

**THE UNIVERSITY OF NEW MEXICO**

**DEPARTMENT OF CIVIL ENGINEERING**



**MANUAL FOR GRADUATE STUDIES**

**2016-2017**

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## 1. INTRODUCTION

This manual outlines the requirements and procedures for graduate degrees offered by the University of New Mexico, Department of Civil Engineering (hereafter referred to as the Department), including the Master of Science in Civil Engineering (MS), Master of Engineering in Civil Engineering (MEng), Master of Construction Management (MCM), and Doctor of Philosophy (PhD) in Engineering.

The Department, the School of Engineering, and the University specify the requirements for the degrees. Students should carefully study the Graduate Program section and the Civil Engineering Graduate Program section of the University of New Mexico Catalog applicable at the time of their admission to become familiar with both general and specific requirements (see <http://catalog.unm.edu/>).

The requirements and regulations in this manual are those in effect at the time of printing. Graduate Studies and the Department may change requirements. Such changes will become effective at a time determined by the Department.

The student's degree requirements are fixed when the Program of Studies (MS, MEng, or MCM) or the Application for Candidacy Forms (PhD) are completed and approved by the student's major advisor (and Committee on Studies for PhD), the Civil Engineering (CE) Director of Graduate Programs, and Graduate Studies.

This manual summarizes most graduate degree requirements but does not necessarily specify all details of the official requirements that are maintained by Graduate Studies. It is the student's responsibility to be informed of and satisfy all requirements by communicating with the Coordinator of Program Advisement and the CE Director of Graduate Programs, and by reviewing the information on the Graduate Studies website, in the UNM catalog, and in this manual.

Graduate Studies also has handbooks for graduate students: <http://grad.unm.edu/current-students/>

Be sure to read the appropriate handbook thoroughly.

In addition to this handbook, students should thoroughly review:

- Graduate Studies website: <http://grad.unm.edu/>
- UNM Catalog: <http://catalog.unm.edu/>

## 2. ADMISSION

UNM provides online applications for graduate students. Applications may be started at the following web site:

<http://apply.unm.edu>

Applicants are responsible for ensuring that all required materials are submitted through the online application system. Online application guidelines can be found by clicking Application Instructions within the application or on the Graduate Studies web site at:

<http://grad.unm.edu/graduate-programs/grad-app.html>

The CE Director of Graduate Programs evaluates applicants in consultation with CE faculty and the Department's Graduate Program Committee, and makes recommendations to Graduate Studies and International Admissions regarding admissions.

Admission is based on the student's previous academic performance, professional background and career objectives, Graduate Record Exam (GRE) General Test or Graduate Management Admission Test (GMAT; for the MCM program only) scores, English language skills, letters of recommendation, and compatibility between the applicant's interests and the Department's resources. Applicants must include a letter of intent/purpose summarizing their qualifications, professional goals, and intended area of study. The letter may also include additional information relevant to the application.

The deadlines for application for admission to the graduate programs in the CE Department are shown below:

Semester	Application Deadline	
	U.S. Students & Permanent Residents	International Students
Fall	July 15	March 1
Spring	November 10	August 1
Summer	April 29	January 1

### 2.1. Entrance Requirements – GPA and test scores

The entrance requirements for new students are summarized below. Students that do not meet the minimum program requirements listed below, have unusual backgrounds, and/or have other special circumstances can request that their applications be considered by the Graduate Program Committee. The Department does not offer "provisional", "probationary", or "conditional" admissions.

### **2.1.1. Masters of Science (MS) Degree**

Grade Point Average (GPA): A minimum GPA of 3.0 (or equivalent) over the last two undergraduate years in science, math, and engineering courses.

GRE Exam Scores: A minimum combined score of 300 on the verbal and quantitative sections is required.

Language Skills for International Students: International students must meet all UNM Graduate Admissions Requirements including tests for English proficiency.

### **2.1.2. Masters of Engineering (MEng) Degree**

Grade Point Average (GPA): A minimum GPA of 3.0 (or equivalent) over the last two undergraduate years in science, math, and engineering courses.

GRE Exam Scores/FE Exam: A minimum combined score of 300 on the verbal and quantitative sections of the GRE is required OR evidence of passage of the FE exam.

Language Skills for International Students: International students must meet all UNM Graduate Admissions Requirements including tests for English proficiency.

### **2.1.3. Masters of Construction Management (MCM) Degree**

Grade Point Average (GPA): A minimum GPA of 3.0 (or equivalent) for courses in the major field of study over the last two undergraduate years.

GMAT/GRE Exam Scores: A minimum score of 500 on the GMAT is required OR a minimum combined score of 300 on the verbal and quantitative sections of the GRE is required.

Language Skills for International Students: International students must meet all UNM Graduate Admissions Requirements including tests for English proficiency.

### **2.1.4. PhD Degree**

The requirements for the PhD degree are the same as the requirements for the MS degree (see Section 2.1.1).

## **2.2. Entrance Requirements - previous degrees and leveling courses**

### **2.2.1. Masters of Science (MS) Degree**

#### **2.2.1.1. *MS applicants with a BS in Civil Engineering***

Applicants with a BS in Civil Engineering are eligible for admission; no preparatory classes

are required.

### **2.2.1.2. MS applicants with an engineering degree outside of Civil Engineering**

Applicants with an undergraduate or graduate degree in engineering other than Civil Engineering can be admitted directly to the program, provided they satisfy all other admissions criteria. They may need to take some undergraduate courses that are prerequisites for graduate courses in their field of study. This course sequence is determined on an individual basis and depends on the student's background and intended program of study. The preparatory course sequence will be selected in consultation with the CE faculty in the student's intended area of study. A member of that group must write a memo identifying the course sequence to the Department's Director of Graduate Programs that will be placed in the student's file. The preparatory course sequence will ultimately be listed on the student's Program of Studies which is filed with Graduate Studies.

### **2.2.1.3. MS applicants without an engineering degree**

Applicants without an undergraduate or graduate engineering degree may apply for admission to the department, with a petition submitted on their behalf by a faculty member willing to serve as their advisor. This petition should include a description of the applicant's circumstances, qualifications, and plans for graduate studies.

Applicants without an undergraduate engineering degree are required to take a set of preparatory courses, which vary by their area of emphasis. Students must maintain a cumulative GPA of 3.0 and no grade below a "B" for these preparatory courses.

These courses (and their equivalent UNM course numbers) are as follows:

#### **All areas**

3 semesters of calculus (MATH 162, 163, and 264), 1 semester of differential equations (MATH 316)

#### **Construction Engineering**

- Statics (CE 202)
- Mechanics of Materials (CE 302)
- Soil Mechanics (CE 360)
- Engineering Economy (CE 350)

#### **Environmental Engineering and Water Resources Engineering**

- 1 semester of college-level chemistry
- 1 semester of undergraduate or graduate science, such as biology, microbiology, geology, or an additional semester of chemistry. (*This course should be selected in consultation with an active or potential faculty advisor.*)
- Fluid mechanics (CE 331). (*Note that Statics (CE 202) and Dynamics (ME 306) are prerequisites, which may be waived at the discretion of the instructor, depending on the student's qualifications.*)
- Environmental Engineering (CE 335) or Hydrology (CE 442)

**Geotechnical Engineering**

- 1 semester of college-level chemistry
- Soil Mechanics (CE 360). (*Note that Statics (CE 202) and Mechanics of Materials (CE 302) are prerequisites, which may be waived at the discretion of the instructor, depending on the student's qualifications.*)

**Structural Engineering**

- Statics (CE 202)
- Dynamics (ME 306)
- Mechanics of Materials (CE 302)
- Soil Mechanics (CE 360)
- Structural Analysis (CE 308)

**Transportation Engineering**

- Probability and Statistics for Civil Engineers (CE 354) or Elements of Mathematical Statistics and Probability Theory (STAT 345)
- Engineering Economy (CE 350) or Intermediate Microeconomics I (ECON 300)

**2.2.2. Masters of Engineering (MEng) Degree****2.2.2.1. MEng applicants with a BS in Civil Engineering**

Applicants with a BS in Civil Engineering are eligible for admission; no preparatory classes are required.

**2.2.2.2. MEng applicants with an engineering degree outside of Civil Engineering**

Applicants with an undergraduate or graduate degree in engineering other than Civil Engineering can be admitted directly to the program, provided they satisfy all other admissions criteria. They may need to take some undergraduate courses that are prerequisites for graduate courses in their field of study. This course sequence is determined on an individual basis and depends on the student's background and intended program of study. The preparatory course sequence will be selected in consultation with the CE faculty in the student's intended area of study. A member of that group must write a memo identifying the course sequence to the Department's Director of Graduate Programs that will be placed in the student's file. The preparatory course sequence will ultimately be listed on the student's Program of Studies which is filed with Graduate Studies.

**2.2.2.3. MEng applicants without an engineering degree**

Applicants without an undergraduate or graduate engineering degree may apply for admission to the department, with a petition submitted on their behalf by a faculty member willing to serve as their advisor. This petition should include a description of the applicant's circumstances, qualifications, and plans for graduate studies.

Applicants without an undergraduate engineering degree are required to take a set of preparatory courses. Students must maintain a cumulative GPA of 3.0 and no grade below

a “B” for these preparatory courses. These courses (and their equivalent UNM course numbers) are as follows:

- Three semesters of calculus and one semester of ordinary differential equations (Math 162, 163, 264, and 316)
- One class in college chemistry
- One year of calculus-based college physics
- Statics – CE 202 (Prereqs Phys 160 and Math 163)
- Dynamics – ME 306 (Prereq CE 202 and Math 264)
- Mechanics of Materials – CE 302 (Prereq CE 202, Pre or Coreq Math 316)
- Fluid Mechanics – CE 331 (Pre or Coreq CE 202 and ME 306)
- Soil Mechanics – CE 360 (Prereq CE 302)

### **2.2.3. Masters of Construction Management (MCM) Degree**

All MCM applicants are expected to have college-level proficiency in English (reading and writing) and mathematics.

### **2.2.4. PhD Degree**

Generally admission to the PhD program requires that the applicant has earned an appropriate MS degree and has demonstrated a high potential for research. Exceptional students may pursue a PhD without first earning an MS. This is accomplished by enrolling in the MS program first, then changing to a PhD program after the student has demonstrated outstanding potential for graduate studies and research. Students interested in pursuing a PhD are encouraged to contact appropriate faculty directly to discuss research interests and the potential to join a faculty’s research program.

#### ***2.2.4.1. PhD applicants with a BS or MS in Civil Engineering***

Applicants with a BS or MS in Civil Engineering are eligible for admission; no preparatory classes are required.

#### ***2.2.4.2. PhD applicants with an engineering degree outside of Civil Engineering***

Applicants with an undergraduate or graduate degree in engineering other than Civil Engineering can be admitted directly to the program, provided they satisfy all other admissions criteria.

#### ***2.2.4.3. PhD applicants without an engineering degree***

Applicants without an undergraduate or graduate engineering degree may apply for admission to the department, with a petition submitted on their behalf by a faculty member willing to serve as their advisor. This petition should include a description of the applicant’s circumstances, qualifications, and plans for graduate studies.

Applicants without an undergraduate engineering degree are required to take a set of preparatory courses. Students must maintain a cumulative GPA of 3.0 and no grade below a “B” for these preparatory courses. These courses are the same as those described for

MS applicants without engineering degrees in section 2.2.1.3.

### **3. INFORMATION PERTINENT TO ALL GRADUATE DEGREES**

UNM policies regarding graduate degrees can also be found in the University Catalog (<http://catalog.unm.edu/>). In some cases, the Department may have additional policies specific to our degrees which are described in the Graduate Manual.

#### **3.1. Incomplete Grades**

The grade of "I" may be given if circumstances beyond the student's control prevent the student from completing a course. The "I" automatically becomes "F" if not removed within one year from the published ending date of the semester in which the grade was assigned.

#### **3.2. Withdrawal from a Course**

A student may withdraw from a course until the end of the 12<sup>th</sup> week of the semester without approval. Withdrawal after the twelfth week requires completing an Enrollment Authorization - Drop with Dean's Permission form with the signature of the Associate Dean of the School of Engineering. No withdrawals are accepted after the last day of instruction of the semester, prior to final exam week.

#### **3.3. Courses taken in Non-Degree Status**

Twelve hours of graduate credit taken in non-degree status at UNM may be applied toward a graduate degree. Designated 300 or 400 undergraduate courses (noted by an \* with the course number) taken in non-degree status may be later applied toward a graduate degree, as long as those courses are identified as being taken for graduate credit at the time of enrollment as outlined by UNM policy.

Courses taken in non-degree status must carry a grade of B or better in order to apply to your graduate degree (see <http://catalog.unm.edu/>).

If you also have transfer courses (see below), a total of 12 credits of non-degree *and/or* transfer courses may be applied toward your degree.

The number of transfer and/or applied (including non-degree) credits used toward a graduate program may not exceed 50% of the required coursework for the degree.

#### **3.4. Undergraduate Courses Taken for Graduate Credit**

Students may wish to take certain upper division (300 and 400 level) undergraduate courses outside the Civil Engineering department as a graduate student and use them in their graduate degree program. Those undergraduate courses marked with \*\* in front of the course number, such as \*\*Math 345 - Elements of Mathematical Statistics and Probability Theory, are, according to the UNM catalog, "available for graduate credit except for

graduate majors in the department".

That means that a \*\* course is ELIGIBLE to be used for graduate credit as long as the student is not majoring in that department. This eligibility is not automatically done by registering for the course.

To have a double-starred course count for graduate credit, the student must first have the approval of their Advisor that it is acceptable to use the course in his/her degree program. He/she must then print Level Restriction/Graduate Credit Authorization form (GCA) (<http://registrar.unm.edu/forms/index.html>), complete it with all the required signatures, and submit it following the form instructions. By signing this form, both the student and the instructor acknowledge that the student will be held accountable for graduate-level work and requirements. When approved, the letters GR will appear next to the class on the student's transcript which shows that the course has been approved for graduate credit. The GCA form must be filed by the last day of the fourth week of classes during the regular semester. Students are responsible for obtaining all signatures and for submitting the GCA.

Graduate courses taken as an undergraduate must carry a grade of B or better in order to apply to your graduate degree (see <http://catalog.unm.edu/>).

### **3.5. Transfer Credit**

Transfer credit for graduate-level course work taken at an accredited institution either in graduate or non-degree status and *not applied to a previous degree* is limited to 12 hours.

In accordance with UNM policy, graduate courses used as transfer credit must carry a grade of B or better in order to apply to your graduate degree.

If you also have UNM courses taken in non-degree graduate status (see above), a total of 12 credits of non-degree *and/or* transfer courses may be applied toward your degree.

### **3.6. Credit/Non-Credit grades**

Other than CE Seminar (CE 691), no courses for degree credit may be taken on a CR/NC basis.

### **3.7. Grades of C and C+**

No more than 6 credit hours of course work in which the student received a C or C+ grade.

### **3.8. Incomplete/NR Grades**

Students may not graduate with any I (Incomplete) or NR (no record) grades. These issues should be resolved as soon as they arise to preserve the student's intended graduation semester.

### **3.9. Credit for Experiential Learning**

The Department grants no credit for experiential learning.

### **3.10. Grade Point Average**

Students failing to maintain a 3.0 GPA will be placed on academic probation in accordance with Graduate Studies policy (See <http://catalog.unm.edu/>, Academic Probation and Consequences). Students having a GPA of less than 3.0 are not permitted to take the Master's or Comprehensive examinations.

### **3.11. Specialization**

MS and PhD students must identify an area of concentration authorized in the Graduate Manual. Each area of concentration has respective core and elective courses, which are determined by faculty in that area (see Appendix A). MEng and MCM students do not need to identify an area of concentration.

### **3.12. Initial Advisement**

The student should select a major advisor in his/her area of concentration as early as possible. The student should meet with a major advisor before the initial registration and identify a program of studies for their first semester. Courses that do not receive prior approval of a major advisor may be disallowed.

### **3.13. Thesis, Dissertation, and Project Proposals**

The student will prepare, with the advice of the major advisor, a written research/project proposal and present it for approval by his or her Committee-on-Studies. The Committee may request an oral presentation. The proposal must be submitted sufficiently early for the Committee's suggestions to be fully incorporated into the work.

### **3.14. Program of Studies/Application for Candidacy**

A Program of Studies (master's students) should be filed with Graduate Studies during the semester after 12-16 hours of graduate work have been completed. The Application for Candidacy (doctoral students) should be filed with Graduate Studies in the same semester in which you pass the Comprehensive Examination. The application must be filed by July 1 for fall graduation, October 1 for spring graduation, and March 1 for summer graduation. Changes in an approved program may be submitted after approval by the major advisor and the Director of Graduate Programs.

### **3.15. Departmental Notification of Intent to Graduate**

The student must inform the Director of Graduate Programs and the Coordinator of Program Advisement of his or her intent to complete all degree requirements by July 20 for fall graduation, December 5 for spring graduation, or May 2 for summer graduation. This notification will not be accepted until a Program of Studies or Application for Candidacy has been submitted to and approved by the Dean of Graduate Studies.

### **3.16. Defense of Thesis, Dissertation, and Projects**

Two weeks before the presentation of the thesis or dissertation the student must:

- (a) Provide a final or near final copy of the thesis/dissertation/project to the Committee-on-Studies.
- (b) Notify the Department and Graduate Studies of the date, time and location of the defense by submitting an "Announcement of Exam" form no later than two weeks before your exam.

The presentation shall summarize the thesis/dissertation work by the student and include an oral examination by the Committee-on-Studies. The examination may cover coursework as well as the research topic. The presentation is open to the public. The deliberation for final acceptance is open only to the Committee. Results of the examination must be submitted to Graduate Studies by 5:00 pm on November 15 for Fall graduation, April 15 for Spring graduation, or July 15 for Summer graduation.

### **3.17. Problems Studies Courses (CE 551)**

Independent study enables a student to pursue for course credit a topic of interest under the supervision of a faculty member. CE 551 (Problems) provides the opportunity for students to perform advanced reading, analysis, design, or research. CE 551 is variable credit (1 to 3) and no more than 6 credit hours can be applied towards graduation. The Problems course is intended to provide a rigorous academic experience equivalent to that of any other graduate course. The student is expected to produce a final product to be completed during the semester for which they are registered for the course.

Problems courses must be approved by the Instructor of Record as well as by the Director of Graduate Studies. The approval process will be based on the submission of a course syllabus that includes logistical details, learning outcomes, course activities, and grading practices. A template of a syllabus is included in Appendix B of this manual. The syllabus should be submitted to the Instructor of Record, Director of Graduate Studies, and Coordinator of Program Advisement no later than the second week of the semester. A copy of the syllabus will be placed in the students academic file.

The Instructor of Record must be a tenure or tenure-track faculty member within the CE Department. They are responsible for ensuring the terms of the syllabus are followed and for assigning the final grade.

## **4. INFORMATION PERTINENT TO ALL MASTER'S DEGREES**

### **4.1. Time to Completion of Degree**

UNM requires that all requirements for master's degrees be completed within seven years prior to the granting of the degree, including transfer work. No course work applied to the degree requirements, including transfer work, may be more than seven years old at the time a master's degree is conferred. Extensions to this time limit are granted by Graduate Studies only for the most unusual circumstances that are clearly beyond the student's control.

### **4.2. Program of Studies**

A major advisor, who must be a full-time Civil Engineering faculty member, shall guide the student's coursework. Approval of the POS by the major advisor, the CE Director of Graduate Programs, and Graduate Studies is required.

### **4.3. Single Faculty Member Limit**

No more than half the graduate program's minimum required coursework hours, exclusive of Thesis/Project, may be taken with a single faculty member.

### **4.4. Committee-on-Studies**

A Committee-on-Studies is formed at the time the student begins thesis research. The Committee must be composed of at least three members; at least two members must be full-time tenure or tenure-track Civil Engineering Faculty with graduate faculty approval. The major advisor chairs the Committee and must be a full-time, tenure or tenure-track CE faculty member with graduate faculty approval. The remainder of the Committee is selected in consultation between the major advisor and the student. Any non-tenure track UNM faculty or any individual outside UNM must be approved for graduate committee service in our department to serve on a committee. Notification of Committee membership must be made in writing to the Director of Graduate Programs and must be approved by Graduate Studies. The Committee evaluates the project/thesis and judges the Master's Exam.

For any individual designated for committee service who is outside the university environment, part of the approval procedure requires that the individual sign a departmental letter describing the possible conflict of interest associated with academic activities. This letter should be given to the individual by the student and must be returned to the Coordinator of Program Advisement before the approval process can begin.

### **4.5. Degree Requirement Deadlines**

Except for courses in which you are currently enrolled, all degree requirements (including final thesis & dissertation manuscripts, graduate exams, defenses, and Incomplete and NR-

no record grades) must be completed and related documentation received by Graduate Studies by the following deadlines:

Fall Graduation -- November 15

Spring Graduation -- April 15

Summer Graduation -- July 15

#### **4.6. Required Enrollment**

All master's students must be enrolled for at least 1 graduate credit either in Master's Thesis (CE 599), Problems (CE 551), or another graduate course for the semester (including the summer session) in which they are completing degree requirements.

### **5. MASTER OF SCIENCE (MS)**

Master of Science (MS) in Civil Engineering students may take courses in construction, environmental engineering, hydraulics, geotechnical engineering, structural engineering/ structural mechanics, transportation or water resources. The primary difference between the M.S. degree and the MEng degree is that the MS degree requires a written thesis and an oral defense. Master's students financially supported as Teaching or Research Assistants usually complete an MS degree.

#### **5.1. Course requirements**

The MS course requirements include the following:

1. 32 credit hours total.
2. A minimum of 24 hours of coursework.
3. A minimum of 6 hours of CE 599 (Master's Thesis).
4. A maximum of 6 hours of Problems (CE 551) courses.
5. A minimum of 9 hours of 500-level courses.
6. A maximum of 12 hours taken in non-degree and/or transfer status.
7. 2 hours of CE 691 (Seminar).
8. General UNM limits, including coursework from a single professor, and time of completion.

Students must complete a minimum of 6 hours of thesis (CE 599) credit, and only 6 hours may be applied to the Program of Studies. Once initiated, continuous enrollment in CE 599 (fall and spring semesters) is required until the thesis is accepted by Graduate Studies.

#### **5.2. Thesis requirements**

##### **5.2.1. Thesis Content**

Thesis work is generally of scientific nature rather than design or practice-oriented. The thesis should involve original work suitable for professional publication.

### 5.2.2. Thesis Format

Information pertinent to preparation of a thesis is described in the UNM publication, "Thesis and Dissertation Manual". Information on thesis format can be found at <http://grad.unm.edu/degree-completion/thesis-dissertations/index.html>.

### 5.2.3. Master's Examination

The thesis presentation to the Committee constitutes the Master's Examination. A student may defend the thesis after the POS has been approved, has a graduate GPA of at least 3.0, and is not on probation.

### 5.2.4. Thesis Submission

Graduate Studies requires that a thesis be submitted electronically. The thesis must first be approved by the Committee and must be submitted for the approval of Graduate Studies by the following deadlines:

- Fall graduation - November 15
- Spring graduation - April 15
- Summer graduation - July 15

## 6. MASTER OF ENGINEERING (MEng)

The MEng degree is a coursework-only (*Plan III*) degree with a focus on professional practice. Graduate study leading to the MEng degree will be offered within or by combining six focus areas of civil engineering: construction engineering, environmental engineering, geotechnical engineering, structural engineering and material science, transportation engineering, and water resources-hydraulic engineering. The MEng course requirements include the following:

1. 33 credit hours of graduate coursework.
2. A minimum of 15 credit hours of practice-oriented civil engineering classes composed from the courses listed in Appendix A.8.
3. 12 additional credit hours that support the student's area of interest.
4. At least 6 additional credit hours that advance the student's management skillset.
5. A maximum of 12 credit hours can be taken in transfer and/or non-degree graduate student status.

## 7. MASTER OF CONSTRUCTION MANAGEMENT (MCM)

### 7.1. Coursework requirements

Students starting in the MCM program during the 2016-2017 school year or later are expected to complete the Course Work Only Option (Plan III). All students must complete a set of five core courses for the MCM degree. The required core courses are CE 570, CE

573, CE 574, CE 575, and CE 577. Students may select from a range of additional elective courses to complete the degree requirements. Students should work with an academic advisor to select appropriate elective courses.

Students enrolled in the MCM program prior to the 2016-2017 school year should continue to consult with their academic advisor to complete their program requirements.

The MCM course requirements include the following:

1. 30 credit hours total.
2. A maximum 6 credit hours of Problems.
3. A minimum 12 credit hours of 500-level courses.
4. A maximum 12 credit hours taken in non-degree status.

## **8. DOCTOR OF PHILOSOPHY (PhD)**

### **8.1. Time to Completion of Degree**

PhD candidates have five years to complete all degree requirements from the date that they are formally advanced to candidacy by Graduate Studies (passing of the Comprehensive Examination). Any extensions of this time limit must be requested in writing. The student's Committee on Studies, the Director of Graduate Programs and Graduate Studies must support the request.

### **8.2. Course Requirements**

The PhD degree requires a minimum of 48 credit hours of coursework, 18 hours of dissertation credits, and 2 hours of graduate seminar (CE 691). PhD students who have earned a MS degree must complete 24 hours of coursework. At least 24 credits must be taken at UNM and at least 18 credits must be completed after admission to the PhD program in Civil Engineering. In addition, 18 credits must be earned at UNM in courses numbered 500 or above. PhD students must complete the core course requirements established in their area of specialty (see Appendix A).

### **8.3. Single Faculty Member Limit**

No more than 50% of the required course credits at UNM may be taken with a single faculty member.

### **8.4. Qualifying Examination**

The PhD Qualifying Exam consists of two parts: (1) a written critical review of a technical paper and (2) an oral presentation before a three-member qualifying exam panel composed of CE faculty. The goal of the qualifying exam is to ensure that the student has the ability to learn independently, write concisely, think critically, make an effective oral presentation,

and answer questions logically, while displaying a solid grasp of underlying fundamental principles.

#### **8.4.1. Written Critique**

Under the guidance of the panel chair, the exam committee will select a technical paper related to the student's major area of study. The PhD Qualifying exam will commence over a one-week period that begins upon receipt of the instructions and journal article. During this one-week period the student may obtain and read any references necessary to assist in understanding the article. The student should critically evaluate the paper and write a review not to exceed four pages. The critique should not be an extended abstract or a summary of a research article but rather should identify and discuss the strengths and weaknesses of the research. Suggested guidelines for reviewing a paper will be provided to the student in advance of the exam.

#### **8.4.2. Oral Examination**

Each student is required to participate in an oral examination conducted by the qualifying exam panel. There are two parts to the oral exam. First, the student will present a concise 15-minute presentation (maximum time) summarizing the paper critique. The presentation should highlight the main findings of the review and include a brief description of the experimental results. Visuals (e.g. PowerPoint) are recommended and can include figures from the paper. Second, the exam committee will test the student about content from courses related to their area of study with an emphasis on the student's master's coursework. The questions will focus primarily (but not exclusively) on fundamental principles related to the technical paper. Oral presentations should occur within one week of the deadline for the written critique.

#### **8.4.3. Assessment**

The exam is just one element in assessing the progress of the student and the student's potential and capabilities to succeed at the PhD level. The exam committee will assign a grade of pass or fail based on the student's written critique, the oral component of the exam, and the student's academic performance to date. Students have two opportunities to pass the qualifying exam.

Students wishing to take the Qualifying Exam must notify the Director of Graduate Programs in writing of their intent to take the examination by September 15 or February 15. This memorandum will identify the student's major advisor. The Director of Graduate Programs will assign the examination committee members.

#### **8.5. Committee-on-Studies**

The purpose of the committee on studies is to assist a student in planning a program of studies for the PhD degree, one which is an integrated individual program of study and research meeting general University and specific graduate program requirements. This committee usually serves as the core of the doctoral comprehensive examination committee and/or the dissertation committee.

The candidate should discuss his/her interests with several Civil Engineering faculty early in attendance at UNM. It is helpful, but not necessary, for an agreement to be reached with a Civil Engineering faculty member to serve as Committee-on-Studies chair before the Qualifying Examination is taken.

The Committee shall consist of at least four faculty members, of whom at least two, including the committee Chair, must be full-time, tenure or tenure-track Civil Engineering faculty. The Chair is usually the student's major advisor. At least one of the Committee members must hold a tenure or tenure-track appointment outside the Department (can be faculty in another UNM department or in another institution). The Committee should be formed the same semester the candidate passes the Qualifying Examination. The Committee-on-Studies must be approved by the CE Director of Graduate Programs.

All members of the Committee-on-Studies must be on the Approved List of Faculty for Graduate Committee Service with Graduate Studies. Prospective members who are not on this list must be approved before he/she can be listed on the committee. Check with the Coordinator of Program Advisement in the department as to the individual's status and as to the procedure that must be followed.

#### **8.6. Application for Candidacy**

The Committee-on-Studies meets with the candidate to plan and approve the program of coursework, including make-up work as needed. All Committee members must be present at this meeting. The candidate will draft an Application for Candidacy Form and submit it to the Committee for approval. The full committee, the Director of CE Graduate Programs, and Graduate Studies must approve the Application for Candidacy Form. The signed and approved Application for Candidacy Form formally establishes the requirements that the student must complete in order to receive the PhD degree.

#### **8.7. Comprehensive Examination**

When the candidate has substantially completed the coursework indicated on the approved Application for Candidacy, the candidate will take the Comprehensive Exam. This exam, prepared by the Committee, will include both written and oral components and must satisfy the Committee that the candidate is prepared to begin research. All Committee members must be present at the Comprehensive Examination. Students will submit a written dissertation proposal to the Comprehensive Examination Committee one month before the exam. The Committee members will prepare written examination questions related to the proposal to examine the student's preparation for the proposed work. The student will be given the written exam questions and asked to prepare a written response. The Committee members will establish time limits for their questions so that the exam can be completed in a reasonable amount of time. At the end of the oral examination, the student's written examination will be placed in his/her file and maintained as a record of their performance.

For any individual designated for committee service who is outside the university environment, part of the approval procedure requires that the individual sign a departmental letter describing the possible conflict of interest associated with academic activities. This letter should be given to the individual by the student and must be returned to the Coordinator of Program Advisement before the approval process can begin.

Doctoral students must be enrolled for and complete at least 1 graduate credit in the term they sit for an examination (including the comprehensive) or complete degree requirements.

### **8.8. Dissertation Committee**

In most cases, the Committee-on-Studies becomes the Dissertation Committee. Membership change requires approval by the Director of Graduate Programs. Selection and appointment of the Dissertation Committee is subject to the same requirements as the Committee-on-Studies.

### **8.9. Dissertation Hours**

The PhD requires a minimum of 18 hours of Dissertation (CE 699) credit. Dissertation enrollment may not begin before the semester in which the Comprehensive Examination is passed.

Enrollment for dissertation may be for 3, 6, 9, or 12 hours per semester, with 9 hours the maximum in summer session. The specific number of hours should reflect the amount of time the candidate is devoting to the dissertation and the demand placed on faculty members, laboratories, libraries, and other University resources. Three hours is appropriate when the candidate is working full-time off campus while continuing to make progress with the dissertation. Six hours represents a half-time commitment. Teaching and graduate assistants should generally enroll for 9 hours.

Continuous enrollment for dissertation is expected in subsequent semesters (exclusive of summer) after initial enrollment until the dissertation is accepted by Graduate Studies. This rule applies whether or not the candidate is enrolled for other credit hours. Candidates who fail to register for dissertation in any semester must petition for either reinstatement or readmission, depending upon the circumstances. If reinstatement is the appropriate choice, and the petition is approved, the student must pay a reinstatement fee to the Bursar's Office. If readmission is the appropriate choice, the student must complete the readmission process and pay the application fee. In extraordinary circumstances, Graduate Studies may waive the requirement for continuous enrollment upon presentation of a written request from the major advisor and the Director of Graduate Programs. Candidates must be enrolled for the semester in which they complete degree requirements, including the summer session.

### **8.10. Dissertation Content and Format**

A dissertation must reflect original and significant scientific study meriting publication in a leading journal. Information pertinent to preparation of a dissertation is available here: <http://grad.unm.edu/degree-completion/thesis-dissertations/guidelines.html>. The Graduate Studies Manuscript Coordinator arranges workshops on the “preparation of a dissertation.” Contact Graduate Studies for more information.

### **8.11. Dissertation Defense**

The PhD Dissertation must be defended before the student's Dissertation Committee. The Dissertation Committee will consist of at least four members approved by the Dean of Graduate Studies for committee service:

- a. At least two members must hold regular, full-time, tenure or tenure-track faculty appointments in the Department of Civil Engineering.
- b. The dissertation director must hold a regular, full-time faculty appointment in the Department of Civil Engineering or must be employed in the department with the title of: research professor, research associate professor, or research assistant professor. Usually this individual is the student's major advisor.
- c. The Committee must include at least one member who holds a regular, full-time faculty appointment outside the Department of Civil Engineering. This member may be from UNM or from another accredited institution.
- d. One member may be a recognized expert in the field if other requirements for committee composition are met.

For any individual on the committee who is outside the University, he/she must be on the Approved List for Graduate Committee Service with Graduate Studies. If he/she is not on that list, then the person must be approved before he/she can be listed on the committee. Check with the Coordinator of Program Advisement in the department as to the individual's status and as to the procedure that must be followed.

The student must notify the Civil Engineering Director of Graduate Programs at least two weeks before the dissertation defense is held and no later than November 1 and April 1 for students expecting to graduate in the fall and spring semesters, respectively. The student must provide each member of the Dissertation Committee with a complete copy of the dissertation in ample time (2 weeks or more) for review prior to the examination. The student must provide the department with an announcement of the defense which includes an abstract of the dissertation that is suitable for posting on department bulletin boards.

The dissertation defense is open to the public and CE faculty and staff. Students are encouraged to attend. The format for the Dissertation Defense will be developed by the Dissertation Committee. Generally, the defense will consist of a formal presentation of the work described in the dissertation followed by questions from the audience. The committee will then convene closed session to decide whether the work meets the standards appropriate for the PhD degree.

### **8.12. Completion of the Dissertation Evaluation Form**

After the Dissertation Defense, the candidate must ensure that each Committee member completes the Report on Dissertation Form and forwards it to the Director of Graduate Programs.

### **8.13. Final Dissertation Approval**

The candidate must revise the Dissertation as instructed by the Committee. The Committee chair must confirm that the Dissertation is in final form, and Graduate Studies must approve the Dissertation for format.

### **8.14. Dissertation Submission**

Graduate Studies requires that a dissertation be submitted electronically. The deadline dates for submission are:

November 15 for fall graduation  
April 15 for spring graduation  
July 15 for summer graduation

### **8.15. Joint PhD Program in Architectural Engineering**

The Joint PHD Program in Architectural Engineering represents a cooperative program offered by the CE Department and the Architecture Program and Landscape Architecture Program in the School of Architecture and Planning (SA+P). This program is a special emphasis within the CE Department and the PhD degree is granted by the School of Engineering. The following sections highlight unique aspects of this special program. All other programmatic details are consistent with this handbook and the UNM Graduate Studies Manual.

#### **8.15.1. Admission to the Program**

The CE Graduate Program Director and SA+P Architecture Director or Landscape Architecture Director will evaluate applicants in consultation with CE and SA+P faculty associated with the emphasis area. The CE graduate program director will make the final recommendation to UNM Graduate Studies and International Admissions regarding admissions. Materials, standards, and procedures for admissions are described in [Section 2.1.4](#) of this handbook.

#### **8.15.2. Leveling Courses**

Generally, admission to the PhD program will require that the applicant has earned an appropriate MS degree and has demonstrated a high potential for research. In some cases, leveling courses may be required to ensure the incoming student has the skills and knowledge to succeed in the program. Leveling courses in Civil Engineering will be determined by the CE Graduate Program Director. Leveling courses in Architecture or Landscape Architecture will be determined by the Architecture or Landscape Architecture

Program Director. Leveling courses will be tracked by the academic advisors in Civil Engineering and in the School of Architecture + Planning. Leveling courses do not count towards the requirements of the degree. Students must maintain a cumulative GPA of 3.0 and no grade below a “B” for these preparatory courses.

*Applicants with a BS or MS in Civil or Architectural Engineering:* Such applicants are eligible for admission. However, additional preparatory coursework will likely be required in order ensure an understanding of architectural or landscape architectural principles as described below.

*Applicants with a BS or MS Engineering degree outside of Civil or Architectural Engineering:* Such applicants can be admitted directly to the program, provided they satisfy all other admissions criteria. They may need to take some undergraduate courses that are prerequisites for graduate courses in their field of study. Further, additional preparatory coursework will likely be required in order ensure an understanding of architectural or landscape architectural principles as described below.

*Applicants without an engineering degree:* Applicants without an engineering degree will be required to take a set of preparatory courses. Students must maintain a cumulative GPA of 3.0 and no grade below a “B” for these preparatory courses. These courses (and their equivalent UNM course numbers) are as follows:

- 3 semesters of calculus (MATH 162, 163, and 264) and 1 semester of differential equations (MATH 316)
- Statics (CE 202)
- Mechanics of Materials (CE 302)
- Soil Mechanics (CE 360)
- Structural Analysis (CE 308) for Architecture or Fluid Mechanics/Lab (CE331) for Landscape Architecture
- Probability and Statistics

Additionally, preparatory coursework will likely be required in order ensure an understanding of architectural or landscape architectural principles as described below.

*Applicants without an Architecture or Landscape Architecture degree:* Applicants without an architecture or landscape architecture degree will be required to take a set of preparatory courses. These courses will be determined by an assessment of their previous academic and professional experience. The intent is to ensure an understanding of architectural or landscape architectural principles, and may include coursework in architectural design or landscape architectural design, visualization, history, theory and technology. The total credit hours for preparatory courses in architecture or landscape architecture shall not exceed 12 credits. Examples of preparatory classes include:

- ARCH 500 Graduate Arch Design (6)
- ARCH 570 Intro to Visualization (1)
- Two additional credits in Design Visualization (2)

- Arch 524 World Architecture II (3)
- LA 501 Design Studio 1 (6) *or* ARCH 500 Graduate Arch Design (6)
- LA 561 History and Theory of Landscape Architecture (3)
- LA 558 Plants 1 (3)

## **Appendix A – Course Requirements for Graduate Degrees**

The following sections contain course requirements for each degree and focus area.

## **A.1 Construction Engineering**

### **Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

### **Required Courses for Master's Students:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 691	Graduate Seminar	2
CE 599	Thesis – Major Advisor	6

### **Construction Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 570	Advanced Construction Equipment Management	3
CE 571	Sustainable Design and Construction	3
CE 572	Decision-Making for Civil Infrastructure Systems	3
CE 573	Construction Law	3
CE 574	Principles of Written Construction Documents	3
CE 575	Construction Safety	3
CE 576	Project Delivery Systems	3
CE 577	Project Controls	3
CE 578	Design of Temporary Support Structures	3
CE 579	Methods Improvement in Construction	3

### **Other Available Courses:**

1. Other Civil Engineering courses.
2. Civil Engineering Special Topics courses – offered occasionally by a faculty member on a specific topic. Course number is listed as CE 598. Check schedule each semester for these courses.
3. Applicable Architecture and Urban Planning courses.
4. Applicable Management courses.

Students must work with their faculty advisor to identify appropriate elective courses for this degree program.

**A.2 Environmental Engineering****Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

**Required Courses for Master's Students:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 691	Graduate Seminar (2 semesters, 1 credit each)	2
CE 599	Thesis – Major Advisor	6

**Core Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 531	Physical-Chemical Water & Wastewater Treatment	3
CE 534	Environmental Engineering Chemistry	3
CE 536	Biological Wastewater Treatment	3

**Environmental Engineering Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 533	Environmental Microbiology	3
CE 538	Sustainable Engineering	3
CE 539	Radioactive Waste Management	3
CE 540	Design of Hydraulic Systems	3
CE 541	Hydrogeology	3
CE 542	Intermediate Hydrology	3
CE 545	Open Channel Hydraulics	3
CE 547	GIS in Water Resources Engineering	3
CE 549	Vadose Zone Hydrology	3
CHEM 301	Organic Chemistry	3

Students must work with their faculty advisor to identify appropriate elective courses for this degree program.

### **A.3 Geotechnical Engineering**

#### **Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

#### **Required Courses for Master's Students:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 691	Graduate Seminar (2 semesters, 1 credit each)	2
CE 599	Thesis – Major Advisor	6

#### **Suggested Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 502	Finite Element Methods in Solid Mechanics	3
CE 551	Problems	1 - 3
CE 560	Advanced Soil Mechanics	3
CE 562	Foundation Engineering I	3
CE 563	Earth Structures	3
CE 564	Rock Mechanics	3
CE 565	Soil Behavior	3
CE 566	Pavement Design	3
CE 567	Foundation Engineering II	3
CE 568	Soil Dynamics	3

Students must work with their faculty advisor to identify appropriate elective courses for this degree program.

## **A.4 Water Resources Engineering**

### **Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

### **Required Courses for Master's Students:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 691	Seminar (2 semesters, 1 credit each)	2
CE 599	Thesis – Major Advisor	6

### **Core Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 541	Hydrogeology	3
CE 542	Intermediate Hydrology	3
CE 545	Open Channel Hydraulics	3
CE 547	GIS in Water Resources Engineering	3

### **Other Electives in Civil Engineering:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 531	Physical-Chemical Water & Wastewater Treatment	3
CE 534	Environmental Engineering Chemistry	3
CE 536	Biological Wastewater Treatment	3
CE 539	Radioactive Waste Management	3
CE 540	Design of Hydraulic Systems	3
CE 560	Advanced Soil Mechanics	3
CE 563	Earth Structures	3

Note: Additional water related classes from across UNM can serve as electives upon approval from the student's advisor.

Students must work with their faculty advisor to identify appropriate elective courses for this degree program.

## **A.5 Structural Engineering and Structural Mechanics**

### **Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

### **Required Courses for Master's Students:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 691	Seminar (2 semesters, 1 credit each)	2
CE 599	Thesis – Major Advisor	6

### **Core Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 501 or ME 501	Advanced Mechanics of Materials	3
CE 502	Finite Element Methods in Solid Mechanics	3
CE 520 or CE 521	Structural Dynamics & Earthquake Engineering	3
CE 562*	Foundation Engineering I	3

### **Structures Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
Math 312**	Partial Differential Equations for Engineering	3
ME 512	Introduction to Continuum Mechanics	3
ME 540	Elasticity	3
CE 503	Composite Materials	3
CE 506	Prestressed Concrete	3
CE 511	Reinforced Concrete Design	3
CE 513	Timber and Masonry Design	3
CE 518	Theory of Structural Stability	3
CE 524	Structural Design in Metals	3
CE 548	Fuzzy Logic and Applications	3
CE 551	Problems	1 – 3
CE 567	Foundation Engineering II	3

\*CE 360L is a prerequisite for CE 562.

\*\* Available for graduate credit except for graduate majors in the department.

## **A.6 Transportation and Traffic Engineering**

### **Course Requirements**

Required for Degree: 32 credits total – 24 credits coursework, 6 credits thesis, 2 credits graduate seminar.

### **Required Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 581	Urban Transportation Planning	3
CE 582	Highway and Traffic Engineering	3
CE 691	Graduate Seminar (2 semesters, 1 credit each)	2
CE 599	Thesis – Major Advisor	6

### **Transportation Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 548	Fuzzy Logic and Applications	3
CE 566	Pavement Design	3
CE 571	Sustainable Design and Construction	3
CE 576	Project Delivery Systems	3
CE 598	Decision-Making in Civil Infrastructure	3
CE 598	Design of Sustainable Transportation Systems & Policy	3
CRP 543	Transportation Planning	3
ECON 300**	Intermediate Microeconomics	3
ECON 501	Microeconomics I #	3
ECON 504	Mathematical Tools & Economic Models #	3
ECON 508	Statistics & Intro to Econometrics #	3
ECON 509	Econometrics I #	3
ECON 544	Environmental Economics #	3
ECON 560	Public Economics #	3
GEOG 381**	Intro to GIS	4
GEOG 581	Fundamentals of GIS	3
GEOG 586	Applications of GIS	3
GEOG 587L	Spatial Analysis and Modeling	3
STAT 527	Advanced Data Analysis I	3
STAT 528	Advanced Data Analysis II	3

\*Course allowed for graduate credit to students enrolled in graduate program.

\*\*Available for graduate credit except for graduate majors in the department.

#Requires permission from the Economics Department to register.

Additional electives may be approved in consultation with your graduate advisor.

Note: Course offerings are subject to change each semester based on enrollment and instructor availability.

**A.7 Master of Construction Management (MCM)****Course Requirements**

Required for Degree: 30 credits hours of coursework only

**Required Courses:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 570	Advanced Construction Equipment Management	3
CE 573	Construction Law	3
CE 574	Principles of Written Construction Documents	3
CE 575	Construction Safety	3
CE 577	Project Controls	3

**Construction Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
CE 455*	Engineering Project Management	3
CE 571	Sustainable Design and Construction	3
CE 572	Decision-Making for Civil Infrastructure Systems	3
CE 576	Project Delivery Systems	3
CE 578	Design of Temporary Support Structures	3
CE 579	Methods Improvement in Construction	3
MGMT 502	Financial Accounting and Analysis	3

**Other Available Electives:**

<b>Course Number</b>	<b>Course Name</b>	<b>Credits</b>
ARCH 571	Real Estate Development	3
CE 547	GIS in Water Resources Engineering	3
GEOG 488L	GIS Concepts and Techniques	3
MGMT 501	Data Driven Decision-Making	3
MGMT 503	Managerial/Cost Accounting	3
MGMT 506	Managing People in Organizations	3
MGMT 520	Operations Design and Decision-Making	3
CRP 585/PADM 588	Practice of Negotiation & Public Dispute Resolution	3
LA 580	Landscape Architecture Technology 1: Grading & Drainage	3
LA 581	Landscape Construction Materials and Techniques	3

\*Course allowed for graduate credit to students enrolled in a graduate program. Normally, a graduate student enrolled in a starred course number below 500 is required to do extra work.

## **A.8 Master of Engineering in Civil Engineering**

Required for Degree: 33 credits coursework only

- A minimum of 15 credit hours of practice-oriented civil engineering classes composed from list of courses found below.
- 12 additional credit hours that support the student's area of interest. These courses are listed as required and elective courses in sections A.1 through A.6.
- At least 6 additional credit hours that advance the student's management skillset. Example courses include those listed in MCM (section A.7) and courses provided by the Anderson Business School. Consult with your advisor to assure a class meets these requirements.

### **Structural Practice Oriented Courses**

502. Finite Element Methods in Solid Mechanics 506. Prestressed Concrete 508. Plates and shells 511. Reinforced Concrete Design 513. Timber and Masonry Design 521. Structural Dynamics and Earthquake Engineering 524. Structural Design in Metals 598. Wood/Masonry Design 598. Design of RC structures with FRP

### **Environmental Practice Oriented Courses**

531. Physical-Chemical Water and Wastewater Treatment 533. Environmental Microbiology 534. Environmental Engineering Chemistry 535. Water Reuse 536. Biological Wastewater Treatment 537L. Aqueous Environmental Chemistry and Analysis 538. Sustainable Engineering 539. Radioactive Waste Management

### **Water Resources Practice Oriented Courses**

540. Design of Hydraulic Systems 541. Hydrogeology 542. Intermediate Hydrology 545. Open Channel Hydraulics 547. GIS in Water Resources Engineering 549. Vadose Zone Hydrology 598. Stream and Watershed Restoration 598. Surface Water Quality Modeling

### **Geotechnical Practice Oriented Courses**

562. Foundation Engineering I 563. Earth Structures 566. Pavement Design 567. Foundation Engineering II 568. Soil Dynamics

### **Construction Practice Oriented Courses**

571. Sustainable Design and Construction 573. Construction Law 574. Principles of Written Construction Documents 575. Construction Safety 576. Project Delivery Systems 577. Project Controls 578. Design of Temporary Support Structures CE598 (future CE570). Advanced Construction Equipment Management CE598 (future CE572). Contemporary Issues in Construction CE598 (future CE579). Decision-making in Civil Infrastructure Systems 598. Building Information Modeling

### **Transportation Practice Oriented Courses**

581. Urban Transportation Planning 582. Highway and Traffic Engineering 598. Design of Sustainable Transportation Systems and Policy 598. Transportation Data Management and Analysis

## Appendix B: Independent Study Syllabus Template

**Course Syllabus (*Template*)**  
**CE 551 – Problems**  
**University of New Mexico**

Course Title: *Independent Study:*

Credit Hours:

Semester and Year Offered:

### **Instructor Information**

Instructor's Name and Title:

Office and phone numbers:

E-mail address:

### **General Course Description**

#### **Course Goals**

*What are the general skills, aptitudes, or bodies of knowledge which this course seeks to enhance?*

#### **Measureable Student Learning Outcomes**

*What should the student know or be able to do after taking this course?*

### **Reading Materials and Resources**

#### **Course Activities**

*Describe all activities (reports, modeling exercises, etc.) along with the percentages or points they are worth.*

#### **Schedule**

*List the major milestones and deadlines for the course.*

### **Grading Policy and Scale**

#### **Code of Conduct**

Academic dishonesty is a violation of UNM's Student Code of Conduct. The complete Student Code of Conduct can be found at: <http://pathfinder.unm.edu/campus-policies/student-code-of-conduct.html>

#### **Students with Disabilities**

The Department of Civil Engineering is committed to providing assistance to help you be successful in this course, and this course is in compliance with the Americans with Disabilities Act (ADA).