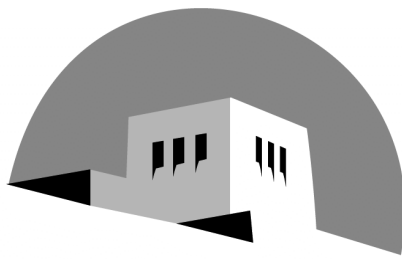


# **Handbook for Undergraduate Students**

## **Department of Civil Engineering**



**The University of New Mexico**

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**University of New Mexico**

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**Department of Civil Engineering**  
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**IMPORTANT NOTE:** Please check our web site for updates to the information contained in this manual: <http://civil.unm.edu>.

### **Introduction**

Welcome to the Department of Civil Engineering! This handbook provides you with helpful information about the programs in the Civil Engineering department and helps you successfully fulfill the requirements of your chosen undergraduate degree.

The Department of Civil Engineering offers three undergraduate degrees:

- BS in Civil Engineering (BSCE)
- BS in Construction Engineering (BSConE)
- BS in Construction Management (BSCM)

and the graduate degrees of Master of Science in Civil Engineering (MSCE), Master's in Construction Management (MCM), and Doctor of Philosophy (Ph.D.) in Engineering with a concentration in Civil Engineering.

### **Mission**

The Department of Civil Engineering at the University of New Mexico provides a high-quality learning environment for its undergraduate and graduate students and promotes lifelong learning for practicing professionals. The Department's focus is on quality instruction in engineering and construction management, innovative research, and community engagement.

### **Program Objectives**

The following are the Educational Objectives of the Civil Engineering program:

- Prepare our graduates for successful professional practice or advanced study in civil engineering.
- Provide our graduates with a broad education as a foundation for professional licensure and life-long learning.
- Produce graduates with an appreciation for social, economic and ethical issues related to civil engineering.

The following are the Educational Objectives of the Construction Engineering program:

- Prepare our graduates for successful professional practice or advanced study in construction engineering.
- Provide our graduates with a broad education as a foundation for professional licensure and life-long learning.
- Produce graduates with an appreciation for social, economic and ethical issues related to construction engineering.

### **Engineering Program Outcomes**

Engineering graduates from the department should achieve the skills and have the incentive to become registered professional engineers. The outcomes for the Civil and Construction Engineering programs are that our students will demonstrate:

- a. An ability to apply knowledge of mathematics, science and engineering

- b. An ability to design and conduct experiments, as well as to analyze and interpret data
- c. An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- d. An ability to function on multidisciplinary teams
- e. An ability to identify, formulate, and solve engineering problems
- f. An understanding of professional and ethical responsibility
- g. An ability to communicate effectively
- h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and society context
- i. A recognition of the need for, and an ability to engage in, lifelong learning
- j. A knowledge of contemporary issues
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering

### **Construction Management Outcomes**

Graduates of the department's construction management program must appreciate the technical components and understand the managerial aspects of civil engineering construction projects.

The outcomes for this program are:

1. Graduates will achieve competence in construction topics including an understanding of:
  - a. Elements of calculus, probability and statistics, and general physics
  - b. Architectural (in contrast to structural) design concepts
  - c. Scientific management principles applied to construction
2. Graduate will achieve competence in management through:
  - a. A knowledge of human relations
  - b. An ability to communicate effectively, both written and oral, as well as an ability to listen
  - c. An appreciation of ethical principles
3. Graduates will have an educated view of the world including:
  - a. An understanding of the role and limitations of technology in addressing society's problems
  - b. An exposure to the cultural, historical, and philosophical foundations of society
  - c. A knowledge of the political and economic systems, particularly those that affect the planning, design, construction, and operation of the infrastructure
  - d. An appreciation for the aesthetics and the environment;

### **Accreditation**

All three undergraduate degree programs in the department are accredited: the BSCE and BSConE by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (EAC/ABET), and the BSCM by the American Council for Construction Education (ACCE). A degree from an accredited program is the first step in your professional career and is required for advanced study at most universities.

## Accreditation Outcomes

Program Outcomes (ABET) for BS in Civil Engineering and Construction Engineering

- a. An ability to apply their knowledge of mathematics, science, and engineering.
- b. An ability to design and conduct experiments as well as analyze and interpret data.
- c. An ability to design a system, component or process that meets desired needs.
- d. An ability to function in multi-disciplinary teams.
- e. An ability to identify, formulate and solve engineering problems.
- f. An understanding of the professional and ethical responsibility.
- g. An ability to communicate effectively.
- h. The broad education necessary to understand the impact of engineering solutions in a global/societal context.
- i. A recognition of the need for and an ability to engage in lifelong learning
- j. A knowledge of contemporary issues.
- k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Outcomes for the BS in Construction Management

- a. Technical Competence  
Apply methods to successfully and safely manage construction projects
- b. Leadership  
Demonstrate the ability to lead through motivating others and applying appropriate technical skills to solve construction management problems
- c. Innovation  
Develop skills in critical thinking and innovation, recognizing the need for continuously learning new skills and competencies
- d. Communication  
Employ effective communication skills to deal respectfully and ethically with all people.

## Admission to the Department

Every student who wishes to pursue a degree offered in the CE department must be formally admitted to the department. Students entering the university usually are admitted to the Pre-Engineering program which is part of Engineering Student Services. When they have successfully completed the first year requirements for a degree, they can apply for admission to the CE department.

Admission requirements to the CE department are as follows:

- Completion of at least 26 credit hours toward the degree and good standing in the university.
- An overall GPA of at least 2.2.
- Completion of at least 19-25 credit hours selected from the technical courses required in the first year curricula.
- A GPA of at least 2.5 and grades of C- or better in each of those 19-25 hours.
- Completion of Engl 102.

Transfer students apply through the Office of Admissions and are considered for

admission to the department under the same conditions. The university's Admissions Office and the CE department will evaluate their transcripts to determine which transfer courses will be accepted toward the appropriate degree program. Prior to admission, if necessary, approval may have to be obtained for appropriate course equivalencies or core substitutions from the respective academic departments or the Associate Dean of Engineering.

### **Advisement**

Once admitted to the department, you will be assigned a faculty advisor who will remain with you until graduation. Construction and engineering programs are very structured by nature, with each course building on previous ones; moreover, most of the courses in the last two years of the curriculum are offered only once a year. Therefore, it is important that you plan your course of studies carefully. Your faculty advisor will not only help you decide which courses to take each semester but also advise you regarding other issues related to success in your studies. As you prepare to register for the upcoming semester, typically in November and April, you must meet with your advisor and fill out an advisement form. You and your advisor will sign the form, after which the department will lift the advisement hold on your registration.

You should make every effort to get to know your advisor and visit with him/her often during the semester. You will find that this relationship will help you make the best decisions regarding your academic future, and an advisor can help you with references, leads for jobs, and many other steps that will help you in your career. While it is critical to follow your advisor's counsel, that will not substitute for taking personal responsibility for your own program.

### **Academic Policies**

The general catalog contains a number of policies affecting your academic program. You should read these policies to ensure that you understand their applications, because they apply to all students in the School of Engineering, regardless of their department.

The faculty encourages you to make the fastest and most efficient progress toward your degree. The following additional departmental policies will help ensure your success in a high-quality program:

- Students in all three degree programs must complete all mathematics, science and engineering courses required for their degree with a grade of C- or better.
- Students must satisfy all prerequisites before enrolling in a course.
- No student may enroll in a course in the civil engineering department without first earning a grade of C- or above in all prerequisites for the course.
- Students transferring into the department must complete at least 24 credit hours of work applicable to the degree after admission to the civil engineering department.
- You will not be permitted to register for a course unless you have satisfied the prerequisites.
- All course work required for graduation in a School of Engineering degree program must be successfully completed within three attempts. (See UNM 2010-2011 catalog, p. 404, column 2, #4.)

**Credit/No Credit Grading Option**

The Credit/No Credit (CR/NC) grading option cannot be used for any courses required in the curriculum or for any technical elective courses. You may elect the CR/NC option for the Humanities, Social and Behavioral Sciences (except Econ 105/106), Fine Arts, and Second Language electives in the core curriculum. Bear in mind that some schools, when evaluating your record for graduate admissions, may interpret the Credit option as a C, and a No Credit as an F on your transcript, thus affecting your GPA.

**Drop**

You may drop a course or courses without a grade during the first three weeks of the semester. (Information on drop and withdrawals is in the 2010-11 UNM Catalog, p. 40 under Changes in Enrollment.)

**Withdrawal**

After the third week you may withdraw from a course until the end of the 12<sup>th</sup> week of the semester and are subject to grades of WP or WF to be determined by the instructor at the time of withdrawal. The WF is calculated as a failing grade in your gpa.

After the 12<sup>th</sup> week, course withdrawals will only be accepted with approval from the Dean of the School of Engineering. No withdrawals will be accepted after the last day of instruction of the semester, prior to final exam week.

Grades at the time of withdrawal are based upon your scores on homework, quizzes, exams, laboratory assignments, or other course work.

**How Withdrawals Can Affect Your Graduation**

You must complete a required course with an appropriate grade (C or higher for all core courses; C- or higher for all required engineering courses) within three attempts. The number of "attempts" includes not only those at UNM but also at any other institution with an accredited program where you have taken the course and received a grade. A course "grade" at UNM or elsewhere includes W, WP, WP, WNC, NC, I, AUD, or any grade A through F.

You are NOT eligible for graduation if you cannot earn the required grade within three attempts.

**Probation and Suspension**

Students who are not making satisfactory progress toward the degree may be placed on probationary status. If the probation conditions are not removed within a semester, a student is subject to suspension from the program. Probation and suspension are discussed in the 2010-11 catalog, p. 405; a School of Engineering committee makes recommendations to the SOE Associate Dean on probation and suspension decisions.

**University Core Curriculum Requirements**

The faculty of the University has instituted a common core of courses required of students in all degree programs. Each curriculum in the CE department satisfies the core requirements while giving you some limited choices. In addition to Econ105 (for engineers) and 106 (for CM students), you will be required to select and complete elective courses in Humanities, Social and Behavioral Sciences, Fine Arts and Foreign

Languages. You can find the current core curriculum requirements as they apply to students in this department on Page 10 of this handbook.

### **Degree Curricula**

The curriculum for each undergraduate engineering degree is designed to provide a foundation of scientific and mathematical understanding of the principles of engineering as well as an introduction to civil engineering design. Likewise, the construction management curriculum includes basic management and technical courses. The undergraduate engineering curricula at UNM provide a broad background with courses distributed in six of the traditional areas of civil engineering practice: structures and materials, transportation, construction, water resources, environmental and geotechnical engineering. During the senior year, you can select technical elective courses in your field, and many civil engineers further specialize during their graduate studies.

Pages 13 to 15 present the current course requirements for each degree. You must satisfy the curriculum specified in the UNM catalog at the time that you are admitted to the department, although you may choose to make substitutions satisfying more recent curriculum requirements that are introduced before you graduate. Your advisor will set up a master sheet in your student file like one of those on pages 13-15 showing your progress. Because this form represents the formal record of your standing in the department, you should check it with your advisor each semester to ensure its accuracy.

### **Electives**

The civil engineering and construction management curricula include some elective courses. In engineering, the technical elective is normally taken in the senior year and is selected from a list of courses approved by the faculty. The current technical electives for the BSCE degree are shown on page 17.

The corresponding list of BSCM electives in various categories is shown on page 18. A student in this program who also completes Mgt 202, Stat 145, and Econ106 and takes three of the 300-level management electives on the list with a grade of C- or better can earn a Management minor from the Anderson Schools of Management.

### **Engineering Design Electives**

Two design electives in the engineering curricula, designated as Technical Elective D, are senior courses that deal with civil engineering systems design. You have several choices in that category. They require extensive previous coursework, and you can take those only in your senior year when you have satisfied all prerequisites. The design electives must be picked from the following six courses:

- CE 411 Reinforced Concrete Design
- CE 424 Structural Design in Metals
- CE 436 Biological Wastewater Treatment
- CE 440 Design of Hydraulic Systems
- CE 462 Foundation Engineering I
- CE 482 Highway and Traffic Engineering

When you have taken at least one of these six, you will be ready to take the final

capstone design course, CE 499L: Design of Civil Engineering Systems. This course is a culmination of all of your studies and can be taken only during your last semester, after you have taken all other basic analysis and design courses.

Correspondingly, Construction Management students will take the final construction class, CE 497L, which entails the management of a typical construction project, in the last semester of their senior year.

### **Course Offerings**

Most 300 and 400-level departmental courses are taught only once a year. If you are not careful, you may find that a course is not offered during the semester you need it, and you will lose a year in a sequence of courses. Be sure to consult your advisor and plan ahead.

### **Cooperative Education/Internships**

You may find it helpful to your understanding of civil or construction engineering as well as to your choice of an area of specialization to participate in some kind of cooperative education or internship program. These programs allow you to work in an industrial setting and give you experience in the work world to augment your academic education.

UNM's Career Services Office can help provide placement with an employer, either locally or at other locations. Such placements are usually for a semester and adjacent summer. The great advantages of a formal internship or cooperative education assignment are that you get to understand the application of what you have learned, and you acquire experience that is valuable when you look for permanent employment. Employers value such experience, and many students return to their co-op employers after graduation. If a work experience interests you, talk it over with your advisor, because taking a semester away from school will require a careful rescheduling of your courses.

### **Independent Study**

During your senior year, you can choose to pursue independent study under the direction of a departmental faculty member. You may receive credit for that course (CE 491-492, Special Topics in Civil Engineering) under the Technical Elective (not Technical Elective D) category. The CE faculty members, their specialties and contact information are listed on page 12.

### **Graduation with Honors**

Departmental honors at graduation are awarded subject to the University requirements shown in the General Catalog. Honors are not automatic, and you should speak to your advisor early enough in your program to be able to take at least six hours of honors independent study (CE 493-494).

### **Application for Degree**

During the second semester of your junior year, or prior to enrollment in the 100<sup>th</sup> hour toward your degree, you must complete an Application for the Undergraduate Degree form, which is available from the Coordinator of Program Advisement. This form indicates the additional courses you plan to take to complete your degree requirements. The Director of Undergraduate Programs will carefully review the completed form to

verify that all the departmental and university requirements have been satisfied. When done in a timely fashion, this ensures that your final year of study will result in a BS degree. If you postpone submitting your application until the “final” semester, you may find that you need to take additional courses, thus delaying your graduation. **IMPORTANT:** You **must** submit this application by the end of the semester *prior* to the one in which you intend to graduate, or you will not be allowed to take CE 499, Design of Civil Engineering Systems (civil and construction engineering students) or CE 497L, Design Construction Integration (construction management students), which is required in your last semester.

### **Professional Certification**

The Fundamentals of Engineering (FE) is a national examination given twice a year, in October and April; all BSCE and BSConE students are required to take the exam before graduating. Passing the FE exam and earning a BS degree are the first steps toward professional licensure, which you enter in the status of Engineering Intern. After a suitable period of practice in the profession and passing of the Professional Engineering exam, you achieve the status of Professional Engineer (P.E.) and are professionally licensed in whatever state(s) you practice. Most civil engineers find it necessary to pursue licensure, both for reasons of professional status and to ensure the health and safety of the public.

There are usually review sessions for the FE exam held each semester, and you will find them helpful as you prepare yourself to take it. Instructions and applications for taking the exam are available at: <http://www.ncees.org/Exams/States/NM.php>. The deadline for submitting an application is approximately eight weeks before the exam.

Likewise, construction managers are certified through an exam administered by the Constructor Certification Commission. BSCM graduates are encouraged to take the Construction Fundamentals Level 1 exam, offered in November and April.

### **Part-Time Work**

If you can avoid working and instead devote full time to your classes, you will finish faster and will enjoy focusing exclusively on your studies. However, if you do find it necessary to work, you should try to select a technical job with a flexible schedule that will allow you to pursue your studies as a first priority. You will need to balance the demands of work and study by reducing your academic load. This causes problems with scheduling and course sequences and invariably leads to a longer program. For this reason, you will want to talk to your advisor about a suitable academic load. The faculty has found it effective to advise students to work no more than 15 hours per week if they plan to take 12 credit hours of academic work.

### **Student Activities**

Many of our graduating students tell us that they wished they had done several things differently during their time at UNM. Their most common advice to incoming students includes: more involvement with student activities, better communication and interaction with the faculty, following an advisor's counsel, and paying more attention in classes. These are excellent recommendations for you as you enter the department.

You will find that participation in extracurricular activities enriches your experience at the university. There are a wide range of organizations and activities both in the larger

university and in the department, and participation provides social association, leadership opportunities and professional development. Most students join and become active in a student chapter of a professional society. This department hosts chapters of the American Society of Civil Engineers (ASCE) and the Associated General Contractors (AGC). These organizations typically sponsor speakers, service projects, national competitions and social events, and your student membership is the start of a lifelong association that is recognized by every employer. Student chapters of American Indian Science and Engineering Society (AISES), Society for Women Engineers (SWE), Women in Science and Engineering (WISE), Engineers Without Borders (EWB-USA), and other organizations are sponsored at the School of Engineering level. The faculty encourages you to be active in organizations.

The department also sponsors a chapter of the national honorary society for civil engineering, Chi Epsilon. Membership in Chi Epsilon, reserved for juniors and seniors who have achieved academic excellence, is recognized by all employers nationwide. Tau Beta Pi is an engineering-wide national honorary society to which civil engineering students may also be invited. If you have excellent grades and six hours of a foreign language, you may be eligible for Phi Beta Kappa, the oldest and most respected honorary society.

### **Scholarships**

There are a wide variety of scholarships available to students through the university, the School of Engineering and the department. Some will be posted on the departmental bulletin boards, and you can inquire about others in the Dean's Office. The Civil Engineering department also has funding for deserving students in the department, both on the basis of scholarship and need. The annual application deadline is June 1. These will be advertised when they are available via email, on bulletin boards, and on the department's web site; you find information and can obtain an application on the web at: <http://www.unm.edu/~civil/finaid.html>.

### **Graduate Studies**

Earning a BS degree is just the first step in your professional career. It provides only the foundation, and you will be continually called upon to learn new things as your career advances. Most engineers find it necessary to take advanced studies as their practices become more specialized. Pursuing the MS degree allows you the opportunity to learn more about your chosen specialty, and many students find it most efficient to continue directly after completion of the BS. Students with a GPA of 3.0 or over and who are within 10 hours of graduation can take courses for graduate credit, provided that all requirements of the BS degree are also fulfilled.

## **University Core Curriculum Civil Engineering Degree Requirements**

The following is the list of choices for the UNM core curriculum. Civil Engineering, Construction Engineering, and Construction Management students will meet specific core requirements with required courses in each respective curricula. Those courses are: Chem 121, Physics 151 or 161, Math 180 or 162, and English 101, 102, and 219. The required Economics 105 or 106 will satisfy one of the Social Science requirements.

All courses in the core curriculum must be completed with a grade of C (not a C-) or better.

Social and Behavioral Sciences (one course)

American Studies 182, 185  
Anthropology 101, 130  
Community and Regional Planning 181  
Economics 105,106  
Engineering-F 200  
Geography 102  
Linguistics 101 (also offered as Anthropology 110)  
Political Science 110, 200, 220, 240  
Psychology 105  
Sociology 101

Humanities (two courses)

American Studies 186  
Classics 107, 204, 205  
Comparative Literature and Cultural Studies 222, 224  
English 150, 292, 293  
Modern Languages 101  
History 101,102,161,162  
Honors Legacy Seminars at 100 and 200 level  
Philosophy 101, 201, 202  
Religious Studies 107, 263, 264

Fine Arts (one course)

Architecture 101  
Art History 101, 201, 202  
Dance 105  
Fine Arts 284  
Media Arts 210  
Music 139, 142  
Theatre 122

Students may instead elect to take one three-credit studio or performance course offered by the Departments of Art and Art History, Music, Theatre, Dance, and Media Arts to fulfill this requirement.

Foreign Language (non-English language, minimum 3 hours)

One course chosen from any of the lower division non-English language offerings of the Department of Linguistics (including Sign Language), Spanish and Portuguese, Foreign Languages and Literatures, and foreign languages in other departments and programs.

Many courses in UNM's core curriculum can be satisfied by taking Advanced Placement courses in high school and achieving a specified score on an AP test. See the UNM 2010-2011 catalog, p. 22, for more details. CLEP (College Level Examination Program) Subject Exams can also be used for credit for specific courses; see p. 23 of the catalog for details.