔	I ✔	I A	I A	I A
2.8 Measuring S/F	I A	I ✔	I ✔	I ✔	I A	I A	I A
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	I A	✔ A	✔ A	I ✔	I ✔	I A	I A
3.2 Central dogma	I A	I ✔	✔ A	I A	I ✔	I A	I A
3.3 Cell division	I A	I ✔	✔ A	I A	I A	I A	I A
3.4 DNA metabolism	I A	I ✔	I A	I A	✔ A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	I ✔	I ✔	I ✔	I A	I ✔	I A	I A
4.2 Comprehension	I ✔	I ✔	I ✔	I ✔	I ✔	I A	I A
4.3 Community	I ✔	I ✔	I ✔	I ✔	I ✔	I A	I A
Evolution							
1 Significance	I A	✔ A	✔ A	I ✔	I A	I A	I A
2 Mechanisms	I A	✔ A	✔ A	I ✔	I A	I A	I A
3 Natural selection	I A	✔ A	✔ A	I ✔	I A	I A	I A
4 Molecular basis	I A	✔ A	✔ A	I ✔	I A	I A	I A
Homeostasis							
1 Biological need	I A	I ✔	✔ A	I ✔	✔ A	I A	I A
2 Steady state processes	I A	I ✔	I ✔	I ✔	I ✔	I A	I A
3 Quantifying	I A	I ✔	I A	I ✔	I ✔	I A	I A
4 Control mechanisms	I A	I ✔	I ✔	I ✔	I ✔	I A	I A
5 Cellular & organismal	I A	I ✔	I ✔	I ✔	✔ A	I A	I A
Other							
Communication	☑	☑	☑	☑	☑	☐	☐
Teamwork	☑	☑	☑	☑	☑	☐	☐
Labs	☑	☐	☐	☐	☐	☐	☐
Safety	☐	☐	☐	☐	☐	☐	☐
Responsible conduct of research	☐	☑	☑	☑	☑	☐	☐

Appendix 2.3 Major coursework template (continuation)

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	BIOL-2110C	BIOL-2410C	MATH-1430	MATH-1440	MATH-1512	MATH-1522	MATH-2531
Required / Elective	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E
If elective, % of BMB students taking the course							
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	✔ A	I A	I A	I A	I A	I A	I A
1.2 Catalysis	✔ A	I A	I A	I A	I A	I A	I A
1.3 Coupling	I ✔	I A	I A	I A	I A	I A	I A
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I ✔	I A	I A	I A	I A	I A	I A
2.2 Structure	I ✔	I A	I A	I A	I A	I A	I A
2.3 Function: Small mol.	✔ A	I A	I A	I A	I A	I A	I A
2.4 Function: Interact.	I ✔	I A	I A	I A	I A	I A	I A
2.5 Dynamics	✔ A	I A	I A	I A	I A	I A	I A
2.6 Regulation	I ✔	I A	I A	I A	I A	I A	I A
2.7 Physical basis	I ✔	I A	I A	I A	I A	I A	I A
2.8 Measuring S/F	I A	I A	I A	I A	I A	I A	I A
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	✔ A	I ✔	I A	I A	I A	I A	I A
3.2 Central dogma	✔ A	I ✔	I A	I A	I A	I A	I A
3.3 Cell division	✔ A	I ✔	I A	I A	I A	I A	I A
3.4 DNA metabolism	✔ A	I ✔	I A	I A	I A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	I ✔	I A	I ✔	I ✔	I ✔	I ✔	I ✔
4.2 Comprehension	✔ A	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔
4.3 Community	I ✔	I A	I ✔	I ✔	I ✔	I ✔	I ✔
Evolution							
1 Significance	✔ A	I ✔	I A	I A	I A	I A	I A
2 Mechanisms	✔ A	I ✔	I A	I A	I A	I A	I A
3 Natural selection	I A	✔ A	I A	I A	I A	I A	I A
4 Molecular basis	I A	I ✔	I A	I A	I A	I A	I A
Homeostasis							
1 Biological need	I ✔	✔ A	I A	I A	I A	I A	I A
2 Steady state processes	I A	I A	I A	I A	I A	I A	I A
3 Quantifying	✔ A	I A	I A	I A	I A	I A	I A
4 Control mechanisms	✔ A	✔ A	I A	I A	I A	I A	I A
5 Cellular & organismal	✔ A	✔ A	I A	I A	I A	I A	I A
Other							
Communication	☐	☐	☑	☑	☑	☑	☑
Teamwork	☐	☐	☑	☑	☑	☑	☑
Labs	☐	☐	☐	☐	☐	☐	☐
Safety	☐	☐	☐	☐	☐	☐	☐
Responsible conduct of research	☐	☐	☐	☐	☐	☐	☐

Appendix 2.3 Major coursework template (continuation)

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	PHYS-1230	PHYS-1310	PHYS-1230L	PHYS-1310L	PHYS-1240	PHYS-1320	PHYS-1240L
Required / Elective	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E
If elective, % of BMB students taking the course							
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔
1.2 Catalysis	I A	I A	I A	I A	I A	I A	I A
1.3 Coupling	I A	I A	I A	I A	I A	I A	I A
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I A	I A	I A	I A	I A	I A	I A
2.2 Structure	I A	I A	I A	I A	I A	I A	I A
2.3 Function: Small mol.	I A	I A	I A	I A	I A	I A	I A
2.4 Function: Interact.	I A	I A	I A	I A	I A	I A	I A
2.5 Dynamics	I A	I A	I A	I A	I A	I A	I A
2.6 Regulation	I A	I A	I A	I A	I A	I A	I A
2.7 Physical basis	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔
2.8 Measuring S/F	I A	I A	I A	I A	I A	I A	I A
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	I A	I A	I A	I A	I A	I A	I A
3.2 Central dogma	I A	I A	I A	I A	I A	I A	I A
3.3 Cell division	I A	I A	I A	I A	I A	I A	I A
3.4 DNA metabolism	I A	I A	I A	I A	I A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	I A	I A	I ✔	I ✔	I A	I A	I ✔
4.2 Comprehension	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔	I ✔
4.3 Community	I A	I ✔	I A	I ✔	I A	I A	I ✔
Evolution							
1 Significance	I A	I A	I A	I A	I A	I A	I A
2 Mechanisms	I A	I A	I A	I A	I A	I A	I A
3 Natural selection	I A	I A	I A	I A	I A	I A	I A
4 Molecular basis	I A	I A	I A	I A	I A	I A	I A
Homeostasis							
1 Biological need	I A	I A	I A	I A	I A	I A	I A
2 Steady state processes	I A	I A	I A	I A	I A	I A	I A
3 Quantifying	I A	I A	I A	I A	I A	I A	I A
4 Control mechanisms	I A	I A	I A	I A	I A	I A	I A
5 Cellular & organismal	I A	I A	I A	I A	I A	I A	I A
Other							
Communication	☐	☐	☐	☐	☐	☐	☐
Teamwork	☐	☐	☑	☑	☐	☐	☑
Labs	☐	☐	☑	☑	☐	☐	☑
Safety	☐	☐	☑	☑	☐	☐	☑
Responsible conduct of research	☐	☐	☐	☐	☐	☐	☐

Appendix 2.3 Major coursework template (continuation)

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	PHYS-1320L	CHEM-301	CHEM-302	CHEM-303L	CHEM-304L	CHEM-2310C	CHEM-315
Required / Elective	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E	✔ E
If elective, % of BMB students taking the course							
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	I ✔	I ✔	✔ A	✔ A	I A	✔ A	I ✔
1.2 Catalysis	I A	I ✔	✔ A	✔ A	I A	I A	I ✔
1.3 Coupling	I A	✔ A	I A	I A	I A	✔ A	I ✔
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I A	✔ A	✔ A	I A	I A	I A	✔ A
2.2 Structure	I A	✔ A	✔ A	I A	I A	I A	I ✔
2.3 Function: Small mol.	I A	I ✔	I A	I A	I A	I A	✔ A
2.4 Function: Interact.	I A	I A	I A	I A	I A	I A	I ✔
2.5 Dynamics	I A	I A	I A	I A	I A	I A	✔ A
2.6 Regulation	I A	I A	I A	I A	I A	I A	I ✔
2.7 Physical basis	I ✔	I A	I A	✔ A	I ✔	✔ A	I ✔
2.8 Measuring S/F	I A	I A	I A	I A	I A	I A	I ✔
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	I A	I A	I A	I A	I A	I A	I A
3.2 Central dogma	I A	I A	I A	I A	I A	I A	I A
3.3 Cell division	I A	I A	I A	I A	I A	I A	I A
3.4 DNA metabolism	I A	I A	I A	I A	I A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	I ✔	I A	I A	I ✔	I ✔	I ✔	I ✔
4.2 Comprehension	I ✔	I A	I A	I ✔	I ✔	I ✔	I ✔
4.3 Community	I ✔	I A	I A	I ✔	I ✔	✔ A	I A
Evolution							
1 Significance	I A	I A	I A	I A	I A	I A	I A
2 Mechanisms	I A	I A	I A	I A	I A	I A	I A
3 Natural selection	I A	I A	I A	I A	I A	I A	I A
4 Molecular basis	I A	I A	I A	I A	I A	I A	I A
Homeostasis							
1 Biological need	I A	I A	I A	I A	I A	I A	✔ A
2 Steady state processes	I A	I A	I A	✔ A	I ✔	✔ A	I ✔
3 Quantifying	I A	I A	I A	I A	I A	I A	I ✔
4 Control mechanisms	I A	I A	I A	I A	I A	I A	I ✔
5 Cellular & organismal	I A	I A	I A	I A	I A	I A	I A
Other							
Communication	☐	☑	☑	☑	☑	☑	☐
Teamwork	☑	☑	☑	☑	☑	☑	☐
Labs	☑	☐	☐	☑	☑	☑	☐
Safety	☑	☐	☐	☑	☑	☑	☐
Responsible conduct of research	☐	☐	☐	☑	☑	☑	☐

Appendix 2.3 Major coursework template (continuation)

MAJOR COURSEWORK TEMPLATE

I: Introductory
A: Advanced / Intermediate

Course	CHEM-1215L	CHEM-1225					
Required / Elective	✔ R E	✔ R E	R E	R E	R E	R E	R E
If elective, % of BMB students taking the course							
1: Energy Is Required By And Transformed In Biological Systems							
1.1 Nature	I A	I ✔	I A	I A	I A	I A	I A
1.2 Catalysis	I A	I ✔	I A	I A	I A	I A	I A
1.3 Coupling	I A	✔ A	I A	I A	I A	I A	I A
2: Macromolecular Structure Determines Function And Regulation							
2.1 Macromolecules	I A	I A	I A	I A	I A	I A	I A
2.2 Structure	✔ A	✔ A	I A	I A	I A	I A	I A
2.3 Function: Small mol.	I A	I A	I A	I A	I A	I A	I A
2.4 Function: Interact.	I A	I A	I A	I A	I A	I A	I A
2.5 Dynamics	I A	I A	I A	I A	I A	I A	I A
2.6 Regulation	I A	I A	I A	I A	I A	I A	I A
2.7 Physical basis	✔ A	I A	I A	I A	I A	I A	I A
2.8 Measuring S/F	I A	I A	I A	I A	I A	I A	I A
3: Information Storage And Flow Are Dynamic & Interactive							
3.1 Genomics	I A	I A	I A	I A	I A	I A	I A
3.2 Central dogma	I A	I A	I A	I A	I A	I A	I A
3.3 Cell division	I A	I A	I A	I A	I A	I A	I A
3.4 DNA metabolism	I A	I A	I A	I A	I A	I A	I A
4: Discovery Requires Objective Measurement, Quantitative Analysis and Clear Communication							
4.1 Process of science	✔ A	I A	I A	I A	I A	I A	I A
4.2 Comprehension	✔ A	I A	I A	I A	I A	I A	I A
4.3 Community	✔ A	I A	I A	I A	I A	I A	I A
Evolution							
1 Significance	I A	I A	I A	I A	I A	I A	I A
2 Mechanisms	I A	I A	I A	I A	I A	I A	I A
3 Natural selection	I A	I A	I A	I A	I A	I A	I A
4 Molecular basis	I A	I A	I A	I A	I A	I A	I A
Homeostasis							
1 Biological need	I A	I A	I A	I A	I A	I A	I A
2 Steady state processes	I A	I A	I A	I A	I A	I A	I A
3 Quantifying	I A	I A	I A	I A	I A	I A	I A
4 Control mechanisms	I A	I A	I A	I A	I A	I A	I A
5 Cellular & organismal	I A	I A	I A	I A	I A	I A	I A
Other							
Communication	☑	☑	☐	☐	☐	☐	☐
Teamwork	☑	☑	☐	☐	☐	☐	☐
Labs	☑	☐	☐	☐	☐	☐	☐
Safety	☑	☑	☐	☐	☐	☐	☐
Responsible conduct of research	☑	☐	☐	☐	☐	☐	☐

Appendices 3

Appendix 3.1 Biochemistry assessment plan and report (AY 2020-2021)

Appendix 3.2 A&S College Assessment Review Committee Program - assessment rubric (corresponding to the AY 2020-2021 assessment plan & report)

Appendix 3.1 Biochemistry assessment plan and report (AY 2020-2021)

Part I: Cover Page
UNM Academic Programs/Unit Combined Assessment Plan and Report
The University of New Mexico

SECTION I-1

College, Department and Date:

College/School/Branch Campus:	College of Arts and Sciences
Department:	Biochemistry & Molecular Biology
Date:	12/6/2021

Active Plan Years (select the three-year cycle that applies):

☐AY16/17-18/19 ☐AY17/18-19/20 ☐AY18/19-20/21 ☒AY19/20-21/22

Academic Program of Study:

Degree or Certificate level:	B.S.
Name of the program:	Biochemistry (both B.S. & B.A. are assessed together)
Is the program accredited?	☒

Contact Person(s) for the Assessment Plan (include at least one name, title and email address):

Summer Raines Hayek, PhD; Lecturer III & Undergraduate Program Manager; shayek@salud.unm.edu
Laura de Lorenzo, PhD; Lecture III; LdeLorenzoBarrios@salud.unm.edu

Dean / Associate Dean / CARC Approval Date: Click to Select Date*

* By selecting the date above, you acknowledge that your respective Dean/Associate Dean/or CARC has reviewed and approved this plan.

SECTION I-2

Table of Contents:

Part II: Assessment PLAN
UNM Academic Programs/Unit Combined Assessment Plan and Report
The University of New Mexico

SECTION II-1

Please identify at least one of your program goals:

Program Goal #1:	Understand major biochemical concepts, theoretical principles, and experimental findings in the field of biochemistry.
Program Goal #2:	Be able to employ critical thinking and hypothesis-driven methods of scientific inquiry.
Program Goal #3:	Present scientific data in an appropriate context and in a variety of ways, at different levels.
Program Goal #4:	Appreciate and promote the ethical dimensions of science.
Program Goal #5:	Practice critical self-reflection in order to progress as a scientist and as a life-long learner.

Please use the grid below to align your program goals to your student learning outcomes and assessment plans:

Student Learning Outcomes (SLOs)	Program Goal #	UNM Student Learning Goals			Assessment Measures	Performance Benchmark	Student Population(s)
SLO #1: Students will demonstrate advanced knowledge and apply their understanding of the core curriculum (as outlined by the American Society for Biochemistry and Molecular Biology [ASBMB], our accrediting body): (1) Energy & metabolism. (2) Structure & function. (3) Information storage & transfer. (4) Homeostasis. (5) Evolution.	1	K ☒	S ☐	R ☐	(1.1) A repeated subset of questions pertaining to the ASBMB core curriculum asked on the final exams for BIOC 445 and BIOC 446. (1.2) The ASBMB certification exam.	(1.1) The cohort achieves an average of 75% or better on the representative questions. (1.2) The cohort achieves at least the national average for certification on the ASBMB exam and at least the national average for "proficiency" on the questions pertaining to the ASBMB core curriculum.	(1.1) All students taking BIOC 445 & 446 (juniors). (1.2) Graduating biochemistry majors who choose to take the ASBMB exam.
SLO #2: Students will develop a hypothesis; design and conduct appropriate experiments to test that hypothesis; analyze and interpret data; reflect on the evidence, the process, and plan the next experiment.	2	K ☒	S ☒	R ☐	(2.1) A repeated subset of questions pertaining to quantitative reasoning asked on the final exams for BIOC 445 and BIOC 446. (2.2) The ASBMB certification exam. *Department faculty are in the process of deciding additional assessment measures that will be used in a variety of BMB courses.*	(2.1) The cohort achieves an average of 75% or better on the representative questions. (2.2) The cohort achieves at least the national average for "proficiency" on the ASBMB exam questions pertaining to quantitative reasoning. *Department faculty are in the process of deciding performance benchmarks for these additional assessment measures.*	(2.1) All students taking BIOC 445 & 446 (juniors). (2.2) Graduating biochemistry majors who choose to take the ASBMB exam. *All students taking BIOC 448L (seniors); students who choose to take BIOC 451, 463, 464, or 495 (seniors).*
SLO #3: Students will write, explain, and present on biochemical topics; using prose, drawings, flowcharts, tables, and figures; in quizzes, exams, papers, laboratory reports, presentations; in small- and large-group course settings, and in professional settings.	3	K ☒	S ☒	R ☐	*Department faculty are in the process of deciding assessment measures that will be used to assess this SLO in a variety of BMB courses.*	*Department faculty are in the process of deciding performance benchmarks for these assessment measures.*	*All students taking BIOC 445 & 446 (juniors), all students taking BIOC 448L (seniors); students who choose to take BIOC 451, 463, 464, or 495 (seniors).*

SLO #4: Students will explain the necessity of objectivity and honesty in the process of science.	4	K ☐	S ☒	R ☒	*Department faculty are in the process of deciding assessment measures that will be used to assess this SLO in a variety of BMB courses.*	*Department faculty are in the process of deciding performance benchmarks for these assessment measures.*	*All students taking BIOC 448L (seniors); students who choose to take BIOC 451, 463, 464, or 495 (seniors).*
SLO #5: Students will reflect on their strengths and weaknesses in biochemistry and, with a mentor, develop related learning and career plans.	5	K ☒	S ☒	R ☒	(5.1) BMB exit survey. *Department faculty are in the process of deciding assessment measures that will be used to assess this SLO via a formalized mentorship program and career development seminar.*	(5.1) At least 80% of graduating biochemistry majors submit answers to the exit survey. *Department faculty are in the process of deciding performance benchmarks for these assessment measures.*	(5.1) All graduating biochemistry majors. *All biochemistry majors starting in their junior year and continuing through graduation.*

SECTION II-2

Please use the area below to elaborate on your assessment plans.

a. Please describe the student artifact/performance that you will use to gather your assessment data:

BIOC 445/446 final exams (SLOs #1.1 & 2.1)
The ASBMB core curriculum (SLO #1) is introduced and emphasized primarily during the intensive biochemistry courses required of all majors (BIOC 445 in the fall and BIOC 446 in the spring). These courses also incorporate inquiry- and case-based components that require quantitative reasoning, knowledge of quantitative techniques, and experimental design (SLO #2). A subset of questions repeatedly asked on the final exams in BIOC 445 and 446 help to assess our student knowledge and skills in these areas. The questions are based on the broad course goals and on the specific course objectives in these courses; these goals and objectives are in turn based on the ASBMB core curriculum and suggested skills. The questions have been developed/edited/revised by a subcommittee of faculty in the department over 10+ years, and we keep the questions secure by ensuring students are only allowed to review their final exam answers under the instructor's supervision (Note: due to the COVID-19 pandemic necessitating online testing for fall 2020 and spring 2021, these questions will need to be revised to ensure question security). This metric assesses our entire population of biochemistry majors; approximately 60-100 students take these final exams each semester.

ASBMB certification exam (SLOs #1.2 & 2.2)
The ASBMB certification exam is given annually and is based on the ASBMB core curriculum and is available to students in Biochemistry departments that have been accredited by the ASBMB (we achieved accreditation in 2015). Each short answer question is rated as either high- or low-order on Bloom's taxonomy and is scored on a three-level scale: highly proficient (3), proficient (2), or not yet proficient (1). To achieve certification or certification with distinction, students are required to score "proficient" or above on a certain number of questions; this number changes year-to-year based on the number of questions and the difficulty of the specific questions asked. The exam is not graded internally and is instead graded by a national committee of ASBMB members using a proprietary set of rubrics and standards that are not shared with the university. The exam results classify each question by ASBMB core curricular area (SLO #1) or as assessing quantitative reasoning (SLO #2), and each question includes a breakdown of cohort percentages for

that year's exam, for comparison. Although not a mandatory component of the biochemistry major, all graduating biochemistry majors are strongly encouraged to take the ASBMB certification exam, and we incentivize doing so by paying the registration fees for the students and offering review sessions before the exam. We anticipate that ~30-50% of our seniors will choose to take the exam each year, based on their schedules and interest in potentially improving their CV.

Exit survey (SLO #5.1)
An exit survey was developed to ascertain student perceptions of their learning in the BMB program and to document their next steps (academic and/or professional). The survey link is emailed out in April of each year, to all students with anticipated graduation dates of spring or fall of that year (the overwhelming majority of our students will graduate in the spring). We ask the students to submit their survey answers no later than two weeks before spring graduation. The survey is based on a short departmental survey that was used for over 15 years as well as templates from other STEM departments at UNM and exemplary national examples of exit surveys (Washington University, University of Colorado at Boulder, etc.)

"To Be Decided" assessments pertaining to quantitative reasoning, presentation of data, the ethical dimensions of science, and career development (SLOs #2-5)
BIOC 445 and 446 (described above) are taught in a studio classroom designed for collaborative learning and peer instruction, and each class involves writing, teaching, and presenting to peers. The BIOC 445/446 instructor is in the process of developing assessments and performance benchmarks that can be used to measure SLO #3.

BIOC 448L is a required, advanced laboratory course that is built around a full-semester, team-based research project. Students investigate a research question, develop a hypothesis, propose and conduct experiments, analyze their results, draw conclusions, and present their findings via both a written report and a final oral presentation. BIOC 448L also includes discussions about the ethics underpinning the practice and process of science and the importance of peer review in research (and offers students the chance to participate in the peer review process themselves). BIOC 448L instructors are in the process of developing rubrics and performance benchmarks that can be used to assess SLOs #2, #3, and #4. These metrics will assess our entire population of biochemistry majors; approximately 60-100 students take BIOC 448L each year.

Our undergraduate electives (BIOC 451, 463, 464 and 495) incorporate both lecture and small group study components that include evaluation of data from peer-reviewed literature and BMB faculty research (and assessment of the objectivity of that data), writing of hypothesis-driven experimental plans, and small group presentations of their findings. The instructors who teach these electives are in the process of developing communal rubrics and performance benchmarks that can be used to assess SLOs #2, #3, and #4 throughout a variety of student assignments given by different instructors. Each metric will assess a subset of our biochemistry majors, as each elective enrolls ~25-75% of our students.

Our department had begun the process of developing a formalized mentorship program to help our students progress through the major and make concrete career development plans earlier in their undergraduate career. During the fall 2020 semester, we premiered a career seminar to our senior BIOC 448L students, and for the current 2021-2022 academic year, we are presenting that seminar to both junior and senior-level students. Moving forward, we plan to begin presenting this seminar yearly to our junior BIOC 445 students. We've also begun the process of a establishing a student-faculty mentorship program that will pair up all department faculty and students throughout the course of the student's time in the Biochemistry department. The department is in the process of developing specific assessment measures and performance benchmarks within these programs that can be used to assess SLO #5.

b. Does your program assess all SLOs every year, or are they assessed on a staggered, three-year cycle? If staggered, please describe which SLOs will be assessed for each year.

We thus far have only assessed SLOs #1, #2, and #5. We assess these SLOs every year, over the course of the fall and spring semesters. We have started the process of reevaluating our assessment plan to better encompass the goals of the entire undergraduate program and to include a wider

variety of SLOs and assessments metrics that span all of our major courses (please see Section III-2c of the assessment report below). In this revised plan (planned to start AY 2022-2023), we will introduce a staggered cycle of assessment that examines 2-3 SLOs per year over a 3-year cycle.

c. What is the process you will use to review, analyze and interpret your assessment data?

While the undergraduate program manager oversees the assessment process for the BMB department and writes the annual report, instructors for each course are individually responsible for tracking, analyzing, and reporting their pertinent assessment data in a timely manner. Instructors are reminded before each semester which SLO(s) they must assess that semester, and they compile and analyze their data (with the help of the undergraduate program manager, if necessary) after each semester. The readout for each metric will be metric-specific, and it is at the instructor's discretion for how they best want to present their data. However, at a minimum, results will be presented as "benchmark vs. reality" for each metric.

For example, for SLO #1.1, the instructor will present the benchmark class average (75%) vs. the actual class average (ex: 60%) for the cohort of assessment questions asked on the BIOC 445 and 446 final exams that year. In addition, for this specific SLO, the instructor will show the percentage of students who answered *each* assessment question correctly, with each question characterized by core curricular concept, so that we can determine which core areas may need more emphasis within the curriculum.

d. What is the process you will use to communicate and implement your assessment results?

All BMB faculty collecting evidence during that academic year prepares a short presentation on their SLO data to present at a faculty meeting in May/June. They present the SLO(s) they are assessing, the specific assessment measure and associated benchmark, how they carried out the assessment (the tools/techniques used), and how they analyzed the data. All faculty are then invited to offer suggestions to improve student learning, including curricular adjustments, course materials, pedagogical approaches, and assessment tools. The assessment results may be used to inform our course offerings, faculty assignments, curriculum design, and advisement opportunities, if necessary. Of note, the ASBMB exam results are not distributed to universities until sometime during the late summer/early fall, so results of the ASBMB exam (SLOs #1.2 and 2.2) are discussed at a separate faculty meeting in the fall.

When necessary, department faculty will convene an education retreat to discuss the educational needs of the department in more detail. At a minimum, an education retreat will occur during the summer following the conclusion of a 3-year assessment cycle so that our assessment plan can be reevaluated and revised as needed, before the start of a new 3-year cycle in the fall. The BMB department held a half-day education retreat in January 2021 and began working on an updated assessment plan, although due to the COVID-19 pandemic, we were unable to make major headway since then. However, our ASBMB reaccreditation is approaching in October 2022, and we have established a faculty committee that will update our assessment plan as part of the reaccreditation process. We plan to begin implementing the update assessment plan starting AY 2022-2023.

Part III: Assessment REPORT
UNM Academic Programs/Unit Combined Assessment Plan and Report
The University of New Mexico

SECTION III-1

In response to last year's assessment report, please:

a. Describe the program changes that were implemented.

Below, we have noted changes that were made in AY 2020-2021 in response to issues found during our AY 2019-2020 assessment or as necessitated by the COVID-19 pandemic:

(1) As a consequence of the COVID-19 pandemic, the entire BIOC 448L curriculum for Fall 2020 and Spring 2021 was taught remotely, which involved both modifying existing hands-on modules and creating new modules that would address our course goals in a remote setting. This remote curriculum focused on quantitative reasoning, experimental design, critical reasoning, and data analysis, which allowed students to engage in a research experience despite the remote setting. The syllabus for this remote modality is included as an appendix to this report, pages 19-27.

(2) In response to our majors' requests for more variety in electives, we are in the process of adding additional electives to our repertoire. As proposed in the AY 2019-20 assessment report, we added BIOC 495: Omics beginning in spring 2021, and it is now regularly offered in spring semesters. The syllabus for BIOC 495: Omics is included as an appendix to this report, pages 28-40. Due to the COVID-19 pandemic, the spring 2021 Omics course was offered remotely but will be offered face-to-face moving forward. One additional topics-based elective, BIOC 495: Proteomics, was offered for the first time this current Fall 2021 semester and will be offered in fall semesters moving forward; we will discuss this elective in more detail in our AY2021-2022 assessment report. This brings our biochemistry major elective offerings to three per semester.

b. Describe any revisions to your assessment process that were made for this reporting cycle.

(1) SLO #5.1 had a previous 75% completion benchmark for our graduation survey. Because we measured full compliance for this metric for the previous two academic years, we increased this benchmark to 80% completion rate for AY 2020-2021. We will likely continue to adjust this benchmark upward over time, as we device new ways to incentivize completion.

(2) We have modified our graduation survey to collect more detailed information regarding the career plans of our students (a weak point in our previous surveys). The 2021 survey asked more specific questions about their short-term plans (immediately after graduation) vs. long-term plans (2-3 years post-graduation). The survey now makes it easier to distinguish between different careers in the health sciences (dental/medical/pharmacy/etc.), different kinds of graduate programs, research careers in academia vs. industry, etc. The survey also provides students the opportunity to choose alternative careers that incorporate biochemistry but are not as well known (forensics, public policy, science writing, etc.)

Owing to the nature of the ongoing COVID-19 pandemic, we decided not to make any further changes to our assessment plan for AY 2020-2021 (nor for the ongoing AY 2021-2022). We are in the process of revising our assessment plan for a fresh cycle starting AY 2022-2023.

Please use the grid and narrative responses below to discuss your assessment results from this year:

SLOs	Student Population	Results
SLO #1: Students will demonstrate advanced knowledge and apply their understanding of the core curriculum (as outlined by the American Society for Biochemistry and Molecular Biology [ASBMB], our accrediting body): (1) Energy & metabolism (2) Structure & function (3) Information storage & transfer (4) Homeostasis (5) Evolution	(1.1) All junior-level biochemistry majors who took BIOC 445 and BIOC 446. (1.2) Graduating biochemistry majors who chose to take the ASBMB certification exam.	(1.1) The cohort achieved a 67% average on the representative ASBMB core curriculum final exam questions (out of a 75% goal) as assessed from 82 students in fall 2020 and 74 students in spring 2021. This cohort represents 72 students who took both the BIOC 445 and 446 final exams, 10 students who took only the BIOC 445 final exam, and 2 students who took only the BIOC 446 final exam: **NOT MET.** (1.2a) The cohort achieved 34.1% certification on the ASBMB exam (out of a 38.3% national goal) as assessed from 41 students who took the exam in March 2021: **NOT MET.** (1.2b) The cohort achieved 60% proficiency on the ASBMB exam core curriculum questions (out of a 61% national proficiency goal) as assessed from 41 students who took the exam in March 2021: **NOT MET.**
SLO #2: Students will develop a hypothesis; design and conduct appropriate experiments to test that hypothesis; analyze and interpret data; reflect on the evidence, the process, and plan the next experiment.	(2.1) All junior-level biochemistry majors who took BIOC 445 and BIOC 446. (2.2) Graduating biochemistry majors who chose to take the ASBMB certification exam.	(2.1) The cohort achieved an 81% average on the representative quantitative final exam questions (out of a 75% goal) as assessed from 82 students in fall 2020 and 74 students in spring 2021. This cohort represents: 72 students who took both the BIOC 445 and 446 finals, 10 students who took only the BIOC 445 final exam, and 2 students who took only the BIOC 446 final exam: **MET.** (2.2) The cohort achieved 50% proficiency on the ASBMB exam quantitative questions (out of a 54% national proficiency goal) as assessed from 41 students who took the exam in March 2021: **NOT MET.**
SLO #5: Students will reflect on their strengths and weaknesses in biochemistry and, with a mentor, develop related learning and career plans.	(5.1) All graduating biochemistry majors.	(5.1) We achieved an 82% average completion rate for the graduation exit survey (out of an 80% completion goal) as assessed from 55 out of 67 students in spring 2021: **MET.**

***Please note that we did not assess SLO #3 or SLO #4 during this assessment cycle.**

Please use the area below to elaborate on your findings.

SLO #1: Students will demonstrate advanced knowledge and apply their understanding of the core curriculum (as outlined by the ASBMB, our accrediting body): energy & metabolism, structure & function, information storage & transfer, homeostasis, and evolution.

(1.1) We asked a repeated subset of questions pertaining to the ASBMB core curriculum on the final exams for BIOC 445 (fall 2020) and BIOC 446 (spring 2021); a list of the questions asked were attached to our AY 2019-2020 report, for reference. We coded each question as belonging to one of the five core curricular areas (energy & metabolism, structure & function, information storage & transfer, homeostasis, and evolution), and calculated the average score that was received on each question across all students (Table 1, columns 1-4). We then averaged all of the questions within each core curriculum area per year (CC AVG). Finally, we averaged all of the questions across all of the core curriculum areas assessed in SLO #1.1 (SLO AVG).

Averages are color coded to indicate if we *met the 75% benchmark* or *missed the 75% benchmark*. We concluded that at a SLO average score of 67% on the representative core curricular questions, we did not make the benchmark during this assessment period.

Energy & Metabolism		Structure & Function		Information Storage		Homeostasis		Quantitative	
Question	**Average**	**Question**	**Average**	**Question**	**Average**	**Question**	**Average**	**Question**	**Average**
445-1	**92%**	445-10	**49%**	445-4	**55%**	446-11	**83%**	445-14	**88%**
445-2	**93%**	445-11	**71%**	445-5	**63%**	446-15	**99%**	445-15	**69%**
445-3	**68%**	445-12	**72%**	445-6	**10%**	446-16	**95%**	445-16	**82%**
446-1	**79%**	445-13	**68%**	445-7	**81%**	446-17	**47%**	445-17	**90%**
446-2	**63%**	445-18	**59%**	445-8	**40%**	446-18	**45%**	446-13	**75%**
446-3	**91%**			445-9	**80%**	446-19	**73%**		
446-4	**69%**								
446-5	**80%**								
446-6	**50%**								
446-7	**77%**								
446-8	**87%**								
446-9	**98%**								
446-12	**45%**								
446-14	**82%**								
CC AVG	**77%**	**CC AVG**	**64%**	**CC AVG**	**55%**	**CC AVG**	**73%**		
SLO AVG	**67%**							**81%**	

Table 1: BIOC 445 and 446 final exam questions related to SLO #1.1 and #2.1.

(1.2a) Our graduating senior students took the ASBMB certification exam in March 2021. The ASBMB certification results can be seen below (Table 2). Percent certifications are color coded to indicate if we *met the national benchmark* or *missed the national benchmark*. We concluded that a certification rate of 34.1% for the spring 2021 exam, we did not quite meet the 38.3% national certification rate benchmark during this assessment period.

(1.2b) We also examined how our students performed on the specific core curricular areas assessed on the ASBMB exam. ASBMB presents the exam results in graphical format, breaking down the percent of the cohort that scored highly proficient, proficient, or not yet proficient on each question (coded by core curricular area and low vs. high Bloom's taxonomy) for both UNM students and all students that took the exam nationally. We used these graphs to estimate the percent of each cohort that scored either proficient or highly proficient on each of the 11 questions asked on the ASBMB exam (Table 3,

columns 1-3). We then averaged all of the questions within each core curriculum area (CC AVG). Finally, we averaged all of the questions across all of the core curriculum areas assessed in SLO #1.2 (SLO AVG).

Averages are color coded to indicate if we *met the national benchmark* or *missed the national benchmark*. We concluded that while we were below the 61% national proficiency rate, we were very close to the national certification rate benchmark at a 60% proficiency.

Certification		Certification with Distinction	
National	**UNM**	**National**	**UNM**
38.3%	34.1%	12.6%	9.8%

Table 2: ASBMB certification results related to SLO #1.2.

Energy & Metabolism			Structure & Function			Information Storage			Quantitative		
Question	**National**	**UNM**	**Question**	**National**	**UNM**	**Question**	**National**	**UNM**	**Question**	**National**	**UNM**
low	84%	82%	low	69%	65%	low	90%	95%	low	45%	42%
high #1	33%	23%	high #1	42%	38%	high #1	27%	19%	high #1	63%	58%
high #2	67%	73%	high #2	76%	79%	high #2	61%	68%			
CC AVG	61%	59%	**CC AVG**	62%	61%	**CC AVG**	59%	61%			
SLO AVG	**61% National vs. 60% UNM**								**54% National vs. 50% UNM**		

Table 3: ASBMB certification exam question proficiency related to SLO #1.2 and #2.2.

SLO #2: Students will develop a hypothesis; design and conduct appropriate experiments to test that hypothesis; analyze and interpret data; reflect on the evidence, the process, and plan the next experiment.

(2.1) As in SLO #1.1 above, we asked a repeated subset of questions pertaining to quantitative reasoning on the final exams for BIOC 445 and BIOC 446, and we calculated the average score that was received on each question across all students (Table 1, column 5). We then averaged all the quantitative questions assessed in SLO #2.1 (SLO AVG). We concluded that at an average score of 81% on the representative quantitative questions, we successfully met our 75% benchmark during this assessment period.

(2.2) As in SLO #1.2b above, we examined how our students performed on the specific ASBMB exam questions pertaining to quantitative reasoning. We first estimated the percent of the UNM vs. national cohort that scored either proficient or highly proficient on each quantitative question asked on the ASBMB exam (Table 3, column 4). We then averaged both of the quantitative questions assessed in SLO #2.2 (SLO AVG). We concluded that we were 4 points lower than the national proficiency benchmark for quantitative skills during this assessment cycle.

SLO #5: Students will reflect on their strengths and weaknesses in biochemistry and, with a mentor, develop related learning and career plans.

(5.1) We distributed a Google form graduation exit survey to all graduating seniors in April 2021, of which 55 of 67 students answered the survey. This 82% completion rate hits our 80% completion benchmark for the survey.

Please identify the SLOs that did not meet your benchmark defined in the Assessment Plan. Elaborate on what you think contributed to this:

We did not hit our target core curriculum scores on either the BIOC 445/BIOC 446 final exams nor the ASBMB certification exam. This suggests that our majors are still struggling to learn and retain the most important biochemical concepts, as dictated by ASBMB (SLO #1). It is difficult to separate this outcome from effects of the COVID-19 pandemic, which induced large amounts of anxiety, demotivation, and difficulties with time management in both our students and our instructors. We also noted students coming into our classes with a lack of prerequisite knowledge from their lower-level courses, again likely due to the pandemic. We plan to reevaluate this SLO as the pandemic begins to recede.

We had mixed results with SLO #2, which assesses quantitative reasoning. Our students seem to do better on the final exam questions related to this skill than they do when assessed via the ASBMB exam. The ASBMB exam is not necessarily intended to be "studied for", but rather assesses the big picture, long-term concepts and skills in biochemistry, so we don't necessarily believe this is simply a matter of the students studying more for the final than they do for the ASBMB exam. Rather, it is possible that students don't practice quantitative reasoning enough in their classes, which we can improve with purposeful curricular design. We also recently made major changes to pertinent quantitative curriculum (mainly BIOC 448L), and the changes may not be visible at the assessment level yet, especially considering we assess SLO #2 during the junior year and via the ASBMB exam taken near spring break of senior year. At that timepoint, 75% of the assessed students (all of our juniors and half of our seniors) will not yet have completed BIOC 448L. Of course, the same issues that contributed to SLO #1 above likely contributed here, as well.

Of note when looking at the ASBMB exam, the national certification rate decreased compared to performance in 2019 and 2020 (perhaps because the COVID-19 pandemic), while UNM's 2021 certification rate looked similar to our 2020 rate, which were both significantly improved from 2019. We therefore believe we are making critical strides in our students' learning overall, and preventing a learning loss is its own feat during these difficult COVID-19 years.

SECTION III-2

In response to this assessment report, please answer the following questions:

a. Who participated in the assessment process (the gathering of evidence, the analysis/interpretation, recommendations)?

Dr. Tyrel Bryan was the instructor for BIOC 445 in fall 2020 and for BIOC 446 in spring 2021. He administered the final exam for these semesters. (SLOs #1.1 and 2.1).

Dr. Summer Hayek (undergraduate program manager) administered both the ASBMB certification exam (SLOs #1.2 and 2.2) and graduation survey (SLO #5.1) in spring 2021.

Dr. Laura de Lorenzo gathered and analyzed all of the data involved in the above assessments and interpreted the data presented in this report. Dr. Hayek contributed to the interpretation and analysis of these data.

Dr. Hayek, Dr. de Lorenzo, and Dr. Karlett Parra (department chair) were involved in making recommendations for improvements to the program and assessment plan.

b. Data Analysis: Describe strengths and/or weaknesses of each SLO in students' learning/performance based on the data results you provided in the table above.

In a continuing theme from our previous assessment reports, our BIOC 445 and 446 students do quite well with energy & metabolism, homeostasis, and quantitative reasoning, but seem to struggle most with structure-function relationships and information storage (i.e., nucleic acid biochemistry). On the final exams for the academic year assessed in this report, the average scores for the structure-function relationships and information storage core concepts were below the typical 70% pass rate. This suggests that we need to pay closer attention to these topics when they are taught during BIOC 445, as well as incorporate this material into our senior-level courses, for added exposure to the material throughout their undergraduate careers.

However, this trend was reversed on the ASBMB exam, with UNM students performing most poorly on energy & metabolism and quantitative reasoning while performing at or above the national average on structure-function relationships and information storage. It would behoove us to take a deeper look at the *specific* questions asked on the BIOC 445 and 446 final exams and the ASBMB exam, to tease out specifically which concepts give our students trouble so that we can better emphasize them in our classes moving forward. It's also possible that certain questions require skills (for example, inductive reasoning or problem-solving vs. rote memorization) that students are still lacking, and knowing this will allow us to modify our curriculum to offer students more practice with these skills.

Our students have improved their performance on the ASBMB exam since 2019, but we have still not reached the national average on the exam. Furthermore, a deeper look at the point distribution within each individual question shows that even when "proficient", our students are often less likely to hit "highly proficient" compared to students at other schools (raw ASBMB exam reports for 2021 can be found on pages 15-18). This would suggest our students still struggle somewhat with higher-order Bloom's skills (interpretation, analysis, synthesis, prediction, etc.) Given the unique and diverse make-up of our student population at UNM, our program could consider incorporating more active learning strategies, which have been shown to increase performance and long-term retention of material in students from a wide variety of backgrounds, in an attempt to guide our students into the "highly proficient" category.

One interesting trend we noticed in the ASBMB exam data is that the students who earn certification, and especially those that earned certification with distinction, often have independent research experience or are members of our honors research program (ASBMB provides us the names of certified students for our records). This fits with our anecdotal observations that students make vast improvements in their understanding of structure-function relationships, data analysis, and hypothesis interpretation after completion of the CURE-based research project in BIOC 448L during their senior year. This speaks to the importance of providing hands-on exposure to biochemistry in the "real-world" as much as possible, as a means to improve our students' quantitative reasoning skills.

Unfortunately, we do not have the physical lab space in the BMB department to provide every student an independent research experience, but we can provide surrogate experiences in our required curriculum as much as possible. For example, we will continue to expand the BIOC 448L curriculum to include as much relevant application of the didactic material as possible. For example, during the current fall 2021 semester, we added a protein purification and validation module to give students additional experience in data analysis and critical thinking regarding advanced biochemical techniques. We've also incorporated a new topics-based course, BIOC 495: Omics. This is an upper-level, highly structured active learning course that exposes students to "real-world" omics situations. Students have the opportunity to integrate and analyze complex bioinformatic data, practice problem solving, think critically, and integrate their knew knowledge with their prior understanding. We will continue to incorporate quantitative reasoning into our other senior-level electives, as well.

As we modify curriculum to address the core curricular and quantitative reasoning skills of our students, will consciously think about how to assess these skills as we revise our assessment plan over the next year. This will be particularly important for BIOC 448L, which contributes substantially to our students' understanding of the ASBMB core concepts but is not currently included in our formal assessment plan. Considering that only 25% of our

majors have taken BIOC 448L by the time we assess SLOs #1 and #2 via the current assessment plan, it will be critical to reassess these SLOs, in particular the quantitative reasoning component of SLO #2, after completion of BIOC 448L.

We met our benchmark of at least 80% of our graduating majors completing our graduation survey. This allowed us to determine that the large majority of our students plan to pursue a post-graduate education within next 2-3 years (medical school, graduate school, or a professional medical degree), and we need to consider these desires as we interact with our students. It is also clear from the survey answers that many students are not quite sure *what* they want to do, and a graduation survey distributed at the end of their undergraduate career should not be the be-all-end-all of their career development plan. We know that students need to begin this process much earlier in their undergraduate career, and to that end, we have begun the development of a formalized mentorship program for our majors, as discussed previously in this assessment plan and report. This program still needs significant fleshing out of the details and assessment metrics, and our department will work on doing so over the next year.

c. Based on your assessment results from this year, describe the recommendation that you have for improvement:

- Describe any program changes (e.g., curriculum, instruction, etc.) that will be implemented.

We have discussed our planned programmatic changes in our answer to question III-2b above and throughout our assessment plan and report. In summary, we plan to:

- Analyze the specific topics within our core curriculum that are particularly challenging for students and spend additional time discussing these topics in BIOC 445 and 446.
- Incorporate core curricular topics and quantitative reasoning in upper-division courses beyond just BIOC 445 and 446.
- Continue to develop more active learning, inductive reasoning, and quantitative reasoning and research activities into our curriculum, in an effort to develop higher-order Bloom's skills in our students.
- Continue to develop a formalized career mentorship program (keeping in mind the career plans of our students) and incorporate it into our assessment plan for SLO #5.
- Add BIOC 448L assessment metrics into our formal assessment plan, particularly for SLO #2 (quantitative reasoning).
- Flesh out our assessment plan, particularly SLOs #3 and #4 (for which there are currently no assessment metrics or benchmarks).

- Describe any revisions to your assessment process that will be made for the next reporting cycle.

We will use the current BMB assessment plan for the AY 2021-2022 assessment cycle, and we do not anticipate changes to the assessment process.

However, given the rapid growth of our undergraduate major and the substantial changes to course offerings, curricula, faculty, and infrastructure that we've implemented since summer 2018, the BMB department has made a concrete commitment to reevaluate and implement a revised assessment plan in conjunction with our upcoming ASBMB reaccreditation (October 2022). We began this process in January 2021 at our education retreat. We revised our program goals and SLOs, and each instructor committed to developing an assessment metric and performance benchmark to accompany each SLO targeted by their course. The COVID-19 pandemic has slowed down our original timeline, but a BMB faculty committee is now working to officially update our assessment plan as part of the reaccreditation process, and the revised plan is slated be used for assessment starting AY 2022-2023.

d. How, when, and to whom will results and recommendations be communicated in a meaningful way?

This AY 2020-2021 assessment report will be distributed to all BMB faculty via email. We will also discuss this report and the successes and challenges of the previous academic year, as well as brainstorm possible improvements to the program, at faculty meetings and ASBMB reaccreditation meetings through the spring 2022 semester (our next faculty is set for January 2022).

University of New Mexico

A total of 41 students from University of New Mexico took the 2021 ASBMB Certification Exam. Of these, 14 (34.1%) achieved certification, including 4 who achieved certification with distinction. Their names are listed below.

Certified	Certified with Distinction
Hannah Ahr	Eric Gomez
Ariana Gutierrez	Jordan Lee
Miranda Juarros	Xavier Robinson
Morgan Lucero	Calista Weiss
AnaLisa Ortiz	
Luis Enrique Paez Beltran	
Elizabeth Raby	
Richard Romero	
Aaron Romero	
Ryan Shaffer	

The exam consisted of 11 questions plus a pilot question that did not contribute to the scoring. Of the 11 scored questions, seven were at a high Bloom's level and four at a low Bloom's level:

Question	Core Concept	Bloom's Level
1	Information Storage	Low
2	Structure & Function	Low
3	Energy & Metabolism	Low
4	Quantitative Analysis	Low
5	Energy & Metabolism	High
6	Structure & Function	High
7	Information Storage	High
8	Structure & Function	High
9	Information Storage	High
10	Energy & Metabolism	High
11	Quantitative Analysis	High

Of the 11 scored questions, 6 were free response questions that were scored manually, and 5 were a combination of multiple choice and fill in the blank questions that were scored automatically by the testing software. Please note the difference in scoring for each question type:

- Questions 1, 3, 4, and 6 were scored automatically on a binary scale: Highly Proficient (3) or Not Yet Proficient (0).
- Questions 2, 5, 7, 9, 10, and 11 were scored manually on a three level scale: Highly proficient (3), Proficient (2), and Not Yet Proficient (1). Note that leaving the field completely blank was scored as a 0.
- Question 8 was a two-part question with partial credit and scored on a three level scale: Highly proficient (3), Proficient (2), and Not Yet Proficient (0).

To achieve certification, students were required to score Proficient or above on 8 questions. To achieve certification with distinction, students were required to score Proficient or above on 10 questions.

Of the 938 students in ASBMB-accredited programs who took the exam nationwide, 359 (38.3%) achieved certification. A total of 118 of these (12.6% of the total) achieved certification with distinction.

Below is the percentage breakdown for the students from your school (in black) and all students (in grey) for each question:

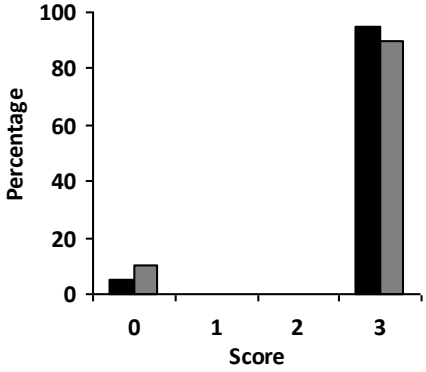
University of New Mexico (41 students)

National (938)

Question 1

Information Storage

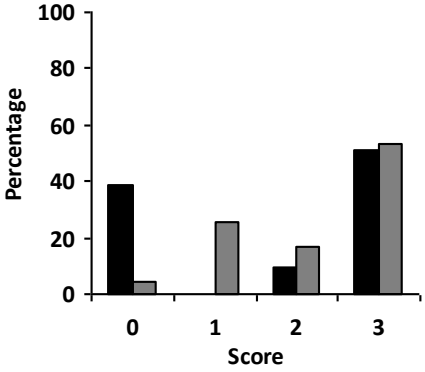
Low Bloom's



Question 2

Structure & Function

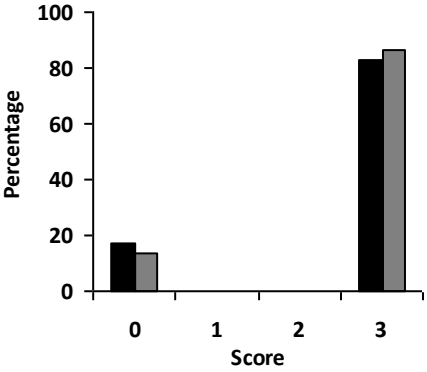
Low Bloom's



Question 3

Energy & Metabolism

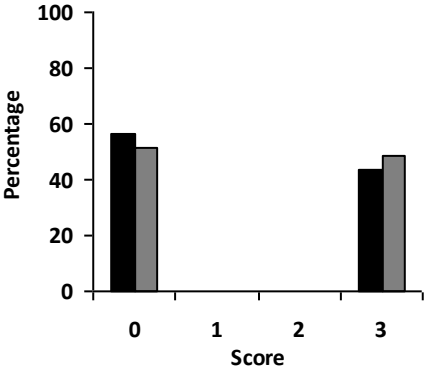
Low Bloom's



Question 4

Quantitative Analysis

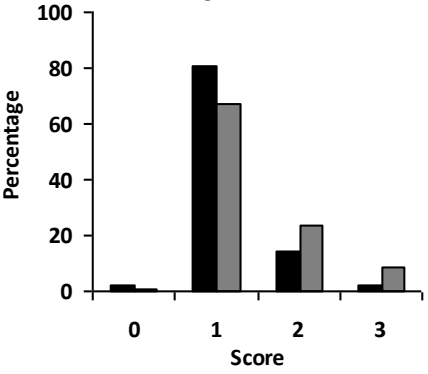
Low Bloom's



Question 5

Energy & Metabolism

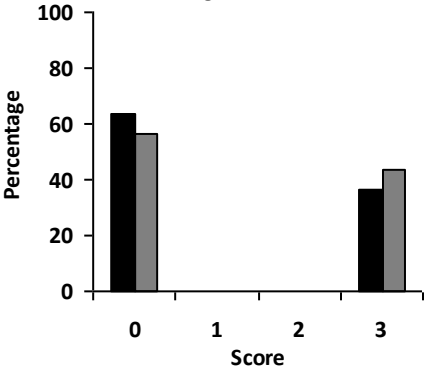
High Bloom's



Question 6

Structure & Function

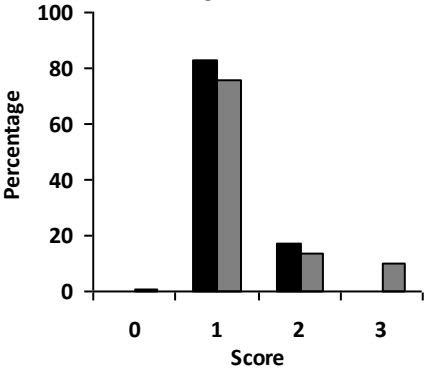
High Bloom's



Question 7

Information Storage

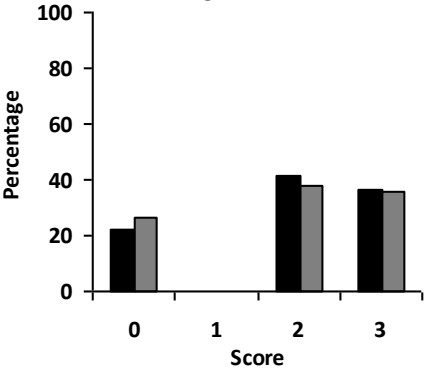
High Bloom's



Question 8

Structure & Function

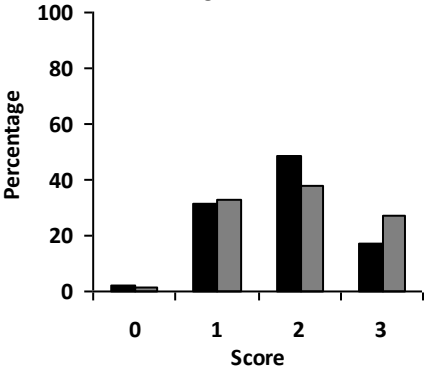
High Bloom's

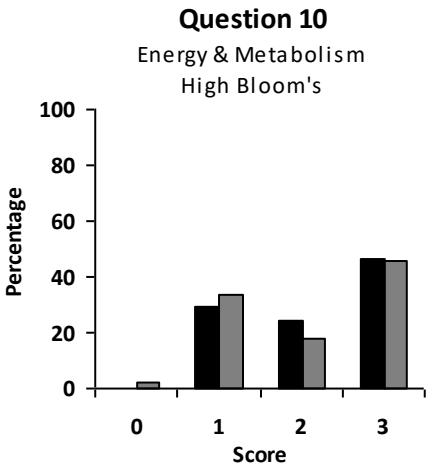


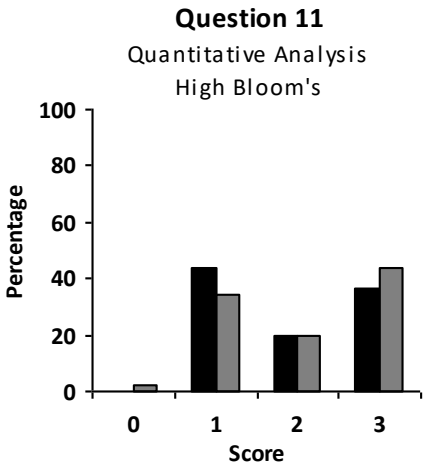
Question 9

Information Storage

High Bloom's




Question 10
Energy & Metabolism
High Bloom's
100
80
60
40
20
0
Percentage
0
1
2
3
Score


Question 11
Quantitative Analysis
High Bloom's
100
80
60
40
20
0
Percentage
0
1
2
3
Score

BIOC 448L –Biochemical Methods – 3 credits

Spring 2021

Lecture Session	Laboratory Sessions
ZOOM	ZOOM
(R) 11:00 AM – 12:50 PM	001: (M) 9:00 AM – 12:50 PM
	002: (T) 9:30 AM – 1:20 PM
	003: (W) 9:00 AM – 12:50 PM

Course Contacts

Instructors

Dr. Summer R. Hayek
shayek@salud.unm.edu
(M) 3:30 PM – 5:00 PM
(T) 11:00 AM – 12:30 PM
(W) 9:00 AM – 10:30 AM

Dr. Tyrel Bryan
tlbryan@salud.unm.edu
Office hours by appointment

Dr. Laura de Lorenzo
ldelorenzobarrios@salud.unm.edu
Office hours by appointment

Teaching assistant

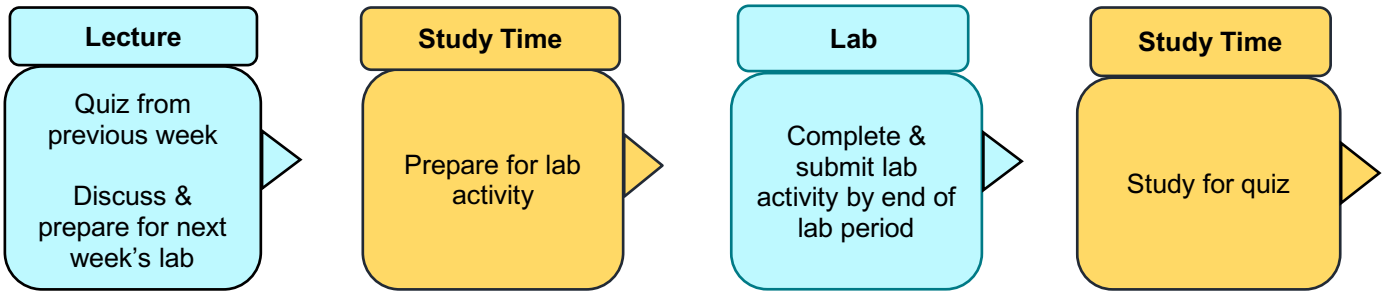
Alexandria (Ali) Viszolay
AlViszolay@salud.unm.edu
505-699-9010
Office hours by appointment

Course Description

This is an advanced laboratory course that is built around a full-semester research project. The project will introduce you to the methods, approaches, and concepts of biochemistry and molecular biology in the context of their application to research and critical thinking. You will investigate a research question, develop a hypothesis, propose and virtually conduct experiments, analyze your results, draw conclusions, and present your findings. You will also practice the important scientific skill of clear and succinct communication, through both a written proposal and an oral presentation.

You will be randomly assigned to work in a group, and you and your teammates will perform all aspects of your research project as a team. Since members will have the same data, you must reach agreement concerning interpretation of your results, which is similar to what happens in actual research projects.
Prerequisite: "C" or better in BIOC 446

This course functions on a weekly cycle. During most weeks, you will need to attend lecture, work with your group during lab, and submit a write-up of your lab activity:



Learning Outcomes

Content Goals

1) Use electronic databases and bioinformatics tools to analyze biomolecular sequences and identify the impact of conservation and/or evolutionary change on biomolecular structure.

2) Understand the theory and specifics involved in techniques to isolate, quantify, characterize, and compare various biomolecules.

3) Apply the fundamental concepts of experimental design to answer a scientific question:

- Use primary literature to gather scientific information.
- Critique and explain the limitations of work published in scientific journals.
- Develop a testable and falsifiable hypothesis.
- Design relevant experiments with appropriate controls to test a hypothesis.
- Explain the chemical and physical basis of biochemical techniques used in experiments.
- Safely operate equipment and perform experiments.
- Record observations, data, and research progress properly in a laboratory notebook.
- Analyze data using appropriate calculations and statistical techniques to generate empirical results.
- Interpret results in the context of the project to draw conclusions.

Process Goals

1) Describe the importance and necessity of scientific ethics and integrity in performing research.

2) Communicate scientific concepts and findings verbally and in writing.

3) Collaborate effectively with colleagues.

Course Tools

UNM Learn

Our class website is housed at UNM Learn (learn.unm.edu). Most course material will be posted there, including notes, lab activities, assignment guidelines, Zoom links, and grades. You will also use Learn to submit assignments and take quizzes. Course announcements will be both sent via email and posted to Learn. Be sure that you check the UNM email address used by the Learn system regularly; this may be an @salud.unm.edu account, if you have been assigned one.

Zoom Virtual Conferencing

We will be using Zoom for all synchronous meetings this semester, including lectures, labs, and office hours. UNM offers Zoom free of charge, either using a computer or the Zoom mobile app. Please see the following link for more information on how to access Zoom:
https://online.unm.edu/help/learn/students/web-conferencing/zoom/index.html

Instructor and Teaching Assistant Help

The instructors are available outside of class times to help your learning, and you are highly encouraged to visit us during office hours or contact us via email when needed!
To best meet your needs in a timely manner, please consider the following forms of support:

Virtual Office Hours

Dr. Hayek will hold office hours using Zoom. You can find her reoccurring Zoom link in a folder on the main page of Learn. Dr. Hayek will run drop-in office hours, meaning you do not need to make an appointment in advance and can simply Zoom in as needed. Please be aware that this means you may be meeting with Dr. Hayek in the presence of other students. If you need to schedule a private meeting with Dr. Hayek, or if you cannot attend her office hours as scheduled, please email Dr. Hayek directly to arrange a different time to meet. Dr. Bryan, Dr. de Lorenzo and Ali may run their office hours differently; please contact them directly.

Emails

All emails should include your full name, your UNM ID number, and your BIOC 448L section number so that we can quickly look up your information as needed. Due to the Family Educational Rights and Privacy Act (FERPA), personal email accounts and phone calls cannot be used for correspondence concerning individual students or student progress. Instructors typically respond to emails between 8:00 AM and 6:00 PM on weekdays; emails sent after hours or on the weekends will be answered during the next work day when possible. We try to respond to emails within 24 hours (excluding weekends), but this is not always feasible. For the fastest turnaround when sending an email, please check that your question isn't already answered in the syllabus, class notes, or announcement page; questions that have been answered elsewhere are sometimes overlooked during busy times of the semester. Please also remember that questions that will require lengthy responses may not be answered in a timely manner; these are better addressed during office hours or in class.

Grading Policy

In order to be fair to all students, there are no exceptions to these policies.

General policies

You should plan to attend all class and laboratory sessions whenever possible, as missing lab or lecture regularly will make it difficult to perform well on quizzes and will make writing your proposal and defending your results unnecessarily challenging. However, the BIOC 448L grading policy is designed to accommodate inevitable absences, specifically the equivalent of missing 15% of the lecture and lab sessions (~2 classes), which UNM considers a "reasonable" number of absences. Therefore, please adhere to the following general grading policies:

1) This is a synchronous course, and you must attend class to receive credit for work done in class.

2) There is no distinction between an excused and unexcused absence. All absences are treated the same, and it is not necessary to provide documentation when you miss class.

3) Late work must be approved by an instructor and will only be accepted in emergency situations.

4) There are no opportunities for extra credit, and there are no opportunities to make up any part of this course at the end of the semester.

5) Grade distributions are not curved, and final grades are not rounded up.

6) All grade appeals must be submitted in writing within one week of grade receipt.

Your final grade will be calculated from the following forms of assessment:

Assessment	Number Offered	Number Dropped	Number Counted	Points Each	Total Points	% of final grade
Lab Activities	9	2	7	25	175	17.5%
Quizzes	9	2	7	25	175	17.5%
Written Proposal	1	0	1	300	300	30%
Oral Presentation	1	0	1	250	250	25%
Participation & Professionalism	4	0	4	25	100	10%
					1000	**100%**

Grades will be assigned based on the percentage of total points accumulated:

A+	> 97%
A	93 – 97%
A-	90 – 92%
B+	87 – 89 %
B	83 – 86%
B-	80 – 82%
C+	77 – 79%
C	73 – 76%
C-	70 – 72%
D	60 – 69%
F	< 60%

Lab Activities
You will complete virtual lab simulations and case studies with your teammates during the lab periods; sometimes you will have preparatory work to complete before coming to lab. Before you leave the lab for the day, one member of your group must submit your completed lab activity write-up to Learn; submissions will not be accepted after the lab session has ended unless prior permission is obtained. Everyone in your group will receive the same score for that lab. We will drop your (2) lowest lab activity scores.

Quizzes
At the beginning of most lecture sessions, you will take a short quiz using Learn, based on the previous lab's theory and protocols. These are individual quizzes and must be taken without collaboration. We will drop your (2) lowest quiz scores.

Written Proposal
You will write a mock grant proposal that is due in April and is worth 2/3 of your written proposal score. The proposal is comprised of background information, your research question and hypothesis, your proposed experimental approach, and references. Your proposal will be assessed for scientific accuracy, clarity, and innovation.

Writing will be done in multiple stages, both individual and team-based, including drafting, critiquing, and revising. Failure to turn in required drafts will result in 0% for the written proposal. The proposal itself is worth 20% of the final course grade, and therefore the highest possible grade you could receive under these circumstances is a B-. You will then work with your partners to consolidate your drafts into a final

proposal, which you will submit as a team. You will have an opportunity to receive feedback on a draft of your proposal from your both your peers and your instructor before submitting the final proposal for a grade. Please note that your team will submit a single proposal, and partners will receive the same proposal score.

The written proposal will be graded using a rubric that will be released to you ahead of time. You will then be individually assigned two of your peers' reports to review using the same rubric. You must complete this review on your own and not with your teammates. You will share your reviews with the rest of the class at the end of the semester, as part of a mock grant review panel. Your accuracy, thoroughness, and thoughtfulness in these two reviews comprise the other 1/3 of your written proposal score (10% from the two grant proposal reviews).

Oral Presentation

Once you have finished writing your grant proposal, you will present your findings to your peers in a 15-20 minute presentation at the end of the semester. In addition to explaining the motivation behind your work, the presentation is comprised of results (figures and tables), conclusions, and future directions. Like the written proposal, your presentation will be assessed (by both the instructors and your peers) for scientific accuracy, clarity, and innovation, as well as general presentation skills. The oral presentation will be graded using a rubric that will be released to you ahead of time.

You will work together with your group to produce your presentation. You will have an opportunity to receive feedback on a draft of your slides from your peers before presenting your final presentation to your lab section. Failure to turn in required drafts or show up for your group's final presentation will result in 0% for the oral presentation. Because the presentation is worth 25% of the final course grade, the highest possible grade you could receive under these circumstances is a C. Please note that partners will present as a team and will receive the same presentation score, other than a portion of the grading scheme devoted to individual presentation skills.

Participation & Professionalism

Your success in this course (and in life) is dependent upon your productive and respectful interactions with others. Therefore, at four times throughout the semester, you will be asked to use a rubric to rate your partners' communication and productivity over the course of the previous ~4 weeks, including during lab activities and when working on the written proposal and oral presentation. You will also rate your own participation and professionalism as a self-reflection exercise. We will average the scores you received from yourself and your partners in a quarterly Participation & Professionalism score, and the (4) quarterly scores will be summed at the end of the semester to calculate your total score for the course. The instructors will keep all feedback confidential. Failure to complete any of the rubrics will result in 0% for the participation & professionalism score.

It is our sincere hope that you will develop a wonderful working relationship with your partners, but disagreements may still arise. If you encounter difficulties working with your assigned group, we ask that you first attempt to resolve your differences one-on-one, as professional adults. However, if problems persist, please talk to your instructors so that we can work with you to find a solution or assign new partners if absolutely necessary.

Credit-Hour Statement

This is a three credit-hour course. Class meets for 5-hours and 40-minutes of direct instruction each week for sixteen weeks during the Spring 2021 semester. This is broken into a 1 hour, 50 minute lecture and a 3 hour, 50-minute lab. Students are expected to complete a *minimum* of six hours of out-of-class work (preparation, study, projects) each week.

Letters of Recommendation

As you move forward in your career, you may need letters of reference for a job, further schooling, an internship, etc. Please be aware that it can be difficult to write a deep, supportive letter from only your participation in a single, large enrollment class, and a "neutral" letter is considered a "negative" letter for most professional schools. I can certainly report your grade in this course and your percentage ranking among your peers, but this leads to a fairly generic letter of reference, and most of this information can already be found on your transcript. If you'd like a strong, personalized letter, please remember that I have to know you well enough to write for you. Strive to be a hard-working, collegial, inquisitive student!

Dr. Hayek's Letter of Recommendation Policy

If you would like a letter of recommendation, you should optimally provide at least two months' notice; requests made less than a month from the deadline may not be accommodated. Please be prepared to provide a CV/resume, a draft of your personal statement, and the due dates and submission information for your letter. I will also ask you the following questions so that I can craft a personal, tailored letter, so please consider your answers as you progress through this course:

1) What are your long-term career plans? (Do you have a specific future specialty in mind? Do you want to work/practice in NM? Etc.)

2) What did you learn in this class (facts or skills) that are pertinent to your career development?

3) What is something that sets you apart compared to your peers who also took this class?

4) What is something(s) you'd like the person reading your letter to know about you? If this is something I can personally speak to, stemming from my interactions with you, it makes your letter particularly strong!

Dr. Bryan's & Dr. de Lorenzo's Letter of Recommendation Policy

Please contact Dr. Bryan or Dr. de Lorenzo directly to inquire about letters of recommendation.

Academic Integrity

As stipulated in the UNM Student Pathfinder (http://pathfinder.unm.edu/code-of-conduct.html), each student is expected to maintain the highest standards of honesty and integrity in academic and professional matters. In this course, academic dishonesty includes, but is not limited to:

1) Dishonesty on assignments or during quizzes.

2) Failing to acknowledge sources and collaborations by appropriate citation (your work must not contain verbatim copying of any kind, from any source, including the internet).

3) Claiming credit for work not done or done by others.

4) Hindering the academic work of other students.

Deliberately and knowingly abetting an act of academic dishonestly, or failing to report an incident, also constitutes a violation of academic integrity. Please ask for help in understanding and avoiding plagiarism and academic dishonesty, which can have very serious disciplinary consequences.

Any student judged to have engaged in academic dishonesty in this course will receive a failing grade for the work in question and/or be withdrawn from the course with a grade of "F". The incident will be reported to the Dean of Students, who reserves the right to take disciplinary action, up to and including dismissal from the university, against any student who is found guilty of academic dishonesty.

Statement of Course Values

We are committed to affirming the identities, realities, and voices of all students, and we value the different experiences that each of us brings to this course and to our careers as scientists. As such, your experience in this course is important to us, and we will do our best to help create an inclusive learning environment where all students can thrive. We strongly believe that all students at UNM can be successful in biochemistry, and it is our job to partner with you to help you achieve our shared learning goals.

University Policies

Accessibility and the Accessibility Resource Center (ARC)

Mesa Vista Hall, Room 2021
(505) 277-3506
arcsrvs@unm.edu

In accordance with University Policy 2310 and the Americans with Disabilities Act (ADA), academic accommodations may be made for any student who notifies the instructor of the need for an accommodation. It is imperative that you take the initiative to bring such needs to the instructors' attention, as we are not legally permitted to inquire. We can schedule a meeting to discuss the course format and requirements, anticipate the need for adjustments, and explore potential accommodations. We rely on the Disability Services Office at ARC for assistance in developing strategies and verifying accommodation needs. If you have not previously contacted them, you are encouraged to do so.

UNM is committed to providing courses that are inclusive and accessible for all participants. If you have concerns about technology barriers in this course, please see the resources offered by UNM here: https://at.unm.edu/coronavirus/student-tech-access.html. If you are experiencing physical or academic barriers, or concerns related to mental health, physical health, and/or COVID-19, please consult with the instructors after class, via email, or during office hours. You are also encouraged to contact ARC for assistance.

Emergency Closure

The schedule, requirements, and procedures for this course are subject to change due to unusual or extraordinary circumstances, including but not limited to those surrounding the COVID-19 pandemic. If class is cancelled or the college closes for any reason, any missed assignments or exams will be postponed, and a revised schedule will be provided by email or at the next class meeting. If changes to graded activities are required, students will not be penalized as a result of the adjustments but will be responsible for meeting any revised deadlines and standards.

Title IX Responsibility to Report

Title IX prohibitions on sex discrimination include various forms of sexual misconduct, such as sexual assault, rape, sexual harassment, domestic and dating violence, and stalking. Current UNM policy designates instructors and teaching assistants as required reporters, which means that if we are notified (even outside of classroom activities) about any Title IX violations, we must report this information to the Title IX coordinator. If you or someone you know has been harassed or assaulted and would like to receive support and academic advocacy, there are numerous confidential routes available to you. For example, you can contact the Women's Resource Center, the LGBTQ Resource Center, Student Health and Counseling (SHAC), or LoboRESPECT. LoboRESPECT can be contacted on their 24-hour crisis line (505-277-2911) or at loborespect@unm.edu. You can receive non-confidential support and learn more about Title IX through the Title IX Coordinator at 505-277-5251 and http://oeo.unm.edu/title-ix/. Reports to law enforcement can be made to UNM Police Department at 505-277-2241.

Course Calendar *(*subject to change at the instructors' discretion)*

Lab Activities
Quizzes
Written Proposal *(draft assignments)*
Oral Presentation *(draft assignments)*
Participation & Professionalism

WEEK	LECTURE		LABORATORY Lab activity write-up submitted by end of lab period	
1	Jan 21	Course introduction MDH background	01/25 01/26 01/27	MDH literature review Lab activity #1
2	Jan 28	Quiz #1 Cloning & mutagenesis Creating a plasmid map	02/01 02/02 02/03	MDH mutant cloning Lab activity #2
3	Feb 04	Quiz #2 Sterile technique & DNA isolation Sequencing PCR & analysis	02/08 02/09 02/10	MDH mutant identification Lab activity #3
4	Feb 11	Participation rubric #1 due Quiz #3 Written proposal expectations "Background" section	02/15 02/16 02/17	ASYNCHRONOUS: NO LABS *Background (individual)*
5	Feb 18	*Background due*; Consolidation Amino acid sequence homology Protein structure visualization	02/22 02/23 02/24	Virtual protein structure preparation Lab activity #4
6	Feb 25	Quiz #4 What is a hypothesis "Specific Aims" section	03/01 03/02 03/03	Hypothesis & prediction creation Lab activity #5
7	Mar 04	Quiz #5 MDH enzyme kinetic assays Designing controlled experiments "Experimental Approach" section	03/08 03/09 03/10	MDH kinetics experimental strategy Lab activity #6
8	Mar 11	*Specific aims due*; Consolidation Participation rubric #2 due Quiz #6 Protein purification & quantification SDS-PAGE & Western blotting	03/15 03/16 03/17	SPRING BREAK: NO LABS
9	Mar 18	SPRING BREAK: NO LECTURE	03/22 03/23 03/24	MDH protein purification Lab activity #7

10	Mar 25	*Proposal due*; Peer feedback Quiz #7	03/29 03/30 03/31	Instructor proposal feedback
11	Apr 01	Michaelis-Menten kinetics Lineweaver-Burk plots	04/05 04/06 04/07	WT vs. MT MDH kinetic assays Lab activity #8
12	Apr 08	Final proposal due; Distributed Participation rubric #3 due Quiz #8 The role of peer review in science Grant review panel expectations Statistics & graphing Hypothesis evaluation	04/12 04/13 04/14	MDH project data analysis Lab activity #9
13	Apr 15	Quiz #9 Oral presentation expectations Biochemistry career advisement	04/19 04/20 04/21	ASYNCHRONOUS: NO LABS *Oral presentation (group)*
14	Apr 22	*Presentation due*; Peer feedback	04/26 04/27 04/28	Proposal peer reviews due Mock grant proposal review panel
15	Apr 29	Bioethics	05/03 05/04 05/05	Final presentations
16	May 06	Participation rubric #4 due		

Important dates

Last day to drop with a refund and without a "W" grade on transcript: February 5th, 2021
Last day to drop without Dean's permission (no refund): April 16th, 2021
Last day to drop with Dean's permission (no refund): May 7th, 2021

BIOC495-002: Omics – Spring 2021

Laura de Lorenzo, PhD
Department of Biochemistry & Molecular Biology
School of Medicine
Instructor email: ldelorenzobarrios@salud.edu.unm
Department email: hsc-biochemistryandmolecularbiology@salud.unm.edu

In this highly structured, active learning course, every student can achieve if they are motivated to be an active learner

COURSE DESCRIPTION

This course will cover state-of-the-art high throughput established and novel approaches used in genome sequencing, transcriptomics and epigenetics to obtain, integrate and analyze complex data (basic bioinformatics).

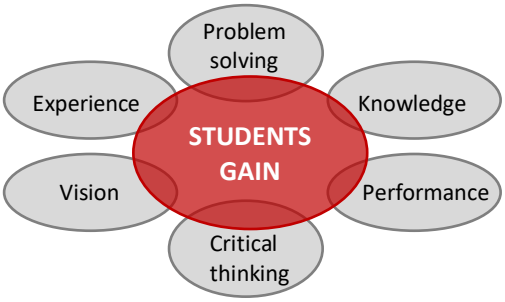
This is a **highly Structured course,** incorporating **Active Learning.**
In this course, you will have to be active before, during and after class, be engaged and review the material weekly. During class, you will need to attend lecture, work with your group, and submit a write-up of your bioinformatic activity.

Required prerequisite: BIOC 445 (Intensive Introductory Biochemistry I)
Highly suggested prerequisite: BIOL 2110C (Cellular & Molecular Biology)

COURSE OBJETIVES

By the end of this course, students will be able to:
C1. Recognize the scope of omics research and methodology.
C2. Identify the importance of experimental design in omics research.
C3. Implement the challenges of big data analysis, including integration of data, computational resources, and interpretation of these data.
C4. Analyze next generation sequencing data using different bioinformatic approaches.
C5. Design a bioinformatic research on a topic related to omics technologies.

In this course, **students will acquire** the following **transferable skills**:



VIRTUAL OFFICE HOURS

Different options to connect with me:

- ✓ **Synchronous option:**

  Drop-in Tue / Thru 10-11 am by zoom, or schedule a virtual appointment.

  "Common concerns" office hours: *if you have similar questions or you feel more comfortable with group discussions*.

- ✓ **Asynchronous option:**

  Forum in Learn.

  Email: Please type BIOC 495 heading of your email message.

All emails should include your full name, your UNM ID number. Due to the Family Educational Rights and Privacy Act (FERPA), personal email accounts and phone calls cannot be used for correspondence concerning individual students or student progress. Instructor typically will respond to emails the same day or during the next work day when possible.

Did you know? *Asking for help is a sign of strength and self-care!* ***Please ask for help early and often!*** *Small problems are easier to cope with than escalated issues, please do not wait until the end of the semester to ask for help. Reach me through after class or by email. Come see me after the first exam if you did not do well. What suggestions can I have for you if you wait until you did poorly on all three exams?*

EXPECTATIONS

- Be respectful. Be on time ⏰
- Pay attention in our synchronous class:
  - 🕓 It is only 2,5 hours/week!!!
  - 📚 Take advantage of them!!
- Be communicative:
  - 🙋‍♂️ Ask questions in class (or virtual office)
  - 💻 Participate in class
  - 👫 Discuss with your classmates (breakout rooms)
- Be ready:
  - 🥇 Before class: Reading / videos / Self-assessments.
  - 🥈 During class: Lecture / Quizzes / Peer-assessments.
  - 🥉 After class: Check the material.

TECHNICAL REQUIREMENTS

Computer

- A high-speed Internet connection is highly recommended.
- Supported browsers include: Detailed Supported Browsers and Operating Systems
- Any computer capable of running a recently updated web browser should be sufficient to access your online course. However, bear in mind that processor speed, amount of RAM and Internet connection speed can **greatly** affect performance. Many locations offer free high-speed Internet access including UNM's Computer Pods.
- For the best experience when using the Kaltura Media Tools inside UNM Learn, be sure to use a supported browser on a desktop.
- Microsoft Office products are available free for all UNM students (more information on the UNM IT Software Distribution and Downloads page)

For UNM Learn Technical Support: (505) 277-0857 (24/7) or use the "Create a Tech Support Ticket" link in your course.

Web Conferencing

Web conferencing will be used in this course. We will be using **Zoom/Learn** as our primary platforms. *For the online sessions, you will need:*

- *A built in or external webcam with microphone.*
- *A high-speed internet connection is highly recommended for these sessions. A wireless Internet connection may be used if successfully tested for audio quality prior to web conferencing.*
- *For UNM Web Conference Technical Help: (505) 277-0857*

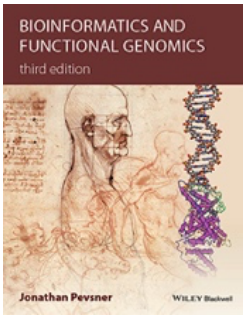
Tracking Course Activity

UNM Learn automatically records all students' activities including: your first and last access to the course, the pages you have accessed, the number of discussion messages you have read and sent, web conferencing, discussion text, and posted discussion topics. This data can be accessed by the instructor to evaluate class participation and to identify students having difficulty

TEXTBOOK AND SUPPLEMENTAL MATERIALS

Textbook

Pevsner, Jonathan
Bioinformatics and Functional Genomics
(Wiley-Blackwell, 3rd edition, 2015)



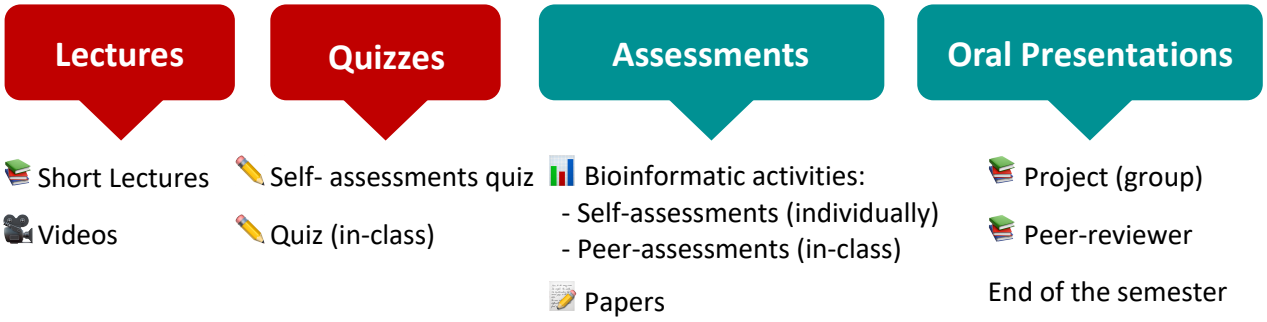
It is reference material to help you achieve the objectives that will be defined in an outline and available for each topic area. Specific sections assigned for reading will only be given for ***Bioinformatics and Functional Genomics.***

UNM Learn (www.learn.unm.edu): this is the primary platform for all course materials and resources, such as those listed below. It is your responsibility to check it regularly.

- Topic objectives
- Primary literature articles
- Peer and Self-assessments
- Quizzes
- Exams
- Games
- Videos

COURSEWORK AND PARTICIPATION

SUMMARY OF COURSE CONTENT



QUIZZES: You will have two types of quizzes:
Self-assessment Quiz (homework): based on you reading instructions. You must complete once started and you cannot go backwards on these questions.
Quiz (in-class): at the beginning of most lecture sessions, you will be required to do online timed quizzes in Learn that assess the learning of the previous session (**application of spaced learning and testing effect).**
Both types of quizzes are individual and must be taken without collaboration.

ASSESMENTS: You will have two types of activities:
Self-assessments (homework): these activities will be part of your reading guide and should be performed individually and summitted on Learn before class.
Peer-assessments (in-class): You will complete bioinformatic activities and case studies with your teammates during the class periods. Before you leave the class, one member of your group must submit your completed bioinformatic activity write-up to Learn; submissions will not be accepted after the class session has ended unless prior permission is obtained. Everyone in your group will receive the same score for that activity.

PROJECT & ORAL PRESENTATION (in group): During the semester, you will be working in a **bioinformatic research project** applying new concepts that you are going to investigate. The project is comprised of background information, your research question, your bioinformatic research results, conclusions and references (no more than 10). You will have two opportunities to **receive feedback** on your Project drafts.

You and your group will present your project (focused on the bioinformatic research results) to your peers in 8-10 minutes as an oral presentation at the end of the semester. In addition to explaining the motivation behind your work, the presentation is comprised of results and conclusions.
Your presentation will be **assessed** (by the instructor and your peers) for scientific accuracy, clarity, and innovation, as well as general presentation skills. The oral presentation will be **graded using a rubric** that will be released to you ahead of time.

Work with your group: you will work together with your group to investigate your topic and produce your presentation.

Feedback: You will have one opportunity to **receive feedback** on a draft of your slides before presenting your final presentation to your peers.
Score: Failure to turn in required drafts or show up for your group's final presentation will result in 0% for the oral presentation. Please note that partners will present as a team and will receive the same presentation score, other than a portion of the grading scheme devoted to individual presentation skills.

Topics for oral presentation

Team 1: Protein **A**	Team 2: Protein **B**	Team 3: Protein **C**
Team 4: Protein **D**	Team 5: Protein **E**	Team 6: Protein **F**

EXAMs:
We will have three exams during the semester. Exam questions (multiple choice, true or false, and multiple answers) will be taken from class meetings and assigned readings. Exams must be taken on the dates indicated; no makeup exams except in special circumstances. Students missing an exam are expected to have an excused absence note and notify the instructor prior to missing an exam. A make-up exam must be taken within one week of the exam, otherwise the final exam score will count for that portion of the grade missed.
If you feel an error has been made in determining an exam score, you may submit the exam for a re-grade in a timely manner after the exam has been returned to the class. You must submit in writing your reasons for requesting a re-grade.

GAMEs:
One game will be carried out before two of our exams to review the material and practice for the exam. Each game will **count** as an in-class Quiz and as self-evaluation, questions elaboration or questions participation, respectively.

Follow these directions to participate:

- Do **a Multiple Choice Question** per chapter (that is included in the exam).
- Choose the **correct answer** in your multiple-choice questions (with a short explanation).
- Send your answers to me
- Game instructions (during class).

STRUCTURE CLASS SESSION

BEFORE class	DURING class	AFTER class
Self-assessment (reading, video or Bioinformatic activity) 🧍 INDIVIDUALLY ⏰ Due before class	**Quiz** (material from previous class) **Lecture** (approx. 30 min) **Peer-assessment** (Bioinformatic activity) 👫👫 GROUPLY ⏰ due before the end of the class	Review the material Connect with your peers Go to my Virtual Office Prepare for the next class

THIS IS NOT A CLASS FOR PASSIVE LEARNERS. You are expected to be actively engaged in this course through before and after class, during class discussions and activities.

You are expected to stay on top of reviewing weekly. SUCCESSFUL STUDENTS REVIEW AND PRACTICE ROUTINELY. Successful students ask questions and get help, ROUTINELY.

BEFORE CLASS

• Follow the instructions shown in the Reading guide. Read the assigned pages or paper, and watch the suggested videos.
• Do the self-assessment (quiz or bioinformatic activity).

DURING CLASS

• Bring a computer, be prepared to take notes.
• Be prepared to answer all the quiz questions (evaluating **spaced learning and testing effect**) without looking at your notes (beginning of the class).
• Be ready to work with your group in the assigned activity (it will due before the end of the class).
• Keep a running list of questions you have about the current topic (these are a study guide)

AFTER CLASS

• Review the material, go to office hours, meet with a study group: do as many of these things as your schedule allows on a regular basis.
• Use quizzes to see what you know throughout the semester.
• Study a little Omics every day. Start with the question “what did I learn today?” and see how much you can recall without looking at your notes.
• Identify areas of uncertainty, these are questions you can ask.

Expectations for Participation

- ☐ time required (9-12 hours per week)
- ☐ students are expected to learn how to navigate in Learn and to use the Learn course email
- ☐ students are expected to communicate with one another in team projects
- ☐ students are expected to keep abreast of course announcements
- ☐ students are expected to keep instructor informed of class related problems, or problems that may prevent the student from full participation
- ☐ students are expected to observe course netiquette at all times

GRADING SCHEME & TYPE OF ASSESSMENT

General policies

The BIOC 495 grading policy is designed to accommodate inevitable absences, specifically the equivalent of missing 15% of the lecture and lab sessions (~2 classes), which UNM considers a "reasonable" number of absences. Therefore, please adhere to the following general grading policies:

- This is a synchronous course, and you must **attend zoom classes** to receive credit for work done in class.
- Late work will NOT be accepted.
- There are no opportunities for extra credit, there are NOT any opportunities to make up any part of this course.
- Early exams can be arranged in case of university-sanctioned activities (e.g., athletic matches) or professional/graduate school interviews if documentation is provided.
- Grade distributions are not curved, and final grades are not rounded up.
- All grade appeals must be submitted in writing within one week of grade receipt.

This is a 3-credit elective course, with commensurate expectations. Accordingly, for all parts of this course except the exams, there is a cushion between the number offered and the number that are counted for credit. In this course, there is no distinction between excused and unexcused absences, so there is no need to provide any documentation if you are absent (unless you are requesting an early exam, as described above). You are responsible for acquiring any material covered. Grading and feedback will be posted on Learn in a period of one week (approximately).

Grading scheme that allows students to grow:

Breakdown for OVERALL course grade	*Number offered*	*Number Dropped*	*Number Counted*	*Point each*	*TOTAL points*	*Percentage of final grade (%)*
Three midterm exams	3	0	3	140	420	42%
Peer-assessments *(Bioinformatics Activity)*	17	2	15	10	150	15%
Quizzes *(in-class)* ***or MCQ game***	14 (+2)	2	14	10	140	14%
Self-assessments *(homework)*	8 (+2)	2	8	10	80	8%
Participation & Professionalism	4	0	4	5	20	2%
Individual FINAL Project	1	0	1	120	120	12%
Oral presentation *(instructor & students' rubric)*	1	0	1	70	70	7%
TOTAL					1000	100%

***Participation & Professionalism**

Your success in this course (and in life) is dependent upon your productive and respectful interactions with others. Therefore, you will be asked to actively participate in this course throughout the semester:

- ✓ Using a **rubric to rate your partners' communication and productivity** over the course when working on the bioinformatic activities and during the games (before exams)

- ✓ Using a **rubric to rate your partners' communication and productivity** over the course when working on the oral presentation.
- ✓ You will also rate your own participation and professionalism as a **self-reflection** exercise.
- ✓ Sending your **surveys** about your previous knowledge, interests and opinions.

The instructor will average the scores you received from yourself and your partners in a quarterly Participation & Professionalism score, and the scores will be summed at the end of the semester (as shown in the table below) to calculate your total score for the course. The instructor will keep all feedback confidential. Failure to complete any of the rubrics will result in 0% for the participation & professionalism score.

Groups: the groups will be forming by the instructor following the **criteria of the Office for continuous professional Learning UNM-SOM.** Hoping that you will develop a wonderful working relationship with your partners, but disagreements may still arise. If you encounter difficulties working with your assigned group, the instructor asks that you first attempt to resolve your differences one-on-one, as professional adults. However, if problems persist, please talk to your instructors so that we can work with you to find a solution or assign new partners if absolutely necessary.

GRADING SCALE

Final grades will be based on the sum of all possible course points as noted above. Percentage of available point:

A+	97% or higher	**C+**	77-79%
A	90-96%	**C**	70-76%
B+	87-89%	**D**	60-69%
B	80-86%	**F**	59% or lower

How *successful* students have done well in this course: They...

1. always read the textbook or watch the assigned video for each corresponding homework (quiz or bioinformatic activity). They pay attention to what they are reading and reflect on what they are unsure about. They are not too focused on the grade they get on homework because they value the homework and videos as a tool to learn.
2. attend each class session prepared, stay engaged by hand-writing notes, and interact with peers that encourage them to participate and learn.
3. are willing to make mistakes, take chances drawing a model wrong, are willing to attempt questions by themselves before checking in with a peer, are willing to participate in class.
4. review after each class to reflect on what was learned and what they still have questions about.
5. study before each quiz and game (practice exam), so as to prepare for them like a real exam.
6. review (on their own) every question from Quizzes, Bioinformatic Activities, papers, class, *etc*. to see if they could TEACH it to someone else. Successful students don't just simply get the right answer and move on, they are able to explain how someone arrives at this answer.
7. attend office hours or study groups routinely because once they have done the work alone, they can collaborate and learn even more from others.
8. study on a regular basis, have a system for planning and keeping track of all deadlines.
9. are able to state what resources are available and where to find them.

LETTERS OF RECOMMENDATION

I would like to do your letter of recommendation in a top-quality way while maximizing a successful outcome for both of us. For that, please remember that I have to know you well enough to write for you. Strive to be a hard-working, collegial, inquisitive student!

Policy: you should provide a CV/resume, a draft of your personal statement, and the due dates and submission information for your letter. Please follow these instructions VERY CAREFULLY if you would like me to write a letter for you:

- Tell me what profession/position/program you are applying for.
- What is your major(s) and minor(s)? What courses did you take with me? What were your grades?
- Telling me what specific aspects of your association with me you would like me to elaborate on in the letter. Describe situations where I observed the traits/attributes that you expect me to describe in the letter.
- What did you learn in this class (facts or skills) that are pertinent to your career development?
- Give me description of your specific contribution to the work that you apply that you think I should emphasize for you.
- Describe experiences and *evidence* that you possess these competencies:
    - **Interpersonal Competencies**: Service Orientation/ Social Skills / Cultural Competence / Teamwork / Oral Communication.
    - **Intrapersonal Competencies**: Ethical Responsibility to Self and Others / Reliability and Dependability / Resilience and Adaptability / Capacity for Improvement.
    - **Thinking and Reasoning Competencies**: Critical Thinking / Quantitative Reasoning / Scientific Inquiry / Written Communication.

STATEMENT OF COURSE VALUES

We are committed to affirming the identities, realities, and voices of all students, and we value the different experiences that each of us brings to this course and to our careers as scientists. As such, your experience in this course is important to us, and we will do our best to help create an inclusive learning environment where all students can thrive. We strongly believe that all students at UNM can be successful in biochemistry, and it is our job to partner with you to help you achieve our shared learning goals.

UNIVERSITY NEW MEXICO POLICIES

Academic Courtesy

To ensure an undisrupted experience for everyone in class, you are expected to:

- Be on time / Be prepared.
- Use technology only for class-related activities.

Academic Integrity

You are expected to:

- Commit to a code of values that honors academic and personal integrity, honesty and ethical standards.
- Complete your own work. All students are expected to work individually on in-class exams, individual quizzes, primary literature summaries or any other assignments that are designated as “individual”.

- Acknowledge work and ideas of another person by appropriate citation. Collaborators must be acknowledged on any assignments, and assignments must not contain verbatim copying of any kind, from any source, including the Internet.

Any incidence of academic dishonesty in this course will result in a failing grade for that assignment and may involve university disciplinary action.

Academic Privacy

To comply with the Family Educational Rights and Privacy Act (FERPA), all communication that refers to individual students must be conducted either in person or through a secure medium (i.e., LoboMail or UNM Learn). Instructors are not allowed to respond to messages that refer to individual students or student progress in the course through non-UNM accounts, phone calls, or other forms of electronic media.

Accessibility Resource Center (ARC)

The American with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodations of their disabilities. If you have a disability requiring accommodation, please contact the UNM Accessibility Resource Center in 2021 Mesa Vista Hall at 505-277-3506. Information about your disability is confidential.

- Blackboard's Accessibility statement
- Microsoft's Accessibility statement
- *Include links to accessibility statements for all other technologies included in the course.*

Netiquette

Virtual classrooms and online small groups are professional settings. You must conduct yourself in the same manner as you would in any classroom in a professional degree program by adhering to University policies and expectations of professionalism and respect.

- Your first and last name should be included on your sign in.
- We encourage including pronouns next to your name.
- Adding a photo to your profile is encouraged. Please ensure that the photo is appropriate for a professional setting.
- In large group settings, turning your camera on is optional. If you would like to speak to answer or ask a question or make a comment, turning on your camera is encouraged but not required.
- In small group settings, turning your camera on is encouraged. Getting to know members of your small group is an important part of small group activities in the curriculum.
- Chat should be used for learning purposes only: to ask a question, answer a question, or make a comment related to course content. The chat is recorded; any unprofessional comments can lead to professionalism referrals to LEO and other appropriate entities.

Title IX Statement

As UNM faculty members, we are required to inform the Title IX Coordinator at the Office of Equal Opportunity (oeo.unm.edu) of any report we receive of gender discrimination, which includes sexual harassment, sexual misconduct, and/or sexual violence. You can read the full campus policy regarding sexual misconduct at https://policy.unm.edu/universitypolicies/2000/2740.html. If you have experienced

sexual violence or sexual misconduct, please ask a faculty or staff member for help or contact LEO or the LoboRESPECT Advocacy Center.

UNM SOM Learning Environment Statement

At the University of New Mexico School of Medicine, we believe that all learners should be treated with respect and dignity. They are to be offered a learning environment that is positive and in which they have the opportunity to thrive, be respected, and feel valued. If you believe you have been mistreated and wish to report an incident of mistreatment to LEO, please go to the website below and click on the "Report Mistreatment" button. Please note, when reporters share their contact information with LEO, actions are not taken without consent of the learner. https://hsc.unm.edu/school-of-medicine/education/learning-environment-office.html

COPYRIGHT ISSUES

All materials in this course fall under copyright laws and should not be downloaded, distributed, or used by students for any purpose outside this course.

The UNM Copyright Guide has additional helpful information on this topic.

Drop Policy

UNM Policies: This course falls under all UNM policies for last day to drop courses, etc. Please see or the UNM Course Catalog for information on UNM services and policies. Please see the UNM academic calendar for course dates, the last day to drop courses without penalty, and for financial disenrollment dates.

OMICS COURSE (**subject to change at the instructors' discretion*)

Syllabus & survey

Module 1: Introduction to command-lines

Lecture Ch 1
Activity #1: Introduction to command-lines
Quiz #1

Module 2: Access to Sequence Data and Related Information

Lecture Ch 2
Activity #2: NCBI resources & the beta globin locus
Activity #3: Analysis of TMEM106B gene using UCSC
Quiz #2 / Quiz #3
Self-evaluation #1: Multiple questions related to the reading guide
Self-evaluation #2: Accessing information from Galaxy

Module 3: Pairwise Sequence Alignment

Lecture Ch 3 (Part-I and II)
Activity #4: Sequence Alignment of TMEM106B at DNA and protein level
Activity #5: Global and Local Sequence Alignment
Quiz #4 / Quiz #5
Self-evaluation #3: Amino acid explorer

GAME & EXAM (Chapters 1, 2 and 3)

Module 4: Basic Local Alignment Search Tool (BLAST)

Lecture Ch 4 (Part-I and II)
Activity #6: BLAST
Activity #7: Protein function identification
Quiz #6
Self-evaluation #4: Evaluation of Arabidopsis PHR1 in tomato database & Globin proteins in mouse

Module 5: Multiple Sequence Alignment

Lecture Ch 5
Activity #8: Retrieval of groups of protein sequences, multiple sequence alignments, explore the accuracy and relatedness of different MSA and uses of MSA.
Self-evaluation #5: Video & Quiz

Module 6: DNA: The Eukaryotic Chromosome

Lecture Ch 6 (Part-I and II)
Activity #9: ChiP-seq methodology
Quiz #7
Self-evaluation #6: Reading multiple choice questions related to repetitive DNA

Module 7: ChIP-seq

Lecture Ch 7
Activity #10: ChIP-seq in the discovery of transcription factor binding sites & in the discovery of the underlying mechanisms of transcription factor-mediated differential gene regulation
Activity #11: ChIP-seq in the discovery of new cis-elements & Importance of cis-elements in transcription regulation
Quiz #8

GAME & EXAM (Chapters 4, 5, 6 and 7)

Module 8: Analysis of Next-Generation Sequence Data

Lecture Ch 8 (Part-I and II)
Activity #12: FASTQ & Quality control using FASTQC at Galaxy
Activity #13: BEDTools
Quiz #9 / Quiz #10
Self-evaluation #7: VIDEO-Quiz (NGS technologies)

Module 9: Bioinformatic approaches to ribonucleic acid (RNA)

Lecture Ch 9 (Part-I and II)
Activity #14: databases for tRNA, miRNA and mRNA
Activity #15: de Lorenzo et al., 2007
Quiz #11 / Quiz #12
Self-evaluation #8: Table with types of RNAs
Self-evaluation #9: VIDEO-Quiz and paper reading (de Lorenzo et al., 2007)

Module 10: Gene Expression: Microarray and RNA-seq Data Analysis

Lecture Ch 10
Activity #16: RNA-seq analysis of RBE using Galaxy
Quiz #13
Self-evaluation #10: RNA-seq analysis of RBE using Galaxy

Module 11: PolyA-seq

Activity #17: de Lorenzo et al., 2017

Module 12: FINAL Project & Oral presentations

Find-a-Gene Project (individual)
Group oral presentation related to Find-a-Gene Project (as a group)

EXAM (Chapters 8, 9, 10 and 11)

Appendix 3.2 A&S College Assessment Review Committee Program Assessment Rubric

	Exemplary Evidence	Developmental Evidence	Introductory Evidence	No Evidence	Rating
	3	2	1	0	
SECTION II-1					
Goals[1]	The plan has stated goals for the program			No goals are provided	3
Grid	Grid is completed with clearly stated requested information	Grid is mostly complete	Grid is only partially complete	Grid is not completed	3
SLOs	All SLO statements are clearly measurable, demonstrate how students learn	Most SLO statements are clearly measurable, demonstrate how students learn	Some SLO statements are clearly measurable, demonstrate how students learn	Minimal or no SLO statements are provided	3
Comments[2]					
SECTION II-2 NARRATIVE					
Student Assessment Tools[3]	Assessment tools, instruments, and/or student work used in assessment is described			Student tools, instruments and/or student work is not described	3
Assessment Time Cycle	Reporting cycle is described			Reporting cycle is not described	3
Process of Reviewing, Analyzing, Interpreting Data	Process for reviewing and analyzing/ interpreting data is clearly explained	Process for reviewing and analyzing/ interpreting data is mostly explained	Process for reviewing and analyzing/ interpreting data is partially explained	Minimal or no explanation is provided	2
Communication of Results	Means of sharing information within department is described			Means of sharing information within department is not described	3
Comments	Call for CARC grants in assessment would be out soon for Spring 2022. It might help you when designing assessment tools for multiple SLOs.				

[1] For scoring purposes, allow for a subset of goals to be listed.
[2] Please provide encouraging comments alongside suggestions for how to improve on rubric measure.
[3] For scoring purposes, do not penalize departments/programs if they have not provided a description for student artifacts and put "n/a" in the rating column.

SECTION III-1 REPORT					
Program Changes	Program changes are clearly described as a result of last year's report OR If no program changes were implemented, and this is indicated	Some program changes are described as a result of last year's report	Program changes are provided without previous year context or without connection to report	Minimal or no program changes are provided	3
Assessment Process Revisions	Revisions to the assessment process are clearly described in response to last year's report OR If no assessment process changes were implemented, and this is indicated	Revisions to assessment process changes are described in response to last year's report	Revisions to assessment process are provided without previous year context or without connection to report	Minimal or no program changes are provided	3
Grid	Grid is totally complete	Grid is mostly complete	Grid is only partially complete	Grid is not completed	3
Elaboration on Report	Clear reflection on findings in grid are provided			Minimal or no discussion is provided	3
Discussion of SLOs that do not meet benchmark	Clear discussion of data for SLOs that do not meet benchmarks OR If all SLOs met benchmarks, and this is indicated	Discussion of data for SLOs that do not meet benchmarks	Discussion of data but not contextualized in terms of grid, benchmarks etc.	Minimal or no discussion is provided	3
Comments	All the data provided is very helpful.				
SECTION III-2 REPORT					
Participants	Relevant participating faculty in assessment are identified			Minimal or no description provided of relevant participating faculty	3

Data Analysis	Analysis and/or strategies for improvement are actionable, specific, and aligned with SLOs.	Analysis and/or strategies for improvement lack specificity and/or alignment with SLOs.	Analysis and/or strategies for improvement are broad or generalized.	No analysis or strategy for improvement provided.	3
Program Recommendations	Recommendations for program are clearly identified in light of on-going assessment efforts (current and most recent)	Recommendations for program are identified in light of some assessment efforts	Recommendations for program are provided but without contextualization/ rationale	Minimal or no recommendations are provided	3
Anticipated changes to assessment process	Recommendations for assessment are clearly identified in light of on-going assessment efforts (current and most recent)	Recommendations for assessment are clearly identified in light of some assessment efforts	Recommendations for assessment are provided but without contextualization/ rationale	Minimal or no recommendations are provided	3
Communication of Recommendations	A clear procedure for communicating recommendations is indicated			Minimal or no communication procedure provided	3
Comments	Thank you for such a careful examination of results and the multiple implications. The info on data analysis is very informative for curriculum planning in your unit.				

Appendices 4

Appendix 4.1 Department exit survey

Appendix 4.2 Biochemistry advisement maturity matrix (2022-2023)

Appendix 4.3 BMB undergraduate research information

Appendix 4.4 ÉLITE Career Mentoring Program flyer

Appendix 4.5 ÉLITE Career Mentoring Program survey

Appendix 4.6 ÉLITE Career Mentoring Program outcomes

Appendix 4.7 BMB graduates with honors, awards and leadership roles

Appendix 4.1 Department exit survey

Personal Information

- First, last name, and email address
- Please give a full mailing address (street, city, state, zip) where we can reach you after graduation.
- The Department of Biochemistry and Molecular Biology uses social media accounts to communicate with students, faculty, and alumni. Do we have your permission to share success stories about you on these platforms? (ex: "Student X received X award", "Student Y will be attending Y graduate program next year", etc.)

What is your short-term plan for the next year, after you graduate?

- Apply to Medical School and work in my area of study
- I have been accepted into a PhD program.
- I have secured a job in my area of study.
- I have been accepted into medical school.
- I am seeking employment in my area of study.
- I have been accepted into a medical professional program (PA, pharmacy, dental, vet, etc.)
- I have been accepted into a masters program.
- MCAT preparation, working at OMI
- I will be doing research in my field of study and applying to vet school
- Take a gap year and apply to medical school this upcoming cycle
- Gap year before applying to medical school.
- Waiting for some program decisions
- I am applying to medical school this year and working full-time as a medical laboratory technician at Presbyterian Hospital.
- Building a distillery and botanical greenhouse.
- I have secured a job outside my area of study.
- Undecided
- Please elaborate on your short-term plans. For example, if you've been accepted into a training program, which school/program is it? If you have secured a job (or are actively looking), where will you be working/what are you planning to do? Are you doing something unique we didn't list here? Do you have any other plans after graduation you'd like to share?

What is your long-term plan (2-3 years) after graduation? If you are not sure what you want to do yet, choose your top choice at the moment!

- I plan to attend medical school (or will continue in the program mentioned above).
- I plan to attend a PhD program (or will continue in the program mentioned above).
- I plan to attend a masters program (or will have graduated from the program mentioned above into a job in my field of study).
- I plan to attend a medical professional program (PA, pharmacy, dental, vet, etc.) (or will have graduated from the program mentioned above into a job in my field of study).
- I plant to attend veterinary school
- I plan to attend an MD/PhD program (or will continue in the program mentioned above).
- Hope to work in a lab in my field of study
- Please elaborate on your long-term career plans. Do you have a particular interest of study long-term? Do you plan to go into academia, industry, government, etc? Do you plan to specialize in a specific medical speciality? Etc...It's completely normal to not have your entire life mapped out yet, but we'd love to get a sense of where you might be heading!

Appendix 4.1 Department exit survey (continuation)

What was the main reason you were attracted to the Biochemistry major?

- Biochemistry looked like a good area in which I could ultimately help solve problems that people face.
- I found biochemical topics interesting.
- Biochemistry was good preparation for training in the field I really wanted to go into.
- I developed a special aptitude for the topics that make up biochemistry.
- Biochemistry looked like a good area in which to find a job.

Indicate your overall level of satisfaction with the following statements; BMB = Department of Biochemistry and Molecular Biology; A&S = College of Arts and Sciences.

- I was satisfied with the preparation received in the lower division A&S courses outside of BMB, but required by the major (i.e. Math, Biology, Chemistry, Physics).
- I was satisfied with the depth and breadth in course offerings in BMB.
- I was satisfied with the availability and flexibility of required courses when I needed them.

Concerning the BMB department faculty, please rate your overall experience in each category:

- BMB professors were accessible to students.
- BMB professors appeared to care if students were learning adequately.
- BMB professors cared about students.
- Were there specific faculty members or individuals who inspired you or had an exceptional effect on your overall experience in BMB? Please list names and details as desired.

While obtaining your BMB degree, did you...

- Participate in a research project within the BMB department?
- Participate in a research project within another department at UNM?
- Participate in a research-based course through BMB (BIOC 497, 498, 499)?
- Participate in a formal research program outside of the department (ex: IMSD, MARC, UPN, other summer research programs)?
- Participate in an internship (Los Alamos, Sandia National Labs, etc.)?
- If you participated in any of the above research opportunities, please tell us the name(s) of the department/lab/investigator/program.
- If you participated in any of the above research opportunities, what was your experience(s) like? Did you consider your experience(s) beneficial? How so?
- What other extra-curricular experiences did you participate in during your undergraduate career (ex: shadowing, employment, sports, hobbies, clubs, etc.)?
- Have you received any academic/community awards? If so, which one(s)?

What did you feel was the MOST beneficial aspect of your undergraduate experience in BMB?

If you could offer one suggestion to improve the BMB undergraduate program for future generations of students, what would it be?

Overall, what do you feel are the most important skills you have learned from BMB? What aspects of the BMB curriculum were the most helpful in teaching these skills?

Appendix 4.2 Biochemistry Advisement Maturity Rubric for 2022-2023

Biochemistry Department 2022-2023

Outcomes	What opportunities are provided to achieve the desired outcome	How will you know if the outcome has been met/what evidence might you gather	How can you verify this activity	Compliance score	Notes
Effectively utilizing LoboAchieve (Appointments, comments etc.)	1. Create workbook to build center 2. Attend necessary training to gain access to LoboAchieve Website resources: https://advisement.unm.edu/resources/technology/loboachieve/index.html	1. All advisors in Center have access 2. All appointments are scheduled via LoboAchieve 3. Advising comments are entered into LoboAchieve	1. Run daily, weekly or monthly usage reports in LoboAchieve 2. Notes are spot-checked by advising supervisors	5	Professional advisors actively use LoboAchieve for sending emails to students for pre-orientation contact, scheduling appointments and entering comments. The professional advisors entered over 424 appointment notes and comments and 722 follow up non-appointment comments during the 2021-2022 academic year.
Entering notes after each interaction with a student	Training on how to enter comments/notes	1. Tracking comments/notes in LoboAchieve 2. Frequency of comments /notes entered 3. Quality of comments/notes (information captured: reason for visits, GPA discussion, grade replacement, use of LoboTrax, courses taking next semester, next steps, referrals, anticipated graduation date etc.)	1. Run daily, weekly or monthly usage reports in LoboAchieve. 2. Ongoing checks and training is provided as necessary	5	Department advisors received the training during their advisor training and within the college. If an insufficient note is identifed during perioic checks, advisors are asked to add more detail or edit the note.
Utilizing the degree audit for student success	1. Attend required training in Learning Central	1. Updated and accurate degree audit (Academic Department) 2. Updated four year plan on the degree map website, degrees.unm.edu	1. Checking with departments and Audit team at the beginning of the semester to see if all the audits are correct 2. Survey students	5	Department participates in all required training and any training that is suggested. Biochemistry currently has a degree map for both their BA or BS programs.
Advising Center will participate in New Student and Transfer orientations	1. Participate in part of NSO/CEP (i.e. presentation, advisement or general triage and assistance) 2. Participate in advisor training for orientations	1. Centers participate in NSO by meeting with their students in major groups twice: once to demonstrate registration and provide information, once to assist student with the registration process and explain how classes relate to degree requirements	1. Learning outcome from NSO 2. NSO Assessment Tool	5	The advisors 1. always participate in NSO as part of the College of Arts & Sciences advisement requirement. 2. Consistently use LoboAchieve to reach out to students. 3. actively participate in college and university wide advising training. 4. Completed an intensive shadowing and training at the college level.
Effectively communicate with students	1. Use of departmental e-mail & listserv 2. Use of Social Media 3. Student appointments	1. Report on use of email (amount of emails sent and/or received). 2. Submit analytics for use of social media sites. 3. Submit report on student traffic and interaction.	1. Information obtained from annual advising report	4	Advisors consistently use departmental email to communicate with students as well as use the departmental website to promote seminars. Advisors have sent 447 emails and listserv messages in 2021-2022. Advisors do not use social media.

Appendix 4.2 Biochemistry Advisement Maturity Rubric for 2022-2023 (continuation)

Outcomes	What opportunities are provided to achieve the desired outcome	How will you know if the outcome has been met/what evidence might you gather	How can you verify this activity	Compliance score	Notes
Advisors have the opportunity for professional development.	1. Participate in Advise-L, attend the Advisor Institute, and Advising Matters 2. Attend or present at conferences 3. Department or College Retreats 4. Regular staff meetings with updates, case studies, etc.	1. Information obtained from the annual advising report	1. Information obtained from annual advising report 2. Survey / Assessments to advisors	5	Actively participates in advising functions and activities
Effectively conduct outreach opportunities for student success.	1. Participate in Senior Day 2. Conduct group advising sessions 3. Conduct student workshops and department orientations 4. Branch and community college visits 5. Participate in UNM - CNM Transfer Day	1. Center provides group advising sessions 2. Conduct student workshops 3. Advising Report/Admission Office 4. Advising Report/Manager of Office of Advising Strategies	1. Information obtained from annual advising report 2. Admissions Office	4	Works with the College level advisement center to provide new student learning and graduation workshops as well departmental orientations. Center advisors representating all College departments participate in Senior Day and Transfer Day at the college level. Biochemistry advisors met with 81 prospective students individually in 2021-2022
			Overall Advisement Maturity Score	30	The professional advisors in the Biochemistry Department work very collaboratively with all College of Arts & Sciences advisors on advising initiatives from meeting with prospective students and onboarding to graduation certification. The professional advisors actively participate in professional development and training at the college and departmental level as well as assist in the training of advisors in the College.

*Advisement Maturity Score is based on a range of 1-5 in each category.
Scoring Matrix:
0 = Information not provided
1 = Achieving only one area of the category.
2 = Achieving only two areas of the category.
3 = Achieving only three areas of the category.
4 = Achieving only four areas of the category or not consistent in entering information.
5= Achieving all the areas of the category.

Appendix 4.3 BMB undergraduate research information

SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

UNIVERSITY OF NEW MEXICO CANCER CENTER

William Curtis Hines, Ph.D.
Assistant Professor
Tel: (505) 681-0014
wchines@salud.unm.edu

Welcome to the Department of Biochemistry and Molecular Biology!

Dear New and Prospective Biochemistry Majors,

First, I would like to congratulate you on selecting a challenging and advantageous undergraduate major. Biochemistry, whose goal is to understand the chemical and biological interactions required by living organisms, intersects several disciplines. Majoring in biochemistry will help you develop strong foundations in mathematics, physics, biocomputing, chemistry, and biology. You, like many prior students, will find that the knowledge and skills fostered during your time as a biochemistry major will help you find success as you graduate and move forward with your career.

One critical piece of your education, which our faculty believe is essential for your career development, is participating and conducting research in a laboratory setting. This is not required for all majors, but students that perform research and complete and undergraduate research project will hone their ability to think critically and understand the research process. They will develop problem-solving skills, learn hands-on lab techniques, and will analyze and interpret data that contributes to the growing body of knowledge regarding human health and disease. In sum, by performing undergraduate research, you will understand the biological sciences at a deeper level than your peers and, frankly, will be a stronger candidate for medical and graduate programs to which you will likely be applying.

I would be delighted to answer your questions regarding opportunities for conducting research at UNM and/or your future career options and planning. Many of your questions may be answered by carefully and thoroughly reading all of the pages within this introductory document.

Yours sincerely,

Curt Hines, Ph.D.
Assistant Professor
Department of Biochemistry and Molecular Biology
University of New Mexico School of Medicine

How to find an undergraduate research lab

You need to know why, when, and how you want to conduct biochemistry-related research. You need to find a professor/PI who has a lab and available supply funds, and whose research area interests you. In addition to the BMB faculty members, you can choose a professor/PI who is conducting biochemistry-related research in other UNM departments, UNM's Health Science Center, VA Hospital, Lovelace Respiratory Research Institute, or New Mexico National Laboratories (Sandia, Los Alamos).

Remember, it's perfectly acceptable and often encouraged to pursue research outside your major! UNM has ample opportunities to pursue numerous research interests. Pursuing research outside of your major department is a great chance to explore and become well-rounded in your training. Often, you'll find the techniques and principles applied in one field relate to another (for example, interdisciplinary synthesis combines engineering and biochemistry). Such interdisciplinary thinking is a skill you'll continue to use once you leave UNM.

Please remember that **the BMB department does not match you with a research mentor**. You are responsible for finding someone whose research interests you and then contacting him or her to inquire about availability in their lab.

Once you have identified a PI, you have a few options for conducting research. The most common option for biochemistry majors is to perform the research for course credit (BIOC 499, 497, or 498). **The end of this document contains detailed guidelines and an application form for these courses;** please read these carefully!

UNM also has numerous formal undergraduate training opportunities in research, beyond simply doing research for credit. For example, the Undergraduate Pipeline Network Summer Research Experience (UPN) works to cultivate students' interest in research while helping them attain skills needed to apply for and succeed in post-baccalaureate education. The program provides the opportunity for students to choose from two types of research: Biomedical Science or Community-Based/Health Disparities. The program period covers 10 weeks over the summer, and students participate in the program a minimum of 40 hours per week. You can find more information about UPN and the other available UNM undergraduate research programs here: https://research.unm.edu/uresearch

Helpful tips for conducting undergraduate research

Tips for succeeding in a research group:

- Find out what the system for ordering supplies is and ask what your responsibility is within this system.
- If a common reagent runs low or runs out…make more!
- If you break something or find something broken…tell someone!
- Don't bother people who are in the middle of an experiment unless their body language indicates it is OK.
- Don't assume that other people will be willing or able to drop everything and help you immediately.
- Plan ahead when you need help and make appointments to talk to people.
- Act interested and take notes when someone is teaching you how to do something.
- Don't use other people's solutions without asking.
- Clean up your messes (and others if you have time).
- Ask people to help you – don't try to order them around.

Tips for communication with your research mentor:

- Communicate regularly.
- Make the purpose of your meeting clear at the time you arrange an appointment.
- Make arrangements according to the mentor's preference.
- Be prepared to arrange the date/time via a support staff person or by email with the mentor.
- Be prepared to stop by the mentor's office during office hours.
- Remember, courtesy and polite persistence are keys to success.

What happens if you want to leave the lab after you've committed?

Students leave their research for a variety of reasons, such as change in research interests, not enough time, or less-than-ideal dynamics between their advisor or lab group. Not all research projects work out. Be truthful with yourself. If you feel you can no longer commit to your research for whatever reason, it is OK to either stop or switch to something else. There are several resources you can contact to discuss your situation, such as your A&S academic advisor or a biochemistry faculty advisor. They are there to help you make your transition.

If you are headed for a career in research, your undergraduate years are an excellent time to get several research experiences so that you can make decisions about the field or topic that you want to pursue in graduate and professional school. Alternatively, you may want to stay in one group for several years, with the hope that your work may be included in a publication. There is no right or wrong way; your commitment needs to fit your needs.

If you decide to pursue another opportunity, follow these guidelines:

- Finish out the semester.
- Talk to the head of the research group, not just the person that you are directly working with. Be appreciative of the opportunity they have given you!
- Explain that you want to explore something else - another field, different research approach, etc.
- Ask if they would like help finding another student to work on the project.

THE UNIVERSITY OF NEW MEXICO ◆ HEALTH SCIENCES CENTER
SCHOOL OF MEDICINE

Undergraduate Honors Research Program
Department of Biochemistry and Molecular Biology (BMB)
Fitz, 258 (BMB office, Fitz 249)

William Curtis Hines, Ph.D.
Assistant Professor
Tel: (505) 681-0014
wchines@salud.unm.edu

Application Form to Register for Research Credit

Please check one of the following options: _____ BIOC 497 _____ BIOC 498 _____ BIOC 499

Submit this signed form to the BMB research program director listed above after agreeing with your Research Mentor. The BMB research program director may request a meeting to discuss your project as necessary.

Student Name:

ID number:_____

Email:_____

Anticipated Graduation Date: _____

Research Mentor Name:_____

Department Affiliation:_____

Mentor email:_____

Research Project Title:

_____

Project Description:

THE UNIVERSITY OF NEW MEXICO ◆ HEALTH SCIENCES CENTER
SCHOOL OF MEDICINE

Undergraduate Honors Research Program

Department of Biochemistry and Molecular Biology (BMB)
Fitz, 258 (BMB office, Fitz 249)

William Curtis Hines, Ph.D.
Assistant Professor
Tel: (505) 681-0014
wchines@salud.unm.edu

Mentor Agreement Form

You have been identified as **the research mentor for** _____ , an undergraduate student who plans to register for research credits in BMB (BIOC 497, BIOC 498, or BIOC 499). In order to ensure uniformity and quality in the research experience for students registered for these courses, we provide you with the following guidelines.

The minimum overall GPA for students who want to receive BMB research honors by taking BIOC 497 and 498 is 3.20. There is no minimum GPA requirement for students who want to take BIOC 499.

Students can start taking BIOC 499 in their sophomore year with an identified mentor for 1 to 3 credit hours per semester. The cap for BIOC 499 credit hours for each student is 6 total credits over the course of their undergraduate career.

BIOC 497 and BIOC 498 are for senior students who plan to graduate with a Bachelor of Science degree in Biochemistry. One of the qualifications to receive research honors in BMB is to finish both BIOC 497 and BIOC 498 at 3 credit hours per course. In some rare cases, qualified students can take BIOC 498 first and then BIOC 497, with the permission of the BMB research program director and the BMB Department.

For BIOC 497, BIOC 498, and BIOC 499, the student is expected to spend at least 3 hours per week in the Research Mentor's laboratory *per hour of credit registered*. The student should not get paid for the hours they spend in the lab. The student is required to meet, at minimum, once a week with the Research Mentor to discuss his/her progress. The student is encouraged to meet with the BMB research program director halfway through the semester.

At the end of the semester, the student must submit a written progress report to the Research Mentor and provide a copy to the BMB research program director *(optional if Research Mentor decides not to).* This progress report, as well as the quality and quantity of effort in the laboratory, should be used to assign a grade (see grading policy below). The Research Mentor must provide the progress report and the recommended grade to the BMB research program director by the week before finals week (email preferred).

If the student is attempting to qualify for Departmental Honors at graduation, a written thesis of the work (in pdf file) must be submitted in lieu of a progress report for that semester. The student must submit this report to their Research Mentor and to the BMB research program director at least two weeks before the BMB Annual Research Day (usually mid-to-late April). The thesis will be reviewed by the BMB faculty. Honors students must present their research and defend their thesis at the Research Day. It is strongly recommended that the Research Mentor assist the student in the preparation of the written thesis and the oral presentation and that they attend the BMB Research Day.

THE UNIVERSITY OF NEW MEXICO ◆ HEALTH SCIENCES CENTER
SCHOOL OF MEDICINE

Undergraduate Honors Research Program
Department of Biochemistry and Molecular Biology (BMB)
Fitz, 258 (BMB office, Fitz 249)

William Curtis Hines, Ph.D.
Assistant Professor
Tel: (505) 681-0014
wchines@salud.unm.edu

Grading Policy for BIOC 497 and BIOC 498

A grade for research credit **(letter grade)** will be assigned by the student's Research Mentor and submitted, along with the student's progress report, to the BMB research program director by the week before finals week to ensure timely recording of the student's grade.

In grading, the mentor should take the following guidelines into consideration:

1) The performance of the student in the laboratory.

2) The time the student spent working on the project (the student is expected to spend at least 3 hours per week for each credit hour).

3) The quality of the progress report in BIOC 497 and the thesis in BIOC 498 that the student must submit to the mentor.

Grading Policy for BIOC 499

A grade for research credit **(credit vs. no credit)** will be assigned by the student's Research Mentor and submitted, along with the student's progress report, to the BMB research program director by the week before finals week to ensure timely recording of the student's grade.

In grading, the mentor should take the following guidelines into consideration:

1) The performance of the student in the laboratory.

2) The time the student spent working on the project (the student is expected to spend at least 3 hours per week for each credit hour).

3) The quality of the progress report that the student must submit to the mentor.

_____ _____

Mentor's Signature Date

Research Mentor (Printed Name) _____

Appendix 4.4 ÉLITE Career Mentoring Program flyer

ÉLITE
Career Mentoring Program @BMB

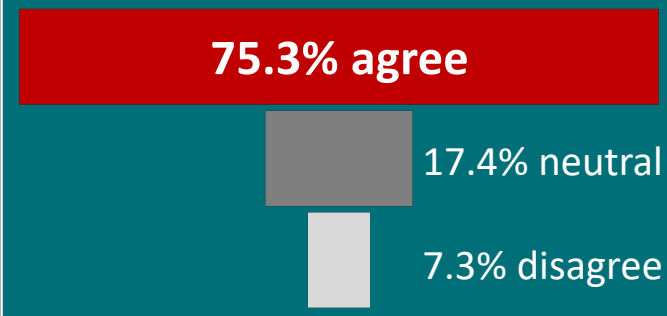
SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

ABOUT THE PROGRAM

The Department of Biochemistry & Molecular Biology (BMB) at University of New Mexico (UNM) is launching the 1st ÉLITE Career Mentoring Program. This program will provide mentorship through professional development seminars where experts will give advice, professional inspiration, and insights about various career paths in Biochemistry and other fields.

WE LISTENED TO YOU!

% of BMB students that would like to have a Mentoring Program:



Topics preferred by >80% of our BMB students:

- ✓ Write an Effective CV
- ✓ Job Interview
- ✓ Health Professions
- ✓ Academic Career Pathway
- ✓ Nontraditional Career Pathway
- ✓ Self-Awareness & Career Success

WHAT YOU NEED TO KNOW

-Program runs from September 13 to December 6.
-Mentor seminar series focused on guiding YOUR career decision-making and develop a professional network.
-You will be involved in your Career Development Plan and Success!
-Your accomplishments will be CERTIFIED by BMB.

HOW TO APPLY

-Those interested should apply online before September 10th, 2022 at https://forms.gle/tR9xFWJr4PQnc25U6
-Applicants must be a current Junior or Senior Biochemistry Major at UNM.
-For questions contact: Laura de Lorenzo (LdeLorenzoBarrios@salud.unm.edu).

"Be ready, Be confident, Be positive"

ÉLITE
Career Mentoring Program @BMB

SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

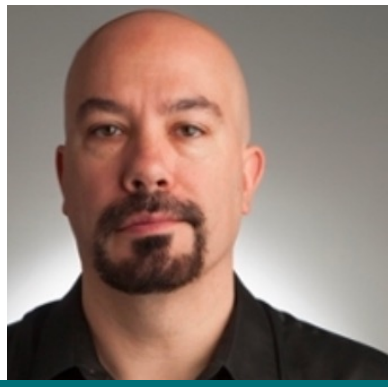
Start planning your Success and Build your Professional Network!

THE MENTOR SERIES:

Louis Metzger IV, PhD

Laura de Lorenzo, PhD

Curt Hines, PhD



Mark McCormick, PhD

Randy Ko

Katey del Toro

Vincent Metzger, PhD

James McKinnell, MD

Gloria Lopez-Hernandez, MD

Sarah Dallo

Ellen Bickel, PharmD

"Be ready, Be confident, Be positive"

ÉLITE
Career Mentoring Program @BMB

SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

Start planning your Success and Build your Professional Network!

On Tuesdays at 4:30 – 5:30 PM @Domenici DCNE Room 2410

Date	Speaker	Topic
Sept 13	**Laura de Lorenzo, PhD**	Welcome to Our Program
Sept 20	**James McKinnell, MD**	Let's Talk: Preparing for your Health Professions Program
Sept 27	**Mark McCormick, PhD**	Overview of Potential Careers for a BMB Major
Oct 4	**Vincent Metzger, PhD**	Steps to Succeed in Academia
Oct 11	**Katey Del Toro**	Self-Awareness and Career Success
Oct 18	**Gloria López-Hernández, MD**	A Successful Medical Journey
Oct 25	**Randy Ko**	Job Interview
Nov 1	**Curt Hines, PhD**	How to Get Involved in Scientific Research
Nov 8	**Louis E. Metzger IV, PhD**	Entrepreneurial Perspective & Networking
Nov 15	**Ellen Bickel, PharmD**	Non-traditional Career Pathways
Nov 22	---------- THANSGIVING WEEK ----------	
Nov 29	**Sarah Dallo**	Write an Effective CV
Dec 6	**All mentors and mentees**	Networking Event

"Be ready, Be confident, Be positive"

ÉLITE
Career Mentoring Program @BMB

SCHOOL OF MEDICINE
DEPARTMENT OF BIOCHEMISTRY & MOLECULAR BIOLOGY

Start planning your Success and Build your Professional Network!

THE MENTOR SERIES:

Louis Metzger IV, PhD: Head Basic Research, Rejuvenate Bio.
Co-Founder & CEO, DeepViews, Inc.
Loftfield Awarded ’04 (BMB Alumni)

Laura de Lorenzo, PhD: Director, Undergraduate Program & Lecturer III

James McKinnell, MD: Professor, Dept of Pediatrics, UNM SOM
Director, Office of Pre-Health Professions Student Development

Curt Hines, PhD: Assistant Professor @BMB UNM
BMB Alumni ’94

Mark McCormick, PhD: Assistant Professor @BMB UNM

Randy Ko: UNM Board of Regents & MD/PhD Candidate
BMB Alumni ’18

Katey del Toro: Graduate Research Assistant @BMB UNM
Loftfield Awarded ’22

Vincent Metzger, PhD: Postdoctoral researcher @UNM

Gloria Lopez-Hernandez, MD: Assistant Professor, Pediatrics Critical Care SOM @UNM

Sarah Dallo: PhD candidate @ Scripps Research in Jupiter, FL
BMB Alumni ’20

Ellen Bickel, PharmD: Pediatric Critical Care Clinical Pharmacist @UNM HSC

“Be ready, Be confident, Be positive”

Appendix 4.5 ÉLITE Career Mentoring Program" final survey

First and last name (optional)

INDIVIDUAL LEARNING: EVALUATE THE MENTORING OUTCOMES_____

1. Overall, how was your experience at the "ÉLITE Career Mentoring Program"?

- ☐ Excellent
- ☐ Good
- ☐ Neutral
- ☐ Poor
- ☐ Very poor

2. How effective was the "ÉLITE Career Mentoring Program" at achieving the following objective?

	Very effective	Effective	Non effective	N/A
Discover the powerful potential of having a Major in Biochemistry.				
Identify or mature your immediate plans for after graduation.				
Identify or mature your medium-term plans.				
Identify or mature your potential future plans and your professional goals.				
Identify actionable steps for your Career Plan.				
Identify professional development activities that support your professional goals.				
Identify or find new opportunities.				
Increase your professional network.				
Increase your networking skills.				
Improve your decision-making skills.				
Improve your communication skills.				
Improve your understanding of what a supporting team really does.				
Improve your choice for letters of recommendation.				
Improve your confidence to apply to professional, graduate school or your desire job.				
Availability of Mentor Seminar Series offered.				

3. How effective was the "ÉLITE Career Mentoring Program" to help you:

	Very effective	Effective	Non effective	N/A
Help to improve your understanding about volunteer decisions.				
Help to improve your understanding of why research experience is important for your professional career.				
Help to understand that the professional journey is not a linear path.				
Help to identify new career pathways for a Biochemistry Major.				
Help to think about and set up your career plan.				
Help to identify your strengths and weakness.				
Help to visualize a career in academia and the potential steps to follow.				
Help to visualize a career in industry and the potential steps to follow.				
Help to visualize a potential day life as a Medical Doctor.				
Help to realize how many options there is pursuing Pharmacy School.				
Help to realize how important is for you the work/life balance.				
Help to improve your CV.				

4. Are you planning to adjust or change your short, medium or long-term plans after participating in the "ÉLITE Career Mentoring Program"? (Select all that apply)

- ☐ Yes, my short-term plans
- ☐ Yes, my medium-term plans
- ☐ Yes, my long-term plans
- ☐ None of them

5. Overall, how effective was the "ÉLITE Career Mentoring Program" to help you:

- ☐ To be ready!!
- ☐ To be confident!!
- ☐ To be positive!!

MENTORING ACTIVITIES

6. The ÉLITE Mentoring Program timeframe was 12 weeks. How do you consider is the mentoring timeframe?

- ☐ Too long
- ☐ Too short
- ☐ Just right

7. Each Mentor Seminar had a duration of one hour. How do you consider is the Mentor Seminar length?

- ☐ Too long
- ☐ Too short
- ☐ Just right

8. How satisfied were you with the accessibility and interaction with Mentors in the "ÉLITE Career Mentoring Program"?

- ☐ Very Satisfied
- ☐ Satisfied
- ☐ Dissatisfied
- ☐ Very Dissatisfied

9. How satisfied were you with the professional advising by ÉLITE Mentors in the "ÉLITE Career Mentoring Program"?

- ☐ Very Satisfied
- ☐ Satisfied
- ☐ Dissatisfied
- ☐ Very Dissatisfied

10. How well do you agree with the following statements?

	Strongly agree	Agree	Neutral	Disagree
The Mentor Seminars Series were relevant.				
The in-person format of this Program was effective.				
The virtual format of this Program was effective.				
Overall, the discussions were useful.				
I benefited from participating in the ÉLITE Career Mentoring Program.				
I would recommend the ÉLITE Career Mentoring Program to my peers.				

11. Did you have the opportunity to contact any ÉLITE Mentor after their Mentor Seminars?

- ☐ Yes
- ☐ No

12. How many ÉLITE Mentors did you contact?

- ☐ Between 1 and 2
- ☐ Between 3 and 5
- ☐ More than 5

13. Please, mention who ÉLITE Mentors did you contact.

PROGRAM HEALTH

14. Who would you recommend to participate in the ÉLITE Career Mentoring Program?

- ☐ BMB Junior major students
- ☐ BMB Senior major students
- ☐ Both BMB Junior and Senior major students
- ☐ Any student at UNM with an interest in the Biochemistry major
- ☐ Any student at UNM independently of the Degree that is pursuing.

15. How likely would you be participating in another ÉLITE Career Mentoring Program?

- ☐ Very likely
- ☐ Likely
- ☐ Neither likely nor unlikely
- ☐ Unlikely
- ☐ Very unlikely

16. What other Mentor Seminars would you like to have seen from the ÉLITE Career Mentoring Program?

17. Please, mention in one word, a few words or one sentence the positive impact of the "ÉLITE Career Mentoring Program" on you.

18. Could you give us at least two ideas for improving the program, please?

DIVERSITY EVALUATION

19. At what undergraduate stage are you?

- ☐ Junior
- ☐ Senior

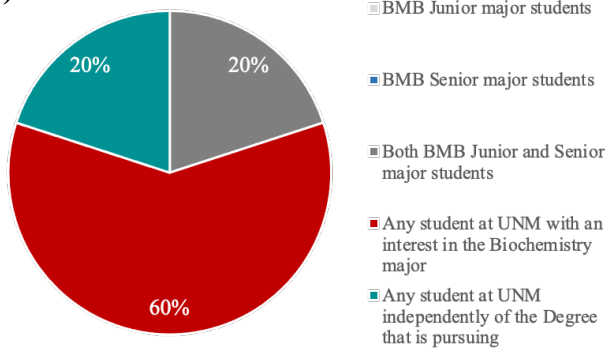
20. What categories describe you? Select all boxes that apply.

- ☐ I prefer not to answer
- ☐ Caucasian/white
- ☐ Hispanic, Latino or Spanish origin
- ☐ Black or African American
- ☐ Asian
- ☐ American Indian or Alaska Native
- ☐ Middle Eastern or North African
- ☐ Native Hawaiian or Pacific Islander
- ☐ Some other race, ethnicity or origin (please indicate)

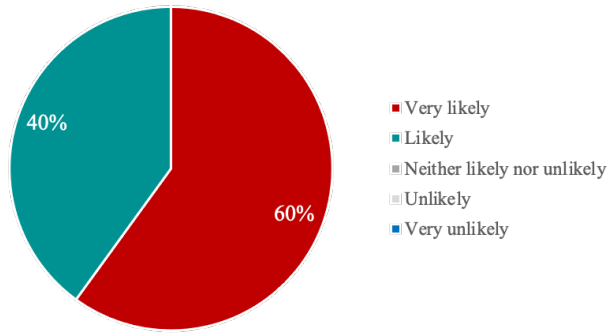
Appendix 4.6 ÉLITE Career Mentoring Program outcomes

Below is shown the program health outcomes. **(A)** How likely the students would be participating in another ÉLITE Career Mentoring Program. **(B)** Who the students would recommend to participate in the ÉLITE Career Mentoring Program. **(C)** Other Mentor Seminars suggested by the 2022 ÉLITE cohort. **(D)** The positive impact of the "ÉLITE Career Mentoring Program" on the 2022 ÉLITE cohort. **(E)** Students' ideas for improving the program. Data are obtained from the ÉLITE final survey, **(F)** Students' benefits gained by participating in the Program.

(A)



(B)



(C) *Other Mentor Seminars suggested by the 2022 ÉLITE cohort.*

- ❑ Nursing, dentistry, neuroscience perspective, bioinformatics, management experience.
- ❑ UNM grad programs. PhD and masters for biochemistry majors.
- ❑ Personal Statement, letters of recommendation, how to be successful in current classes, communication in the professional setting.
- ❑ *"More students! I know this is only the first round, but it is good people are getting to hear about it!"*

(D) *The positive impact of the "ÉLITE Career Mentoring Program" on the 2022 ÉLITE cohort.*

"Helped me organize my options for the future and figure out where to start."
"The ÉLITE Career Mentoring Program connected me with professionals of various backgrounds who shared their wisdom to help me succeed."
"A positive look to the future."
"The ELITE Career Mentoring Program helped me identify my career plans, make actionable goals, and realize that it is okay to not stay settled on one career."
"This program inspired and informed me how to find a mentor & steps to be taking as an undergraduate."
"A much clearer idea of the steps to take towards my career goals."
"It was just very understanding of the possible different career paths you can take and it was clear on what you could do if you wanted."
"I felt connected, and I appreciated the networking aspect of this program."
"Genuine. Motivational. Enlightening."
"It helped me get over my fear of asking questions and reaching out to people."

Appendix 4.6 ÉLITE Career Mentoring Program outcomes (continuation)

(E) *Other Mentor Seminars suggested by the 2022 ÉLITE cohort.*

"Present more volunteer opportunities and maybe have us reevaluate our career plans periodically during the series."
"Bring snacks or have the students sign up to bring snacks every week!"
"I think the structure of the program is great. Perhaps matching a student with a mentor (?) although I know that is a lot more work and would require more time commitment. I think making more meetings perhaps in late August would be nice."
"I'd be interested in more speakers in genetics
"It would be nice if the seminars had food."
"Account for session that could go longer than an hour for better time management."
"I think it would be beneficial to let the students shadow a couple of research labs in school in one of the meetings. I know that the mentors in this program are not meant to be the research mentors but I think, the mentors in this program have a lot to offer to students. So, they could perhaps ask questions to do the survey during the meetings and evaluate that to recommend where the students should start their research based on their responses. I think it would also be beneficial to let the students create a draft of their personal statements, I know that students might be undecided, but this could make them think about their past experiences, and help them understand who they are so that they could potentially decide for themselves sooner than later."
"A career/job fair session or how to find more opportunities for internships."

(F) *Mention specific benefits that personally you gained by participating in this Program*

"Gained a lot of information that has made me make some decisions about the future and it was really nice to see successful people that did not have a linear career path."
"I really loved meeting a variety of people from different careers. The most helpful ones for me were the pharmacy ones and the CV one. I didn't know anything about CV before starting this."
Knowledge of different pathways."
"The program helped me decide to take a gap year and ways to improve my career development"
"Helped me identify my weaknesses and branch out to those around me; overall be more confident."
"Build professional network."
"Personally, helped me feel less alone, confused and scared about what I wanted to do with my future."
"A clear idea of the steps I need to take towards my career goals."
"I have been able to find specific opportunities of volunteer and research work related to my short-term goals."
"The benefits that personally gained was to be able to reach out to mentors to recommend where I should be a good place to start my research. I personally value their perspectives, and sharing about their own experiences."
"Learning from professionals who are putting their education into action helped me realize where I need to focus my efforts and gave some clarity about what careers may be available to me."
"Hearing the perspectives and goals of my peers who are making their path through biochemistry, gave me confidence to take positive steps now rather than waiting."
"Student presentations at the end were a good idea as they challenged me to develop coherent material to share and built rapport with other participants."
"I increased my personal confidence to reach out and to not be afraid to ask questions."

Appendix 4.7 BMB graduates with honors, awards and leadership roles

	Year (period 2019-2022)			
% Graduation BMB Students Receipt of Honors & Awards	2019	2020	2021	2022
Advancing Our Community Award				3
Agora Volunteer of the Month			2	
American Indian Graduate Center Scholar of the Month			2	
Arts & Sciences Summer Scholarship	2			
ASPB SURF Fellowship		2		
ASSURE Scholarship				3
Austin Roberts Scholarship	2			
Barry Goldwater Scholarship				3
Best Student Essays		2		
Braidwood/Vigil Honors Scholarship for STEM		2		
Catching the Dream Scholar and Scholarship Recipient			2	
Chief Manuelito Scholar and Scholarship Recipient			2	
Churchill Scholarship	2			
Clauve Outstanding Senior Award			2	
Community Involvement Award	2			
Continental Divide Coop Scholarship	2			
CT French Scholarship			2	
Dr. John W. Ryan Leadership Circle Award		2		
El Puente Research Fellowship				3
Elks Scholar	2			
Elsie and James Demas Scholarship				3
Emilie Schaffer Scholarship	2			
Emily Sannebeck Scholarship	2			
Frank M. and Sadie O. Lane Scholarship for Women in STEM		2		3
Fraternity and Sorority Life President of the Year			2	
Honor Society of Phi Kappa Phi			2	3
Honors Society of Phi Beta Kappa			2	3
HWC Scholarship		2		
Indian Health Service Scholar and Scholarship Recipient			2	
Jim and Mary Lois Hulsman Library Award		2		
Kappa Sigma National Scholarship/Leadership Award		2		
Lane Endowed Scholarship for Research	2			
LB Reeder Scholarship Recipient		2		
Lottery Scholarship	2			
MANA del Norte Scholarship		2		
MCAT+ Program Recipient			2	
Merit scholarship to Georgetown		2		
National Merit Scholar	2			3
NELA award from National Society of Leadership & Success	2			
NHI Loving Service Award			2	
NIH MARC Research Scholarship	3		2	
NSF GRFP Honorable Mention		2		
Outstanding Honors Sophomore of the Year		2		
Popejoy Hall Jeffrey Sherman Memorial Scholarship				3
Presbyterian Health Care Services Volunteer Appreciation Award			2	
Raza Excellence Outstanding Student Award		2		
Residence Hall Award				3
Sandia Labs Research Award	2			
Scholar's Scholarship	2			
Secretary of Energy Achievement Honor Award				3
Selfless Senior				3
Special Olympics NM Partner of the Year			2	
Spirit of Service Award			2	
Sponsored Summer Research Programs (ex: UPN)	5			
Sport Award for Sandia National Lab's COVID diagnostic lab			2	
STEM Symposium Best undergrad Presenter Award			2	
The National Society of Collegiate Scholars	3			
UNM Advancing Our Community Honoree	2			
UNM Biology Research Day oral presentation award				3
UNM Honors Designation	5	2	4	
UNM International Amigo Scholarship	2	2		
UNM Leadership & Involvement Award	5	2	4	
UNM Nominee for Goldwater Scholarships	2	2	2	
UNM Nominee for Truman Scholarship		2		
UNM Presidential Merit Scholarship	5	4	5	
UNM Regents Scholarship			2	
UNM RLSH Outstanding Programmer			2	
UNM Student Activities Center Leadership & Involvement Award				3
UNM Student Activities Sorority Leadership Award			2	
UNM Undergraduate Research Opportunity Conference Award		2		
UNM's Outstanding Academic Achievement	2			
UPN's outstanding poster presentation	2			
Woodward Scholar				3

Appendix 4.7 BMB graduates with honors, awards and leadership roles (continuation)

% Graduating BMB Students with Leadership Roles	Year (period 2019-2022) 2019	2020	2021	2022
ASUNM Outstanding Spring Senator	2			
ASUNM Senator				3
Beta Theta Pi Men of Principle			2	
City of Albuquerque behavioral health sub-committee member				3
Dean's List	32	27	22	21
Golden Key International Honors Society			2	
Health Professions Symposium Committee organizer				7
LoboTHON committee member				3
LoboTHON executive director				3
National Honors Society	3			
National Society of Collegiate Scholars			2	
National Society of Leadership & Success	7		2	
National Society of Student Leadership	2			
New Mexico Leadership Institute Scholar			2	
New Student Orientation Leader				3
President of Baptist Student Union				3
President of UNM’s Mortar Board Senior Honor Society				3
Southwest Environmental Education Cooperative Advisory Board				3
Student Health Leadership Council				3
Teaching assistants (BMB, Chemistry, CAPS)				18
UNM Honors College Pathmaker Mentorship Program				3
Vice President for the Pre-Vet society at UNM				3
Vice President of STEM at UNM				3
Women To Be board member				3

Appendices 5

Appendix 5.1 Faculty credentials template

Appendix 5.2 Faculty by rank of UNM Biochemistry Department faculty (2017-2023)

Appendix 5.3 BMB TT faculty teaching expectations

Appendix 5.4 Faculty teaching evaluation

Appendix 5.5 FTE allocations in education, research and service across the years (FY 2017-2023)

Appendix 5.1 Faculty Credentials Template

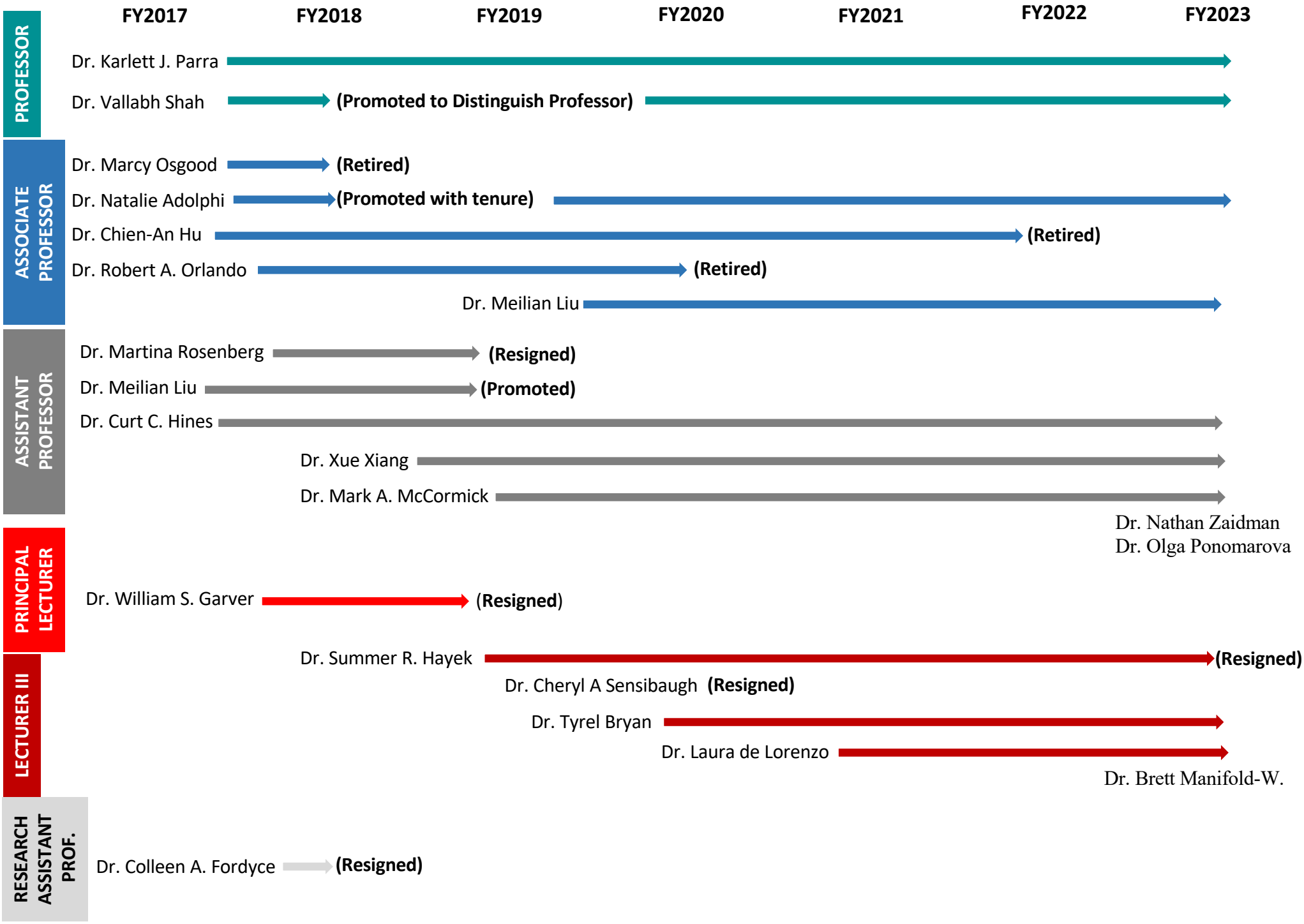
Name of Department/Academic Program(s): Department of Biochemistry and Molecular Biology / Biochemistry Program.

Full First and Last Name	**Faculty Appointment** Continuing • Lecturer (LT) • Probationary/Tenure Track - Instructor (TTI) or Asst. Prof. (TTAP) • Tenured - Assoc. Prof. (TAP), Prof. (TP), or Dist. Prof. (TDP) • Prof. of Practice (PP) Temporary • Research Faculty (RF)	**Institution(s) Attended, Degrees Earned, and/or active Certificate(s)/Licensure(s)** (e.g., University of New Mexico—BS in Biology; University of Joe Dane—MS in Anthropology; John Doe University—PhD in Psychology; CPA License—2016-2018) **Only Terminal Degree is Necessary**	**Program Level(s)** (Please leave blank or provide "N/A" for each level(s) the faculty does not teach at least one course.)		**Faculty Credentials** • Faculty completed a terminal degree in the discipline/field (TDD); • Faculty completed a terminal degree in the discipline/field and have a record of research/scholarship in the discipline/field (TDDR); • Faculty completed a terminal degree outside of the discipline/field but earned 18+ graduate credit hours in the discipline/field (TDO); OR • Other (Explain)
1. Dr. Karlett Parra	TP	University of Simon Bolivar (Venezuela)—BS in Biology; University of Simon Bolivar—MS in Biochemistry; SUNY Upstate Medical University—PhD in Biochemistry & Molecular Biology; SUNY HSC—Post-doc in Biochemistry & Molecular Biology.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
2. Dr. Laura de Lorenzo Barrios	LT	University of Seville (Spain)—BS in Pharmacy; University of Seville—MS in Molecular and Cell Biology; University of Seville & Plant Science Institute, CNRS (France)—PhD in Molecular and Cell Biology; University of Kentucky and Spanish National Center for Biotechnology (Spain)—Post-doc in Genomics.	Undergraduate	x	TDDR
			Graduate	N/A	
			Doctoral	N/A	

3. Dr. Curt Hines	TTAP	University of New Mexico—BS in Biochemistry; University of New Mexico—PhD in Biomedical Sciences; UCSF and Lawrence Berkeley National Laboratory—Post-doc in Biomedical Sciences.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
4. Dr. Mark McCormick	TTAP	University of Texas at Austin—BS in Biology & Mechanical Engineering; University of California San Francisco—PhD in Biochemistry and Molecular Biology; Buck Institute for Research on Aging—Post-doc in Biomedical Sciences.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
5. Dr. Meilian Liu	TAP	Hunan Normal University (China)—BS in Chemistry; Central South University—PhD in Biochemistry; University of Texas HSC at San Antonio—Post-doc in Biochemistry and Cellular Biology.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
6. Dr. Natalie Adolphi	TAP	Augustana College—BA in Physics; Washington University in St. Louis—MA and PhD in Physics; University of New Mexico—BS in Nuclear Engineering (Medical Physics Concentration); ABR Medical Physics Initial Qualification (Part 1: General Physics and Clinical)	Undergraduate	x	TDDR (Physics/Medical Physics)
			Graduate	N/A	
			Doctoral	N/A	
7. Dr. Brett Manifold-Wheeler	LT	University of California, Davis—BS in Genetics; University of New Mexico—PhD in Biomedical Sciences; University of New Mexico HSC—Post-doc in Molecular Genetics and Microbiology.	Undergraduate	x	TDDR
			Graduate	N/A	
			Doctoral	N/A	
8. Dr. Tyrel Bryan	LT	University of New Mexico—BS in Chemistry; University of New Mexico—PhD in Chemistry; University	Undergraduate	x	TDDR
			Graduate	N/A	
			Doctoral	N/A	

		of New Mexico—Post-doc in Chemistry.			
9. Dr. Vallabh (Raj) Shah	TDP	Maharaja Sayajirao University (India)—BA in Zoology, Chemistry & Botany; Maharaja Sayajirao University—MA in Reproductive Physiology & Endocrinology; Gujarat Agricultural University (India)—PhD in Microbiology & Parasitology; Summa Medical Corporation—Post-doc in Immuno-genetics.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
10. Dr. Xue Xiang	TTAP	Medical School of Southeast University (China)—BS in Laboratory Medicine; Shanghai Institute of Materia Medica, Chinese, Academy of Sciences (China)—PhD in Pharmacology & Toxicology; University of Michigan—Post-doc in Gastrointestinal Physiology.	Undergraduate	x	TDDR
			Graduate	x	TDDR
			Doctoral	x	TDDR
11. Dr. Nathan Zaidman	TTAP	University of Minnesota—BS in Biomedical Engineering; University of Minnesota —PhD in Integrative Biology & Physiology Epithelial Physiology; Johns Hopkins University—Post-doc in Renal Physiology.	Undergraduate	x	TDDR
			Graduate	N/A	
			Doctoral	N/A	
12. Dr. Olga Ponomarova	TTAP	National University 'Kyiv-Mohyla Academy' (Ukraine)—BS in Biology and MS in Computer Science; European Molecular Biology Laboratory (EMBL), (Germany)—PhD in Biology & Physiology; University of Massachusetts—Post-doc in Systems Biology.	Undergraduate	x	TDDR
			Graduate	N/A	
			Doctoral	N/A	

Appendix 5.2 Faculty by rank of UNM Biochemistry department faculty (2017-2023)



Appendix 5.3 BMB TT Faculty Teaching Expectations

Minimum Teaching: 0.06 FTE
TT Faculty (Tenured; Funded)
Minimum Teaching: 0.03 FTE
R Faculty
TT Faculty (Untenured)
Minimum Teaching Non-Funded (extramural) TT Faculty (Tenured):

Up to 1 Year	0.06 FTE
1 Year	0.09 FTE
2 Years	0.12 FTE
3 Years	0.15 FTE
4 Years	0.18 FTE
5 Years	> 0.36 FTE

	Current	Prior to 2012
1 hour Lecture	0.004 FTE	0.0035
1.25 hours Lecture	0.005 FTE	0.0035
3 hours Tutorial Session	0.004 FTE	0.0035
5 hours Lab Session/week (Th;F)	0.016 FTE	0.007
5 hours Lab Session/week (Th;F) + Lecture	0.02 FTE	0.0105
One 3-week block BIOC 463/464	0.03 FTE	0.03
One 4-week block BIOC 463/464	0.04 FTE	
One 3-week block BIOM 515	0.03 FTE	0.03
One 3-week block BIOC 448L	0.06 FTE	
One 4-week block BIOC 448L	0.076 FTE	
7.5 hours Lectures (GI Block)	0.03 FTE	
Tutorial 5 weeks/cases (2x3 hour/week)	0.04 FTE	
3-cr Course	0.168 FTE	0.168
3-cr Course + course director (add 7%)	0.18 FTE	0.18
4-cr Course	0.224 FTE	0.224
4-cr Course + course director (add 7%)	0.24 FTE	0.24
3-cr Course multi-instructor course director (add 10%)	0.0168 FTE	0.03
3-cr BIOC 448L Course (Th & F)	0.3 FTE	
BIOC 448L Course director (multiple instructors)	0.05 FTE	0.03
GI Director (UME)	0.20 FTE	0.25

NOTE (Underg.): UNM Policy: (1 FTE) = 18 cr/y (9-month contract)
HSC = 24 cr/y (12-month contract) _SOM 2400 h/y (12-month contract= 48W, 50/w)

NOTE (UME): SOM: 2400 Hrs =1 FTE

Appendix 5.4 Faculty teaching evaluation

The BMB department employs the UNM's course evaluation tool to ensure sustainability, efficiency, and quality in teaching evaluations. Faculty course evaluations provide students with the opportunity to provide feedback on teaching strengths and weaknesses. Evaluations are conducted at the end of each course, with summary reports being provided to faculty within two months of the semester's end. The course feedback tool includes mandatory UNM-wide questions, which are automatically incorporated into all student surveys (*Standard UNM SET*). Additionally, we have revised the Student Evaluations of Teaching (SET) and incorporated custom questions focused on learning to reduce biases and improve effectiveness (*BMB SET*, fall 2020).

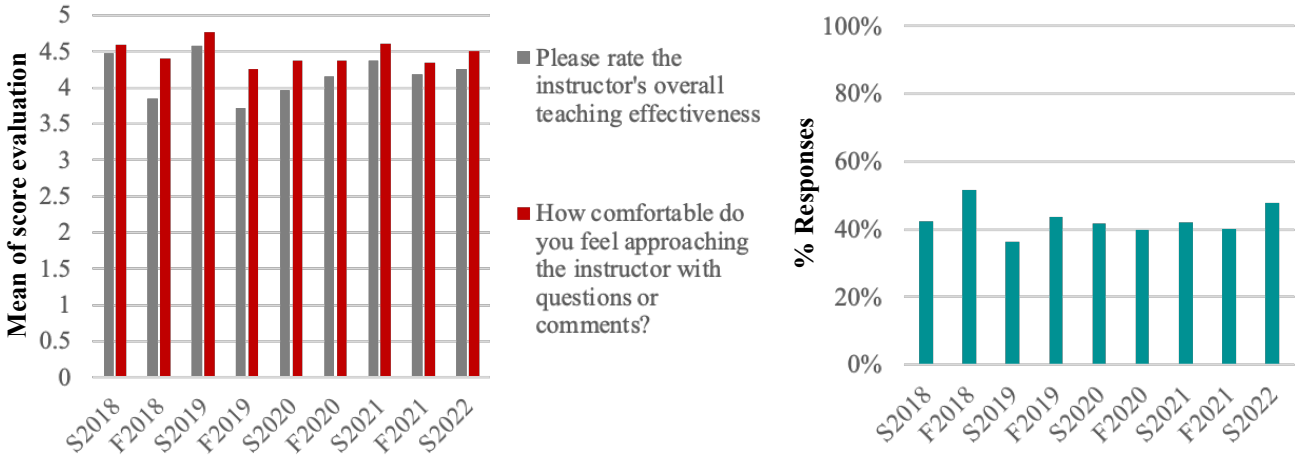
Standard UNM SET

1. Please rate the instructor's overall teaching effectiveness.
2. How comfortable do you feel approaching the instructor with questions or comments?
3. What features of this course and of the instructor's teaching contributed most to your learning?
4. What specific suggestions do you have to improve the course and the instructor's teaching?

BMB SET

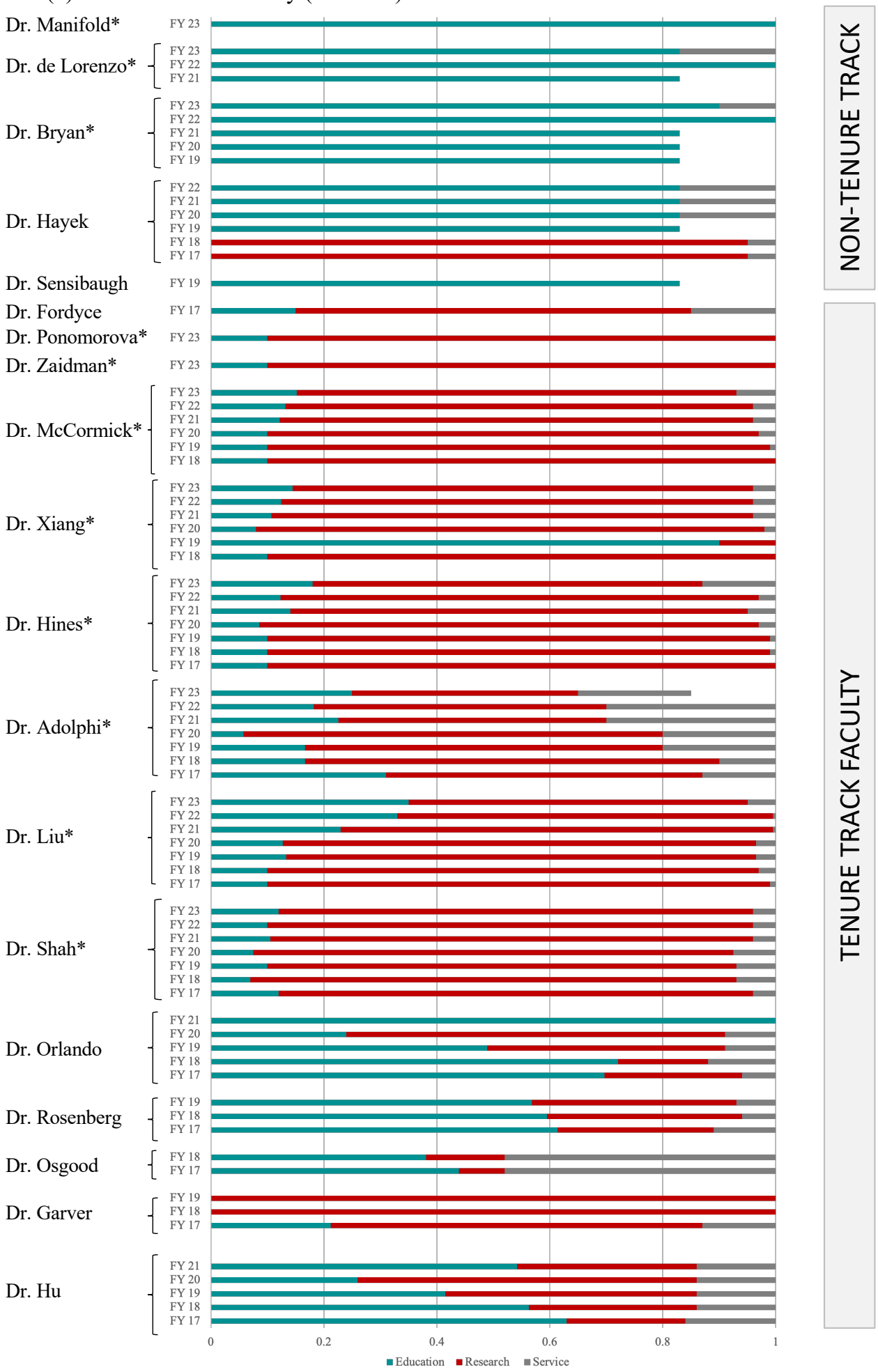
5. If you took this class again, name three helpful things you'd like to see your instructor continue to use in their teaching.
6. What aspects of this class contributed most to your learning?
7. Name two ways this course has prepared you for your future courses or career path.
8. Name two recommendations you would give to future students for how they can best learn and succeed as students in this course.

The results of the faculty teaching evaluations are presented in the accompanying figure. The left panel displays the mean score of students' evaluations for all courses by semester, while the right panel illustrates the percentage of responses per semester (average of all courses)



Appendix 5.5 FTE allocations in education, research and service across the years

The asterisk (*) denotes current faculty (FY 2023).



Appendices 6

Appendix 6.1 Research-creative work of BMB faculty

Appendix 6.2 List of journals where our faculty have published

Appendix 6.3 HSC Excellence in Research Award for Junior Faculty Research (Dr. Meilian Liu, 2017)

Appendix 6.4 HSC Excellence in Research Award for Junior Faculty Research (Dr. Xiang Xue, 2021)

Appendix 6.5 CURE Fellow award (Dr. Laura de Lorenzo, 2022)

Appendix 6.6 Selected students' creative work

Appendix 6.1 Research-creative work of BMB faculty
Examples of the selected scholarly/creative works and research accomplishments of current faculty are included.

Breast/breast tumor microenvironment – Dr. Curt Hines, Assistant Professor
Selected peer-reviewed publications:

Del Toro, K., Sayaman, R. W., Thi, K., Licon-Munoz, Y., and **Hines, W. C.** (2022). A cellular and transcriptomic dissection of the human breast for studying mechanisms of cell and tissue function. bioRxiv. (In review, ***eLIFE***—submitted as a companion to #1).

Hines, W.C. (2022) Lost in Transduction: viral vectors, common pitfalls, and reproducibility; Mathematical perspectives of viral transductions (in revision, ***Front. Cell Dev. Biol***.).

Wang, C., Zhang, X., Luo, L., Luo, Y., Wu, D., Spilca, D., Le, Q., Yang, X., Alvarez, K., **Hines, W. C.,** Yang, X. O., and Liu, M. (2022) COX-2 Deficiency Promotes White Adipogenesis via PGE2-Mediated Paracrine Mechanism and Exacerbates Diet-Induced Obesity. ***Cells*** 11, 1819.

Serigado, J. M., Foulke-Abel, J., **Hines, W. C.,** Hanson, J. A., In, J., and Kovbasnjuk, O. (2022) Ulcerative Colitis: Novel Epithelial Insights Provided by Single Cell RNA Sequencing. ***Front Med*** 9, 868508.

Klimaj, S. D., Licon Munoz, Y., Del Toro, K., and **Hines, W. C**. (2020) A high-throughput imaging and quantification pipeline for the EVOS imaging platform. ***PLoS One*** 15, e0236397.

Selected active research projects:

CURRENT FUNDING

- Title: Identification of pericyte-derived ligands inducing breast cancer growth **University of New Mexico HSC, SOM Research and Allocation** (NIH/DOD grant development). PI: Curt Hines (No Effort) - July 1, 2022 – June 30, 2023
  Award: **$25,000**

PENDING FUNDING

- Title: Deciphering the tumor-promoting properties of breast pericytes. **Department of Defense, Breast Cancer Research Program, Breakthrough Level II.** PI: Curt Hines (50% Effort) - April 1, 2023 – March 30, 2026
  Award: **$1,502,956**
- Title: Deciphering the tumor-promoting properties of breast pericytes. **National Institutes of Health, NCI (resubmission; 31%).** PI: Curt Hines (35% Effort) - January 1, 2023 – December 30, 2027.
  Award: **$1,850,504**

Biology of aging – Dr. Mark McCormick, Assistant Professor
Selected peer-reviewed publications:

Small, EM*, Felker, DP*, Heath, OC, Cantergiani, RJ, Robbins, CE, Osley, MA, **McCormick**, MA. SPOCK, an R based package for high-throughput analysis of growth rate, survival, and chronological lifespan in yeast. ***Translational Medicine of Aging*** 4:141-148. (2020).

Robbins CE, Heath OC, Patel B, Sawyer DL, Wilkinson B, Kennedy BK, and **McCormick MA**. Cytosolic and mitochondrial tRNA synthetase inhibitors increase lifespan in a *GCN4* / *atf-5* dependent manner. ***Cell Reports*** (Under revision). (2020)

Felker DP, Robbins CE, **McCormick MA**. Automation of *C. elegans* lifespan measurement. ***Translational Medicine of Aging*** 4:1-10. (2019).

Selected active research projects:

- Title: Measurement of lifespan and Gcn4/ATF4 upregulation in a cohort of tRNA synthetase inhibitors. **Norn Group, Longevity Impetus Grant** (PI: Mark A. McCormick), (12/01/2021-11/30/2024).
  Budget: **$343,995**
- Title: Acceleration of Circulatory and Neurological Aging due to Wildfire Exposures Principal Investigator: Matthew J. Campen. **National Institutes of Health, NIA, R01** (role in this Award: Consultant), (12/01/2021 – 11/30/2026).
  Budget: **$1,250,000**

Iron metabolisms – Dr. Xiang Xue, Assistant Professor

Selected peer-reviewed publications:

Yin K, Lee J, Liu Z, Kim H, Martin DR, Wu D, Liu M, **Xue X#**. (2021). Mitophagy protein PINK1 suppresses colon tumor growth by metabolic reprogramming via p53 activation and reducing acetyl-CoA production. ***Cell Death Differ*** 28(8):2421-2435. PMID: 33723373 PMCID: PMC8329176 (# Corresponding author, Highlighted by **NIEHS** Superfund Research Program)

Schwartz AJ, Goyert JW, Solanki S, Kerk S, Chen B, Castillo C, Hsu P, Do B, Singhal R, Dame M, Lee H, Spence J, Lakhal-Littleton S, Vander Heiden MG, Lyssiotis C, **Xue X#**, and Shah Y#. (2021). Hepcidin sequesters iron to sustain nucleotide metabolism and mitochondrial function in colorectal cancer epithelial cells. ***Nat Metab***. Jul;3(7):969-982; PMID: 34155415. PMCID: PMC8316354 (# Corresponding author, **highlighted** by ***Cancer Discovery*** with a research watch article "Colorectal Cancer Cells Ectopically Express Hepcidin to Sequester Iron. 2021 Jul 2. PMID: 34215630")

Morales M, **Xue X#**. Targeting Iron Metabolism in Cancer Therapy. ***Theranostics*** 2021; Jul 25;11(17):8412-8429. PMID: 34373750 PMCID: PMC8344014 (# Corresponding author)

Zhang L, Pang R, **Xue X**, Bao J, Ye S, Dai Y, Zheng Y, Fu Q, Hu Z, and Yi Y. (2020) Anti-SARS-CoV-2 virus antibody levels in convalescent plasma of six donors who have recovered from COVID-19. ***Aging*** (Albany NY). 22;12(8):6536-6542. PMID: 32320384 (As of March/April 2021, this **Highly cited** received enough citations to place it in the top 1% of the academic field of **Molecular Biology & Genetics** based on a highly cited threshold for the field and publication year.)

Zheng W, Ma Z, Sun X, Huang Y, Lu B, Chen X, **Xue X#**, Yang X#, Wu X#. (2020 Exposure time determines the protective effect of Trichinella spiralis on experimental colitis. ***Microb Pathog***. 147: 104263. PMID: 32442663 (# Co-corresponding author)

Selected active research projects:

- Title: The Role of Mitochondrial Iron Homeostasis in Colon Cancer. RSG-18-050-01-NEC (PI: Xue), (07/2018-06/2023).
  Total amount: **$792, 000**
- Title: Profiling iron-regulated metabolic reprogramming for nucleotide biosynthesis in colon tumors. P20 GM130422-7965 **(**07/2020-05/2025**).**
  Total amount: **$1,321,250**

Patents

Xue, X., Combination Therapy for the Treatment of Cancer, United States Provisional Patent Application No.63/144,788. filed on February 2021; International patent PCT/US22/13676, filed on January 25, 2022.

Adipose tissue biology & metabolic diseases – Dr. Meilian Liu, Associate Professor

Selected peer-reviewed publications:

Wang C, Zhang X, Luo L, Luo Y, Yang X, Wang L, Le H, Feldman L, Men X, Yan C, Huang W, Feng Y, Liu F, Yang XO, **Liu M**. Adipocyte-derived PGE2 is Required for Intermittent Fasting-induced Treg Development and Improvement of Insulin Sensitivity. ***JCI Insight***, 8;7(5):e153755. (2022).

Luo L, Wang L, Luo Y, Romero E, Yang X, **Liu M**. Glucocorticoid/Adiponectin Acis Mediates Full Activation of Cold-induced Beige Fat Thermogenesis. ***Biomolecules***. 2021, 11 (11):1573.

Yin K, Lee J, Liu Z, Kim H, Martin DR, Wu D, **Liu M**, Xue X. Mitophagy protein PINK1 suppresses colon tumor growth by metabolic reprogramming via p53 activation and reducing acetyl-CoA production. ***Cell Death Differ***. 2021 Mar 15. PMID33723373.

Wang L, Yan L, Wu D, Luo L, Ding X, Zheng H, Yang X, Wang C, Zhang X, Zheng X, Brigman J, Yang XO, **Liu M**. Adiponectin Suppresses Adipose-resident ILC2 via AMPK-mediated Feedback Inhibition of IL-33 Signaling. ***J Exp Med,*** 218(2):e20191054. (2021).

Zhang X, Luo Y, Wang C, Ding X, Yang X, Wu D, Silva F, Yang Z, Zhou Q, Wang L, Wang X, Zhou J, Boyd N, Spafford M, Burge M, Yang XO, **Liu M**. Adipose mTORC1 Suppresses Prostaglandin Signaling and Beige Adipogenesis via the CRTC2-COX-2 Pathway. ***Cell Reports***, 24:3180–3193. (2018)

Selected *active* research projects:

- **R01 DK132643-01** (PI, Liu M) 04/01/22-03/31/27 NIH/NIDDK.
  The goal of this project is to investigate the development and interconversion of low- and high-thermogenic adipocytes and their transcriptional control in adipose tissue.
  Impact score-27 and percentile:9. Approved for funding

Forensic radiology – Dr. Natalie Adolphi, Associate Professor

Selected peer-reviewed publications:

Knorr C, **Adolphi NL**, and Nolte KB. (2021). What do you mean it doesn't fit?" - Facility and operational considerations for next-generation forensic imaging equipment. ***Forensic Imaging*** 26:200467. doi: 10.1016/j.fri.2021.200467.

Norii T, Makino Y, Unuma K, **Adolphi NL**, Albright D, Sklar DP, Crandall C, and Braude D. (2021). CT imaging of extraglottic airway device-pictorial review. ***Emerg Radiol***. 28:665-673. doi: 10.1007/s10140-021-01909-2.

Norii T, Makino Y, Unuma K, Hatch GM, **Adolphi NL**, Dallo S, Albright D, Sklar DP, and Braude D. (2021). Extraglottic Airway Device Misplacement: A Novel Classification System and Findings in Postmortem Computed Tomography. ***Annals of Emergency Medicine*** 77:285-95. Doi: 10.1016/j.annemergmed.2020.10.005

47. Helmrich E, Decker L, **Adolphi N**, Makino and Y. Postmortem (2020). CT lung findings in decedents with Covid-19: A review of 14 decedents and potential triage implications. ***Forensic Imaging.*** 2020 Dec;23:200419. doi: 10.1016/j.fri.2020.200419.

Dogra P*, **Adolphi NL***, Wang Z*, Lin Y-S, Butler KS, Durfee PN, Bearer, EL, Cristini V, and Brinker CJ. (2018). Establishing the effects of mesoporous silica nanoparticle properties on in vivo disposition using imaging-based pharmacokinetics. ***Nat Commun***. 9:4551. doi:10.1038/s41467-018-06730-z (*equal contributors).

Selected active research projects:

- Title: Improving identification of unknown American Indians and Hispanic/Latinx Americans. NIJ 2021-15PNIJ-21-GG-04139-SLFO Natl Inst Justice (PI Edgar). (01/01/22 – 12/31/23). Role: Co-I, 0.05 FTE
  Total Award Amount: **$532,833**
- Title: Researching Covid to Enhance Recovery (Recover) Initiative/Phase II. NHLBI/NYU OT2HL161847-01/AUT-01-21 (PIs Decker, Elifritz), (12/01/21 – 05/25/25). Role: Co-I, 0.19 FTE.
  Total Award Amount: **$1.4M/year**
- Title: Improving and Evaluating Computed Tomography and Magnetic Resonance Imaging in the Investigation of Fatalities Involving Suspected Head Trauma NIJ 2016-DN-BX-0173 Natl Inst Justice (**PI Adolphi**), (01/01/18 – 6/30/23). Role: PI, 0.25 FTE
  Total Award Amount: **$714,891**

Health services & molecular epidemiology – Dr. Vallabh Shah, Professor

Selected peer-reviewed publications:

Sephira G. Ryman, Arvind Caprihan, Gary Rosenberg, Jillian Prestopnik, Michele Quam, Donica Ghahate, Vernon S. Pankratz, Thomas Faber, Mark Unruh and **Vallabh Shah** (2022). Albuminuria, cognition, and MRI biomarkers of cerebrovascular disease in American Indians of the Zuni Pueblo. ***eNeurologicalSci*** 29, 2-7.

Safia Safi, Donica Ghahate, Jeanette Bobelu, Angela Wandinger-Ness, Cheryl Willman and **Vallabh Shah** (2022). Assessing Knowledge and Perceptions of Cancer among American Indians of Zuni Pueblo, New Mexico. ***Cancer Education*** https://doi.org/10.1007/s13187-021-02023-0. PMID 33963443.

Pankratz VS, Choi EE, Qeadan F, Ghahate D, Bobelu J, Nelson RG, Faber T, **Shah VO** (2021) Diabetes status modifies the efficacy of home-based kidney care for Zuni Indians in a randomized controlled trial. ***Journal of Diabetes and its complications*** 35(2):107753. PMID: 33097384

Bailey JE, Gurgol C, Pan E, Njie S, Emmett S, Gatwood J, Gauthier L, Rosas LG, Kearney SM, Robler SK, Lawrence R, Margolis KL, Osunkwo I, Wilfley D and **Shah VO**. (2021). Early Patient-Centered Outcomes Research Experience with the Use of Telehealth to Address Disparities: Scoping Review. ***J Med Internet Res*** 23(12): e28503. PMID: 34878986

Mark L. Unruh, Soraya Arzhan, Harv Feldman, Helen C. Looker, Robert G. Nelson, Thomas Faber, David Johnson, Linda Son-Stone, Vernon S. Pankratz, Larissa Myakovsky and **Vallabh O. Shah** (2020). American Indian Chronic Renal Insufficiency Cohort Study (AI-CRIC Study). ***BMC Nephrology*** 21:291. PMID: 32698776 PMCID: PMC7376925

Selected active research projects:

- Title: Home-Based Chronic Kidney Disease (Care in Native Americans of New Mexico – A Disruptive Innovation (1/1/2017 – 02/28/2022).
  Total Award Amount (including indirect costs): **$2,546,128**.
- Title: American Indian Chronic Renal Insufficiency Cohort Study (AI-CRIC), (7/1/2019 – 06/30/2024).
  Total Award Amount (including indirect costs): **$2,426,078**.
- Title: Standing Strong in Tribal Communities: Assessing Elder Falls Disparity (04/01/2021 – 03/31/2025).
  Total Award Amount (including indirect costs): **$2,709,151**.

Cellular pH regulation & V-ATPase and proton pumps – Dr. Karlett Parra, Professor

Selected peer-reviewed publications:

Fogarty S, Yu-Chan Chen, Hallie Rane, **Karlett J. Parra**, Francesco Manoni, Liubo Li, Jared Rutter, Patrick G. Harran. Callyspongiolide is A Potent Inhibitor of the Vacuolar ATPase. ***Journal of Natural Products*** (2020) Nov 25;83(11):3381-3386. doi: 10.1021/acs.jnatprod.0c00813. Epub 2020 Nov 5. PubMed PMID: 33151675.

Rane H, Hayek S, Frye J, Abeyta E, Bernardo S, **Parra K**, Lee S. Candida albicans Pma1p contributes to growth, pH homeostasis and hyphal formation. ***Frontiers in Microbiology*** (2019) May 9;10:1012. doi: 10.3389/fmicb.2019.01012. eCollection. PMID: 31143168.

Licon-Munoz Y, Fordyce CA, Raines Hayek S., and **Parra KJ**. V-ATPase-Dependent Repression of Androgen Receptor in Prostate Cancer Cells. ***Oncotarget*** (2018) Jun 22;9(48):28921-28934. *Article Highlighted News and Views (Oncotarget* 2018 Aug 7;9(61):31793-31794, https://www.ncbi.nlm.nih.gov/pubmed/30159121).

Parra K.J. and Hayek Summer. A lysosomal proton pump turns on when glucose runs out. **J. Biol. Chem.** 293(23) 9124 –9125. (2018).

Licon-Munoz Y.[PhD], Michel Vera, Fordyce CA., **Parra K.J**. F-actin Reorganization by V-ATPase Inhibition in Prostate Cancer. **BIOLOPEN** Nov 15;6(11):1734-1744 (2017).

Appendix 6.2 List of journals where our faculty have published
Since FY 2017, faculty have published their peer-reviewed articles in the listed journals.

Aging
Am J Forensic Med Pathol
Am J Kidney Dis.
Am J Physiol Cell Physiol.
Am J Physiol Gastrointest Liver Physiol.
Am J Physiol Regul Integr Comp Physiol.
American Journal of Physiology Metabolism and Physiology
Amino Acids
Anaerobe
Ann Surg.
Annals of Emergency Medicine
Antioxid Redox Signal.
Autophagy
BIOLOPEN
Biomolecules
BMC Medical Research Methodology
BMC Nephrology
Can J Microbiol.
Cancer Education
Cancer Med.
CBE-LSE
Cell Death Differ
Cell Metab.
Cell Reports
Chemical Science
CJASN
Clin Anat.
Clin Oncol Res
Clinical J of Am Soc of Nephrology.
CourseSource
Current Opinion in Plant Biology
Cytokine Growth Factor Rev.
Development.
Diabetes
DNA Cell Biol.
Emerg Radiol.
Endocrine
J Biomol Res and Therap
J Cell Biol.
J Exp Med
J Integrative Cardiol Open Access.
J Med Internet Res
J Nutr.
J Pharmacol Exp Ther
J Physiol.
J Transl Med.
J Vis Exp.
J. Biol. Chem.
J. Exp & Clin Cancer Res.
J. Mol Cell Biol
J. Surg. Res.
JASN
JCI Insight
J. of Biological Chemistry
J. of Biomolecular Research and Therapeutics
J. of Cardiothoracic and Vascular Anesthesia
J.l of Diabetes and its complications
Journal of diabetes and obesity
Journal of Natural Products
Kidney Int Rep
Med One.
Microb Pathog.
Mol Cell Biochem
Mol Cell Biol.
Mol Metab.
Mucosal Immunology
Nat Commun.
Nat Med.
Nat Metab.
Nature
Neurobiology of Aging
Oncotarget
Oxid Med Cell Longev
Plants

FASEB J.
Food Funct.
Forensic Imaging
Front Biosci
Frontiers in Genetics
Frontiers in Microbiology
Gastroenterology
Gene
Genes Nutr.
Hypertens Res.
Innate Immun.
Int J Environ Res Public Health.
Int J Mol Sci.
J Am Soc Nephrol.
J Biol Chem.
J Biomed Sci Tech.
PLoS One
Preventing Chronic Disease
Proc Natl Acad Sci U S A
Sci Rep
Sci Transl Med
Science
Science Advances
Scientific Reports
The Plant Cell
The Plant Journal
Theranostics
Thinking Skills and Creativity
Toxicol Appl Pharmacol.
Translational Medicine of Aging
Vet Res.

Appendix 6.3 HSC Excellence in Research Award for Junior Faculty Research (Dr. Meilian Liu, 2017)

UNM HEALTH SCIENCES CENTER

OFFICE OF RESEARCH

November 7, 2017

Meilian Liu, PhD
Department of Biochemistry and Molecular Biology
MSC08 4670

Dear Dr. Liu:

It is my great pleasure to congratulate you for receiving the Faculty Research Excellence Award for Jr. Faculty in 2017. All nominations for the award were reviewed and your research accomplishments were judged to be the most deserving of the award this year. The recognition includes a plaque and a check in the amount of $1000 to recognize your work for Jr. Faculty Science, which will be deposited into your payroll.

The 2017 HSC Research Excellence Award ceremony is on November 17, 2017 from 3:00 pm to 4:00 pm, followed by a reception. We typically ask your chair, or suitable alternate, to make a brief presentation about your career and accomplishments and hope that both of you can attend. In anticipations of photographs, please wear appropriate business attire.

The selection committee enjoyed the task of reviewing your extensive research success and accomplishments, and we are very proud to have you as our colleague and to honor you with this award.

Please keep confidential until ceremony.

Warm regards,

Corey

Corey Ford, M.D., Ph.D.
Senior Associate Dean for Research

Cc: Paul Roth, M.D., Chancellor for Health Sciences
Richard Larson, MD, PhD, Executive Vice Chancellor, Vice Chancellor for Research
Martha McGrew, M.D., Executive Vice Dean, SOM,
Karlett Parra, PhD, Chair, Department of Biochemistry and Molecular Biology

Appendix 6.4 HSC Excellence in Research Award for Junior Faculty Research (Dr. Xiang Xue, 2021)

HSC FACULTY RESEARCH EXCELLENCE AWARDS

13th Annual Excellence in Research Awards

HSC Office of Research

Document Type
Video

Publication Date
Fall 11-23-2021

Abstract
Health Sciences Center's 13th Annual Excellence in Research Awards

Hosted by the HSC Office of Research

Tuesday, November 23, 2021 from 3:00 pm to 4:30 pm via Zoom.

The formal award ceremony begins at 3:00 pm, with Dr. Richard Larson, MD, PhD Providing opening remarks and announcement of the Awards.

The award ceremony will honor six outstanding faculty members for their outstanding work in:

- Basic Science Research: Diane Lidke. Introduced by Nancy Joste, Interim Chair of Pathology.
- Clinical Science Research: Christopher Abbott. Introduced by Mauricio Tohen, Chair of Psychiatry and Behavioral Medicine.
- Population Science Research: Melissa Gonzales. Introduced by Mark Unruh, Chair of Internal Medicine.
- Junior Faculty Research: Xiang Xue. Introduced by Karlett Parra, Chair of Biochemistry & Molecular Biology
- Team Science Research: Jonathan Brigman. Introduced by Bill Shuttleworth, Chair of Neurosciences.
- The Scholarship of Teaching and Learning: Jonathan Eldredge. Introduced by Melissa Rethlefsen, Exec. Director, Health Sciences Library and Informatics Center.

The winning faculty members were nominated by their colleagues for this award, and selected through a vigorous peer review selection process by the HSC Excellence in Research Award Committee.

This event is an excellent opportunity to learn more about the research being conducted at the UNM HSC.

All faculty, staff and students are invited to the virtual event via Zoom.

Recommended Citation
HSC Office of Research. "13th Annual Excellence in Research Awards." (2021). https://digitalrepository.unm.edu/hsc_research_awards/1

Appendix 6.5 CURE Fellow award (Dr. Laura de Lorenzo, 2022)

Engaging Students in Research

Creating a Community of Faculty

DATE: August 20, 2022

TO: Laura de Lorenzo Barrios, Biomedical Research Facility, University of New Mexico

FROM: MDH CURES Community Leadership Team

SUBJECT: MCC Fellow Award Letter

Dear Dr. de Lorenzo Barrios, this letter recognizes the excellence and dedication you have placed in your professional development by applying for and being selected for the 2022-2023 Malate Dehydrogenase CUREs Cohort.

The Malate Dehydrogenase CUREs Community (MCC) is a vibrant community of community college and university faculty focused on bringing engaging-cutting edge teaching. The goal of the MCC is to provide opportunities for all students.

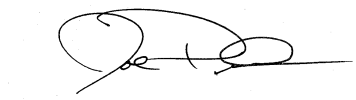
The MCC Cohort Fellows program is a crucial aspect of the NSF-funded MCC project. Each year we select nine faculty who are committed to using CUREs to engage their students, participate in the community, partake in mentoring and professional development, and become leaders with future MCC faculty. This is a two-year commitment.

Each member of the Faculty Fellows Cohort is required to participate in both online and in-person workshops to learn how to employ MDH research in their teaching laboratories. MDH Faculty Fellows are expected to teach in the upcoming academic year. An essential component of this training is that new Fellows will be exposed to both existing MDH CURE research areas that are easy to start with and potential CURE research areas that may align with their own research interests. Fellows will choose one of the MCC scientific areas and design and implement an MDH CURE.

To make CURE adoption feasible, the support network available to Faculty Fellows includes funds that can be requested for small equipment to help them get started. The regional networks may provide access to instrumentation not available at their home institution. In addition, the MCC Leadership group will provide resources such as alternate protocols/techniques that can be used if they lack particular instrumentation or equipment. Support will also include travel and housing for the workshop, a stipend as they participate in the workshop and develop their CURE, funds for supplies as they begin an MDH CURE, and support for reagents to start their new MDH CURE.

We are glad you choose to apply and participate in this program.

For the MCC Leadership Team *Joseph Provost, Amy Springer, Ellis Bell & Lisa Gentile.*



Joseph Provost
Professor Department of Chemistry and Biochemistry
University of San Diego

Appendix 6.6 Selected creative work published and/or presented by our undergraduate students while working in our research laboratories (undergraduate co-authors are underlined)

PEER-REVIEW PUBLICATIONS

2022 | Wang C, Zhang X, Luo L, Luo Y, Yang X, Wang L, Le H, Feldman L, Men X, Yan C, Huang W, Feng Y, Liu F, Yang XO, Liu M. Adipocyte-derived PGE2 is Required for Intermittent Fasting-induced Treg Development and Improvement of Insulin Sensitivity. JCI Insight, 8;7(5):e153755 (2022).

2022 | Morales M, **Xue X#**. Hypoxia in the Pathophysiology of Inflammatory Bowel Disease. ***Comprehensive Physiology;*** Invited Review. Under Consideration (# Corresponding author).

2022 | Kim H, Villareal LB, Liu Z, M Haneef, Falcon DM, Martin DR, Lee H, Dame MK, Attili D, Chen Y, Varani J, Spence JR, Kovbasnjuk O, Lyssiotis CA, Lin HC, Shah YM, **Xue X#**. Transferrin receptor-mediated iron uptake is essential for colon tumorigenesis. In submission. (# Corresponding author).

2021 | Luo L, Wang L, Luo Y, Romero E, Yang X, Liu M. Glucocorticoid/Adiponectin Acis Mediates Full Activation of Cold-induced Beige Fat Thermogenesis. Biomolecules. 2021, 11 (11):1573.

2021 | Morales M, **Xue X#**. Targeting Iron Metabolism in Cancer Therapy. ***Theranostics*** 2021; Jul 25;11(17):8412-8429. PMID: 34373750 PMCID: PMC8344014 (# Corresponding author).

2021 | Yin K, Lee J, Liu Z, Kim H, Martin DR, Wu D, Liu M, **Xue X#**. Mitophagy protein PINK1 suppresses colon tumor growth by metabolic reprogramming via p53 activation and reducing acetyl-CoA production. ***Cell Death Differ*** (2021). Aug;28(8):2421-2435. PMID: 33723373 PMCID: PMC8329176 (available on 2022-08-01) (# Corresponding author, Highlighted by **NIEHS** Superfund Research Program).

2020 | Small, EM, Felker, DP, Heath, OC, **Cantergiani, RJ**, Robbins, CE, Osley, MA, McCormick, MA. SPOCK, an R based package for high-throughput analysis of growth rate, survival, and chronological lifespan in yeast. *Translational Medicine of Aging* 4:141-148. (2020).

2020 | Zhang X, Wu D, Wang C, Luo Y, Ding X, Yang X, Silva F, Arenas S, Weaver J, Mandell M, Deretic V, **Liu M**. Sustained Activation of Autophagy Suppresses Adipocyte Maturation via a Lipolysis-dependent Mechanism. *Autophagy*, 18: 1-15. (2020).

2020 | Klimaj, Stefan D. Licon-Munoz, Yamhilette. Del Toro, Katelyn. and William C. Hines. A high- throughput-imaging and quantification pipeline for the EVOS imaging platform. Minor revisions requested, PLOS ONE (2020).

2018 | Zhang X, Luo Y, Wang C, Ding X, Yang X, Wu D, Silva F, Yang Z, Zhou Q, Wang L, Wang X, Zhou J, Boyd N, Spafford M, Burge M, Yang XO, **Liu M**. Adipose mTORC1 Suppresses

Prostaglandin Signaling and Beige Adipogenesis via the CRTC2-COX-2 Pathway. *Cell Reports*, 24:3180–3193. (2018).

ORAL PRESENTATIONS

2022 | Who wants to live forever? **Ryla J. Cantergiani**, Christine E. Robbins, Blaise L. Mariner, Olivia C. Heath, Daniel P. Felker, Mark A. McCormick. **Undergraduate Research Opportunity Conference**, Albuquerque, NM, USA, April 18, 2022. *Recipient of UROC 180 Best Talk Award.*

2022 | High throughput automation of *C. elegans* lifespan experiments. **Alexander Achusim**, Blaise L. Mariner, Daniel P. Felker, Christine E. Robbins, Olivia C. Heath, Mark A. McCormick. **Bio Research Day**, Albuquerque, NM, USA, March 31, 2022. *Recipient of Outstanding Talk Award*.

2022 | Identifying Mechanisms of Gcn4-Dependent Longevity in *Saccharomyces Cerevisiae*. **Ryla J. Cantergiani,** Christine E. Robbins, Blaise L. Mariner, Mark A. McCormick. **BMB Research Day**, Albuquerque, NM, USA, April 29, 2022.

2022 | tRNA Synthetase Inhibitors Activate ATF4 in a GCN2-Dependent Manner and Cause Similar Differential Gene Expression Between *In Vivo* And *In Vitro* Models. **Victor Oliva**, Blaise L. Mariner, Mark A. McCormick. **BMB Research Day**, Albuquerque, NM, USA, April 29, 2022.

2022 | Hypoxia-inducible Factor 3α1 Promotes Epithelial-to-mesenchymal Transition in Colon Cancer Cells. (Trainee: Daniel Falcon). **The Academic Science Education and Research Training (ASERT) program Research Retreat,** Albuquerque, NM.

2019 | Upregulation of Gcn4 by deletion of mitochondrial ribosomal proteins suggests a common mechanism for lifespan extension through cytosolic and mitochondrial translation. **Marissa Westenskow**, Christine E. Robbins, Olivia C. Heath, **Mark A. McCormick**. **Biochemistry and Molecular Biology Research Day**, Albuquerque, NM, USA, April 12, 2019.

POSTER PRESENTATIONS

2022 | tRNA synthetase inhibitors activate a conserved longevity pathway in mice in vitro. **Blaise L. Mariner**, Daniel P. Felker, Christine E. Robbins, Olivia C. Heath, Victor Oliva, Mark A. McCormick. **BMB Research Day**, Albuquerque, NM, USA, April 29, 2022.

2022 | High throughput automation of *C. elegans* lifespan experiments. **Alexander Achusim**, Blaise L. Mariner, Daniel P. Felker, Christine E. Robbins, Olivia C. Heath, Mark A. McCormick. **BMB Research Day**, Albuquerque, NM, USA, April 29, 2022.

2022 | Transferrin receptor-mediated iron uptake is essential for colon tissue homeostasis (Trainee: Hyeoncheol Kim). **Experimental Biology**, Philadelphia, PA.

2021 | Hypoxia-inducible Factor 3α1 Promotes Epithelial-to Mesenchymal Transition in Colon Cancer Cells (Trainee: Luke Villareal). **ABRCMS,** Virtual.

2020 | Increased lifespan through altered Gcn4 / ATF-5 in *S. cerevisiae* and *C elegans*. **Olivia C. Heath**, Christine E. Robbins Daniel P. Felke, Ryla J. Cantergiani, **Mark A. McCormick**. **Intra- and Intercellular Mechanisms of Aging**, Keystone Symposium, Vancouver, Canada, February 9-13 2020.

2020 | tRNA synthetase inhibitors increase lifespan in a GCN4 / atf-5 dependent manner. Christine E. Robbins, Ryla J. Cantergiani, Olivia C. Heath, **Mark A. McCormick**. **AIM Early Career Investigator Symposium**, Virtual, November 23, 2020.

2020 | tRNA synthetase inhibitors increase lifespan in a GCN4 / atf-5 dependent manner. **Christine E. Robbins**, Ryla J. Cantergiani, Olivia C. Heath, **Mark A. McCormick**. **Biological Sciences Graduate Program Research Day**, Albuquerque, NM, USA, March 6, 2020.

2019 | tRNA synthetase inhibitors upregulate autophagy leading to increased lifespan. **Ryla J. Cantergiani**, Christine E. Robbins, **Mark A. McCormick**. **Undergraduate Pipeline Network Symposium**, Albuquerque, NM, USA, August 2, 2019.

2019 | Increased lifespan through altered Gcn4 / ATF-5 in *S. cerevisiae* and *C. elegans*. Olivia C. Heath, Christine E. Robbins, Daniel P. Felker, Ryla J. Cantergiani, **Mark A. McCormick**. **Keystone Symposium, Autophagy: From Model Systems to Therapeutic Opportunities**, Santa Fe, NM, USA, February 17-21, 2019.

2019 | The interaction of Hemin and Sestrin2 Modulates Oxidative Stress and Colon Tumor Growth (Trainee: Hyeoncheol Kim). **BMB Research Day**, Albuquerque, NM.

2019 | Hypoxia-inducible factor 3α1 promotes epithelial-to-mesenchymal transition in colon cancer (Trainee: Daniel Falcon). **BMB Research Day**, Albuquerque, NM.

2019 | Transferrin Receptor is Essential for Colon Tissue Homeostasis (Trainee: Hyeoncheol Kim). **University of New Mexico Comprehensive Cancer Center Research Day and Recruitment Event,** Albuquerque, NM.

2019 | Mitophagy Protein PINK1 Suppresses Colon Tumor Growth by Reversing Warburg Effect (Trainee: Kunlun Yin). **University of New Mexico Comprehensive Cancer Center Research Day and Recruitment Event,** Albuquerque, NM.

2018 | Gcn4 Production in Mitochondrial Translation Deletion Strains of *Saccharomyces cerevisiae*. **Marissa Westenskow**, Christine E. Robbins, **Mark A. McCormick**. **Undergraduate Pipeline Network Symposium**, Albuquerque, NM, USA, July 30, 2018.

2016 | V-ATPase and cancer: At the crossroads of life and death". Colleen Fordyce, Yamhilette PhD Licon-Munoz, Frank Martinez, Matthew Pearson, Karlett Parra. NM-INBRE **Annual Symposium**, Santa Fe, NM, March, 2016.

Appendix 7

Appendix 7.1 Peer comparison template

Appendix 7.1 Peer comparison template

	Total University Enrollment	Unit Undergraduate Degrees/Certificates Offered	Unit Undergraduate Student Enrollment	Unit Graduate Degrees/Certificates Offered	Unit Graduate Student Enrollment	Total # of Unit Faculty	Status/Ranks/ Comparisons	Other (please specify)
University of New Mexico	19,556	2 Certificates B.A. and B.S.	67 Bachelor Degrees			12	ASBMB Accredited	
University of Arizona	49,471	2 Certificates B.A. and B.S.	71 Bachelor Degrees	MS and PhD	5 – MS 7 – PhD	22	ASBMB Accredited	
New Mexico State University	13,904	2 Certificates B.A. and B.S.	10 Bachelor Degrees	MS and PhD	NONE	17	ASBMB Accredited	
University of Utah	30,916	2 Certificates B.A. and B.S.	83 Bachelor Degrees	MS and PhD	1 – MS 64 – PhD	12		Graduate program is in a separate college
University of Oregon	22,257	B.S.	117 enrolled 15 B.S.	NONE	NONE	44	Faculty is for Chemistry and Biochemistry	
Chapman University	9991	B.S.	28 B.S.	NONE	NONE	16	ASBMB Accredited	

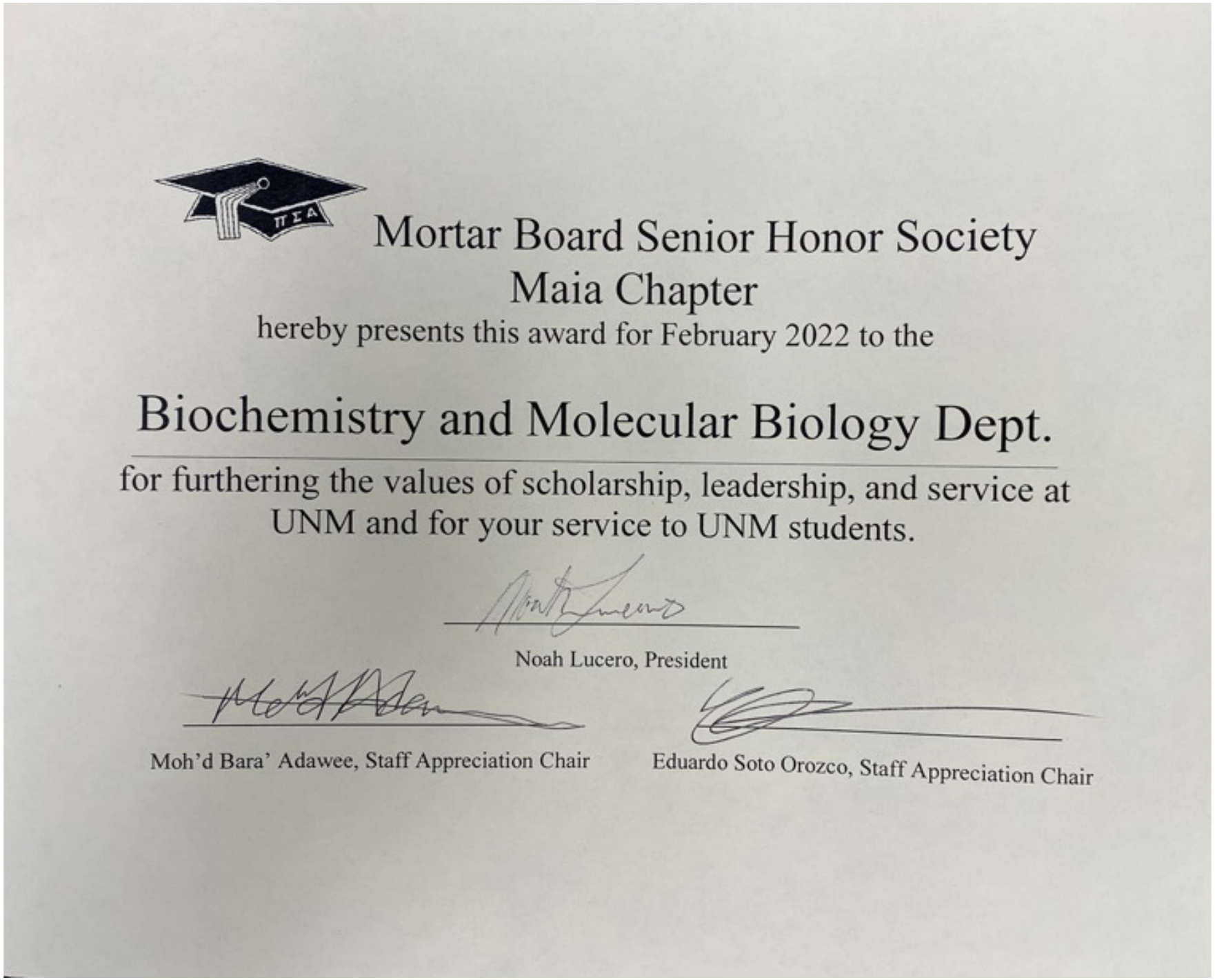
Appendices 8

Appendix 8.1 2022 Mortar Board award by the Mortar Board Senior Honor Society UNM

Appendix 8.2 2022 Dean's staff award by the School of Medicine UNM

Appendix 8.3 2021 Outstanding staff award by Provost James Holloway UNM

Appendix 8.1 2022 Mortar Board award by the Mortar Board Senior Honor Society UNM



Mortar Board Senior Honor Society
Maia Chapter
hereby presents this award for February 2022 to the

Biochemistry and Molecular Biology Dept.

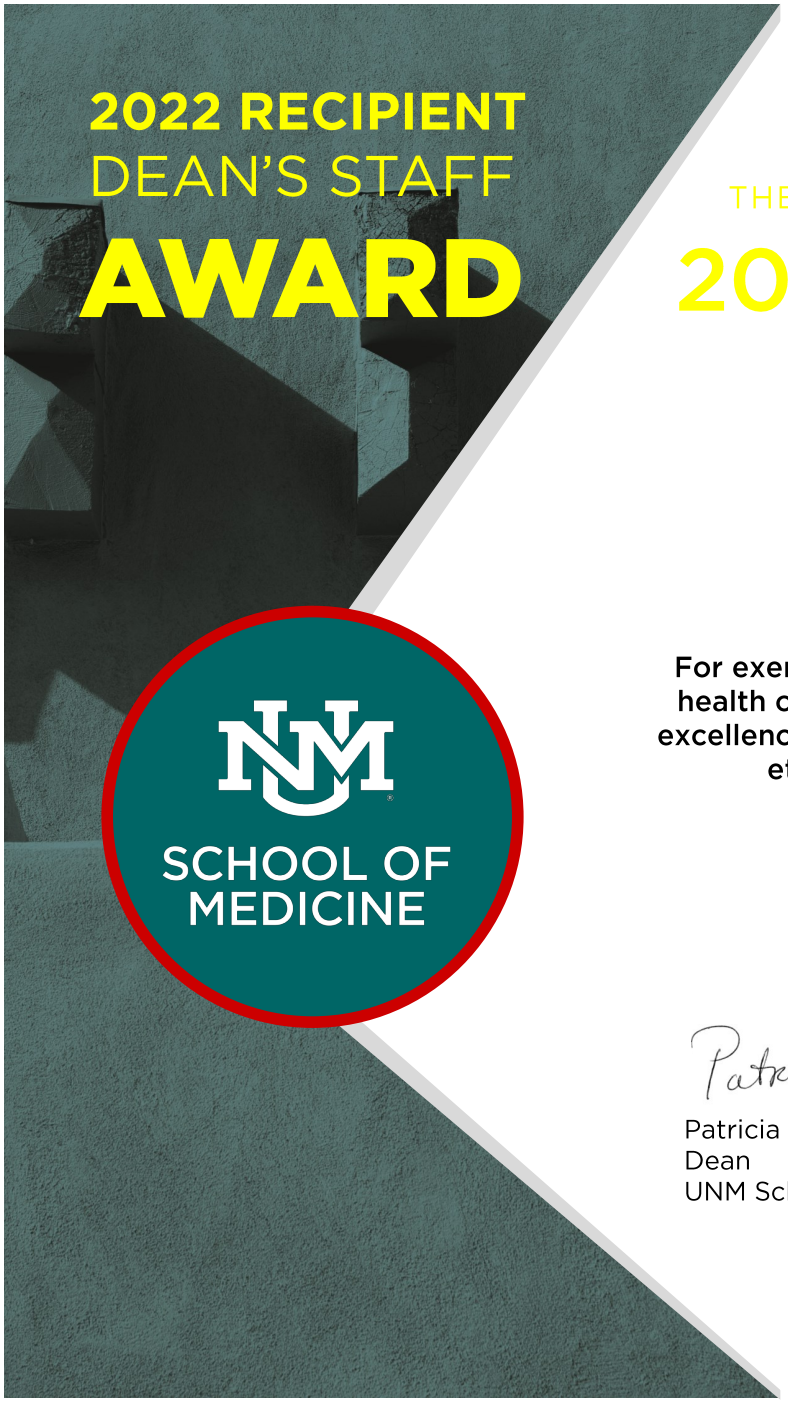
for furthering the values of scholarship, leadership, and service at UNM and for your service to UNM students.

Noah Lucero, President

Moh'd Bara' Adawee, Staff Appreciation Chair

Eduardo Soto Orozco, Staff Appreciation Chair

Appendix 8.2 2022 Dean's staff award by the School of Medicine UNM



THE UNIVERSITY OF NEW MEXICO SCHOOL OF MEDICINE

2022 Dean's Staff Award

IS PRESENTED TO

Tyler Humble

For exemplary service to the UNM School of Medicine's mission of advancing the health of all New Mexicans, and outstanding demonstration of the core values of excellence and accountability, compassion, diversity, integrity, professionalism and ethical behavior, social responsibility, and creativity and innovation.

December 2, 2022

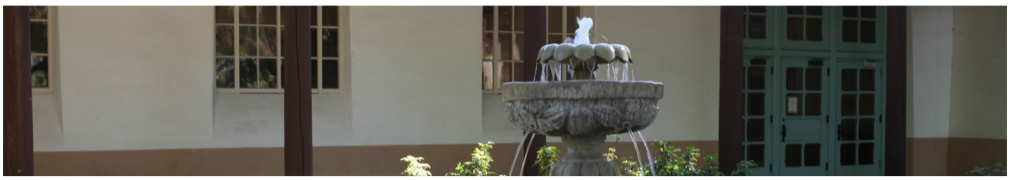
Patricia W. Finn, MD
Dean
UNM School of Medicine

Jeanne Marquardt
Executive Project Director
UNM School of Medicine

Lisa Gamboa
HR Administrator
UNM School of Medicine

Appendix 8.3 2021 Outstanding staff award by Provost James Holloway UNM

Provost Committee for Staff (PCS)



PCS Home
PCS Members
Outstanding Staff Award
Outstanding Workgroup Award
Kindness Award
Academic Support Scholarship
Award & Scholarship Winners

PCS Award & Scholarship Winners

The following lists contain the winners of the PCS Oustanding Staff, Workgroup, Kindness and Scholarships. Click on the section to see the winners for each award.

Outstanding Staff Award Winners

2022
- Dee Dee Lopez
- Maria C. Anchondo
- Ana Lombard

2021
- Heather Armstrong
- Kimberly Delker
- Susan McAllister
- Bryan Stewart

2020
- Sergio de la Cruz
- Christine Sraha
- Olivia Torres

2019
- Erika Elwell
- Dayra Fallad-Mendoza
- Randall Starling, PhD.

2018
- Theresa Lopez
- Armando Bustamante
- Vickie Madrid Nelson

2017
- Brooke Steiger
- Christine Sraha
- Stephanie Hands

2016
- Celeste Cole
- Tim Johnson
- Mitzi Vigil

2015
- Megan Chibanga
- Alfredo Ruiz
- Nancy Treviso

2014
- Dawn Blue Sky-Hill
- Ramsey Lofton
- Elizabeth Siletti

2013
- Emmett Martinez
- Lourdes McKenna
- Heather Paulsen

2012
- Alisa Gibson
- Beth Kaimowitz
- Linda Melville

2011
- Juan Escarsega
- Lisa Stewart
- Jim Todd

2009
- Elsa Castillo
- John DeMoss
- Eugene Rooney

2005
- Florence Gonzales
- Dan Noyes
- Cheryl Martin
- Fredine Lauer

2004
- Sue Garley
- Sarah Dilmore
- Jerry Pilkinton

Outstanding Workgroup Award Winners

Kindness Award Winners

PCS Scholarship Recipients