

Spring 2016

Pre-Engineering 2016 Valencia Self-Study & Documents

University of New Mexico - Valencia County Branch

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Valencia Campus Program Review Worksheet for the Pre-Engineering Program

I. Mission:

The associate of science in pre-engineering degree program provides students with quality instruction to facilitate mastery of the knowledge, skills and behaviors necessary to continue their studies with an end to completing a bachelor's degree in a variety of engineering fields such as Chemical, Civil, Computer, Construction, Electrical, Mechanical, or Nuclear Engineering. Engineering contains a large number of job opportunities and specialties in areas such as medicine, aerospace, automotive, geology, software, and more.

Central New Mexico is fortunate to allow engineering majors to find employment in their fields even while they seek degrees. Many local internships are available.

II. Goals:

The pre-engineering science program provides students with quality instruction to facilitate mastery of the knowledge, skills and behaviors necessary to continue their studies with an end to completing a bachelor's degree in engineering. Course syllabi describe the learning objectives for each course that contribute to the program learning goals and explain how students' learning is evaluated. Upon successful completion of the required courses for the associate of science in general science, our students will demonstrate that they have developed the ability to:

1. Describe information and concepts in one of the following areas: mathematics or science.
2. Apply the scientific method of inquiry and critically evaluate experimental design.
3. Utilize the basic skills used in engineering.

III. Trends:

The Pre-Engineering program is relatively new at UNM Valencia. The first course, ENG 116 Introduction to Engineering, was offered as a one-hour course in the fall of 2011. Then, I believe that the first Pre-Engineering Associates Degrees (2) were awarded in May 2013. The Pre-Engineering program has grown steadily since its inception. The number of transfers and the number of graduates has remained low. A percentage of our students continue their studies at New Mexico Tech instead of at UNM Main Campus. See Table 1 for supporting data. More detailed data has been requested.

IV. Assessment:

The program assessment of the Pre-Engineering program in the past has been based on the abilities of students in physics. This was reasonable because not only are physics courses prerequisites for many engineering courses but engineering is essentially an applied science requiring a strong math background. In the most recent Program Assessment, problems were chosen from Physics 160 and 161 final exams to demonstrate the competencies of students in these courses, then to support their ability to succeed in engineering, and finally, to assess the Pre-Engineering Program. In the fall of 2014, 65% of the Physics 160 students were able to meet or exceed expectations on the problem assessed. Then in the spring of 2015, 67% of the Physics 161 students met or exceeded expectations on the assessed final exam problem.

This year two courses primarily populated with engineering students were used for assessment: ENG 120 and CS 151L. Using data from ENG 120, 100% of the students performed at better than 80% proficiency while in CS 151L, 12 of 17 students or 70% of the students performed at 80% or better proficiency. It was noted that

the tutoring support for CS 151L is very limited so the instructor should be more diligent in covering the material.

V. Funding:

The Pre-Engineering program has just one engineering faculty member with a background in mechanical engineering. On the other hand, there are required courses that pre-engineers take that many other students also need such as physics, calculus and chemistry.

For the past five years, funding for the engineering assistant professor has been covered in part by a Title III STEM grant that ended September 30, 2016. Recently a new grant has been awarded to UNM Valencia that will allow engineering students to experience undergraduate research at UNM Valencia.

VI. Articulation:

The current offerings here at UNM Valencia do not align well with the varied engineering disciplines at Main Campus. Each Pre-Engineer Associate can expect to receive only 50-55 of 64 hours toward their bachelor's degree at Main. This is due to the widely varied first and second year requirements within each of the engineering departments. See Table 2 on following pages.

The Pre-Engineering Introduction to Engineering course, while beneficial to students trying to decide whether to major in engineering or not, is no longer part of the engineering curriculum at Main Campus.

The UNM Valencia catalog indicates that students should "select one course contingent on specific engineering field as follows:

1. Chemical and Nuclear Engineering: CHNE 230 or CHNE 251,
2. Civil, Construction, or Mechanical Engineering: CE 202, or
3. Electrical and Computer Engineering: ECE 131."

However, we do not currently have the faculty to cover the CHNE or ECE courses but we do offer ME 217 and the ECE 131 is offered online.

Most two-year institutions have cut or are cutting their Pre-Engineering Associates Degree to 60 hours to better align with UNM Engineering College hour reduction to approximately 120 hour for a bachelor's degree. Some schools have cut the number of core electives and some have eliminated the engineering courses.

VII. Summary:

The biggest discrepancy in transfer versus courses taken is in the sciences. It is recommended that the Pre-Engineering coursework be restructured to allow science electives to reduce the Pre-Engineering Associates to a 60 hour degree.

The 100-level engineering requirements differ from engineering department to department. There is more overlap at the 200 level but the number of UNM Valencia students that have completed the prerequisite mathematics for 200-level engineering courses is limited. The lone assistant professor has chosen to maximize the offerings by teaching one lower level CE, one lower level ME, one general engineering course, two computer science courses, and math. To add to the offerings, she has developed an introductory robotics course that does not transfer but is useful to any students needing to program or learn basic circuitry.

Table 2: Valencia Hours Required Compared to Hours Toward UNM Engineering Degree

UNM-VC Pre-Engr*	VC	UNM EE	UNM ChemE	UNM CompE	UNM CS	UNM ME	UNM CE	UNM ConE	UNM NucE
Engr/CS/Econ	12	3	3	3	3	12	9	6	9
Total VC Hours	64	50	53	50	54	56	55	52	59
Courses Req'd But Not Needed		CHEM 122/124L	PHYC 160L	CHEM 122/124L	MATH 264	PHYC 161L	CHEM 122/124L	CHEM 122/124L	PHYC 160L
		PHYC 160L	PHYC 161L	PHYC 160L			PHYC 160L	PHYC 160L	PHYC 161L
							PHYC 161L	PHYC 161L	
Hours Not Needed		5	2	5	4	1	6	6	2
Hours Not Offered		9	9	9	9	0	3	6	3
Wasted Hours		14	11	14	13	1	9	12	5
Possible Hours		ECE 131 ECE 203		ECE 131 ECE 203			BIO 110 or EPS 101	EPS 101 or MGMT 202	

*Construction Management is a very different degree.

UNM-VC Pre-Engr*	V C	UNM EE	UNM ChemE	UNM CompE	UNM CS	UNM ME	UNM CE	UNM ConE	UNM NucE
ENGL 110.112.113	3	3	3	3	3	3	3	3	3
ENGL 120	3	3	3	3	3	3	3	3	3
ENGL 219	3	3	3	3	3	3	3	3	3
Write/Speak Total	9	9	9	9	9	9	9	9	9
Math 162	4	4	4	4	4	4	4	4	4
Math 163	4	4	4	4	4	4	4	4	4
Math 264	4	4	4	4	0	4	4	4	4
Math Total	12	12	12	12	8	12	12	12	12
Chem 121/123L	4	4	4	4	4	4	4	4	4
Chem 122/124L	4	0	4	0	4	0	0	0	4
PHYC 160	3	3	3	3	3	3	3	3	3
PHYC 161	3	3	3	3	3	3	3	3	3
PHYC 160L	1	0	0	0	1	1	0	0	0
PHYC 161L	1	1	0	1	1	0	0	0	0
Science Total	16	11	14	11	16	11	10	10	14
Humanities Total	6	6	6	6	6	6	6	6	6
Fine Arts Total	3	3	3	3	3	3	3	3	3
Foreign Lang Total	3	3	3	3	3	3	3	3	3
Soc Sci Total	3	3	3	3	6	0	3	3	3
Core Total	15	15	15	15	18	12	15	15	15
Eng 116	2								
STEM	1								
CS 151L	3					3	3	3	3
ECON 105	3	3	3	3		3	3		3
ME 217 Soc Sci*	3					3			
CE 202						3	3	3	3
CS 152L					3				
Engr/CS/Econ Total	12	3	3	3	3	12	9	6	9
Total Hours	64	50	53	50	54	56	55	52	59

Blue shading represents hours that could be another course.

Pre-Engineering

Associate of Science in Pre-Engineering

Program Description

The associate of science in pre-engineering degree provides the first two years of study for a student who plans to transfer to a four-year institution to pursue a bachelor's degree in engineering. A degree in pre-engineering leads to further study in the areas of chemical, civil, computer, construction, electrical, mechanical, or nuclear engineering. The degree consists of core curriculum, with an emphasis on mathematics and science, and engineering electives designed to be tailored to your future, more specific field of engineering.

Career and Educational Advancement Opportunities

The associate of science in pre-engineering degree program provides students with quality instruction to facilitate mastery of the knowledge, skills and behaviors necessary to continue their studies with an end to completing a bachelor's degree in a variety of engineering fields such as Chemical, Civil, Computer, Construction, Electrical, Mechanical, or Nuclear Engineering. Engineering contains a large number of job opportunities and specialties in areas such as medicine, aerospace, automotive, geology, software, and more.

Program Requirements

Total credit hours required: 63 (see checklist for specific requirements). Please refer to The University of New Mexico Core Curriculum for a list of allowable core curriculum elective courses.

Program Learning Goals

The pre-engineering science program provides students with quality instruction to facilitate mastery of the knowledge, skills and behaviors necessary to continue their studies with an end to completing a bachelor's degree in engineering. Course syllabi describe the learning objectives for each course that contribute to the program learning goals and explain how students' learning is evaluated. Upon successful completion of the required courses for the associate of science in general science, our students will demonstrate that they have developed the ability to:

1. Describe information and concepts in one of the following areas: mathematics or science.
2. Apply the scientific method of inquiry and critically evaluate experimental design.
3. Utilize the basic skills used in engineering.

Contact and Advising Information

Information about the associate of science in general science degree is available from Advisement Center at 505.925.8560 or vcadvise@unm.edu, or the Academic Affairs Office at 505-925-8600.

Course Prerequisites

Students must meet prerequisites by achievement of minimum placement scores on the ACCUPLACER or ACT or through completion of course work.

Course Prerequisites

Students must meet prerequisites by achievement of minimum placement scores on the ACCUPLACER or ACT, or through completion of course work.

Course: ENGL 100 and UNIV 101 or equivalent – or place into ENGL 110;

Credit Hours: 4 and 3; **ACCUPLACER/ACT Minimum Scores:** 75/19

Course: MATH 150 and MATH 123 – or place into MATH 162;

Credit Hours: 3 and 3; **ACCUPLACER/ACT Minimum Scores:** 67/32

Associate of Science in Pre-Engineering Degree Requirements

The following are the course requirements for completion of an associate of science in pre-engineering degree. Students should see an advisor to customize their educational plans.

Area	Semester	Grade	Credits
Writing and Speaking: (9-10 credits)			
ENGL 110 or 112 or 113	_____	_____	3 or 3 or 4
ENGL 120	_____	_____	3
ENGL 219	_____	_____	3
Mathematics: (12 credits)			
MATH 162L	_____	_____	4
MATH 163L	_____	_____	4
MATH 264L	_____	_____	4
Physical and Natural Sciences: (16 credits)			
CHEM 121 /123L	_____	_____	4
CHEM 122/124L	_____	_____	4
PHYC 160/L	_____	_____	4
PHYC 161/L	_____	_____	4
Social and Behavioral Sciences: (6 credits)			
ECON 105	_____	_____	3
_____	_____	_____	3

Select one course from the UNM Core Curriculum in Social and Behavioral Sciences.

Humanities: (6 credits)			
_____	_____	_____	3
_____	_____	_____	3

Select two courses from the UNM Core Curriculum in Humanities.

Fine Arts: (3 credits)			
_____	_____	_____	3

Select one course from the UNM Core Curriculum in Fine Arts.

Foreign Language: (3 credits)			
_____	_____	_____	3

Select one course from the UNM Core Curriculum in Foreign Language.

Engineering Careers, Computer Science, and Engineering Core Requirements: (8 credits)			
UNIV 175	_____	_____	1
CS 151	_____	_____	3
ENG 116	_____	_____	1
_____	_____	_____	3

Select one course contingent on specific engineering field as follows:

1. Chemical and Nuclear Engineering: CHNE 230 or CHNE 251,
2. Civil, Construction, or Mechanical Engineering: CE 202, or
3. Electrical and Computer Engineering: ECE 131.

Total Required: (63 credits)

Students transferring to UNM-Main and other 4-year institutions should be aware that core curriculum requirements are not necessarily met upon the completion of this degree.