Self-Study Report

for

Civil Engineering Program
University of Illinois at Chicago

2002 - 2003 Accreditation Visit
by
Accreditation Board for Engineering and Technology

June 14, 2002

Self Study Report

for Civil Engineering

A. Background Information

1. Degree Title

This self-study report is submitted by the Department of Civil and Materials Engineering at the University of Illinois at Chicago for re-accreditation of the degree:

Bachelor of Science in Civil Engineering

2. Program Modes

The Bachelor of Science in Civil Engineering (BSCE) is offered to interested students in conventional day classes with a co-op option. The number of students graduating per year since the last ABET accreditation is shown below; additional details may be found in Appendix II, p. 80.

1996-97	1997-98	1998-99	1999-00	2000-01	2001-02
31	46	32	28	27	22

3. Actions to Previous Shortcomings

No deficiencies, weaknesses, or concerns were present in the final statement of the last evaluation dated June 1, 1996.

4. Contact Information

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B. Accreditation Summary

This section of the Self-Study report documents how the Civil Engineering Program satisfies the ABET accreditation Criteria 1 - 7 under the *Criteria for Accrediting Engineering Programs Effective during the 2001-2002 Accreditation Cycle*, and Criterion 8 under the American Society of Civil Engineers (ASCE) Program criteria for Civil Engineering Programs. The material presented is organized following the ABET format in sequence and contents.

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1. Students

1.1 Evaluation

Evaluation of Civil Engineering students takes several forms:

1. Evaluation at the time of admission

2. Evaluation of progress towards the BSCE degree

1.1.1 Evaluation at the Time of Admission

Students are admitted directly to the Civil Engineering program in the College of Engineering as: a) a new freshman; b) an internal transfer student from another UIC college; or c) a transfer student from an institution other than UIC. The general procedures are described below.

Freshman Students

The two primary factors used to determine the admissibility of a new freshman applying to the University of Illinois at Chicago are the high school percentile rank (HSPR) and the American College Test (ACT) composite score. The University will also accept Scholarship Aptitude Test (SAT) scores. SAT scores are converted to an ACT composite equivalent. Should an applicant submit more than one set of entrance exam scores, then the Office of Admissions will use the highest score when processing an application.

The College of Engineering has used a Selection Index (SI) for the purpose of determining a student's admission to the college since Fall 1981. The SI is determined by the following equation:

$$SI = C1 * ACT + C2 * HSPR + C3$$

The constants C1, C2 and C3 are determined from a multiple linear regression of previous students enrolled in the College of Engineering using their ACT, HSPR and grade point average (GPA) at the completion of their first semester.

Before making the admission decision, a student's high school course work is checked to meet the specified subject pattern. The high school subject pattern specified for the College of Engineering is a total of 16 units, which include a minimum of 3 ½ units of mathematics, 2 units of lab science (not including general science) and 4 units of English. This subject pattern is in compliance with the State of Illinois Public Act 86-954, which defines the minimum high school requirement for admission to public colleges and universities in the State of Illinois. If the applicant has not satisfied Subject Pattern II (a pattern specified by Illinois high schools that is in excess of Public Act 86-954) but satisfies State of Illinois Public Act 86-954, then the application will be forwarded to a special review by the College of Engineering.

The College of Engineering provides the Office of Admissions the guidelines to be used in admitting freshmen to the College. For 2001-2002, applicants with an SI of 39 or higher were admitted to the College of Engineering. Applicants with an SI in the range of 28 to 38 were individually reviewed by the College of Engineering. Applicants with an SI below 28 were denied admission to the College. The minimum ACT composite score for an admitted student is 19. Minority students whose applications show potential in other areas are admitted with a minimum ACT composite score of 17.

All entering freshmen are admitted with the condition that they must take campus placement exams in math, chemistry and English composition. The results of these exams are critical in determining what courses students take during their first semester at UIC. If the results indicate the student needs a preparatory course in math, chemistry or English composition, then the student must register and pass the course.

Transfer students from another UIC college

Students seeking admission to the Civil Engineering program in the College of Engineering from another UIC college will be admitted if they have completed at least 60 semester hours of credit, including:

English Composition I and II (Engl 160, 161)
Calculus I, II, III and Differential Equations (Math 180, 181, 210, 220)
Physics I and II (Phys 141, 142)
Chemistry I (Chem 112)
Courses in which grades of D are earned will not be applied toward the degree, but will be included in all GPA calculations.

Students must have earned at least a cumulative GPA of 3.5 (A=5.0), including all UIC and all transfer work.

Transfer students from other institutions

Transfer students must have completed a minimum of 60 hours of course work, including:

English Composition I and II (Engl 160, 161)
Calculus I, II, III and Differential Equations (Math 180, 181, 210, 220)
Physics I and II (Phys 141, 142)
Chemistry I (Chem 112)
Courses in which grades of "D" are earned will not be applied toward the degree, but will be included in all GPA calculations.

Students must have earned at least a cumulative GPA of 3.5 (A=5.0).

Transfer credit evaluation criteria

The State of Illinois has formal articulation agreements between state community colleges and senior public institutions. Credit from a community college is limited in the sense that the last 60 hours of the degree must be completed at a senior institution. In addition, the university maintains a general provision that either the first 90 or the last 30 hours of the degree must be earned at UIC.

The College of Engineering maintains transfer guides with the more common "feeder" transfer institutions. These transfer guides provide general information for transfer students and stipulates the courses that are acceptable for credit at UIC. Transfer guides are updated annually.

Work successfully completed in other fully accredited institutions (either those approved by one of the regional accrediting associations or those approved by one of the agencies recognized by the National Commission of Accrediting) is generally accepted by the University on an hour-for-hour basis, as shown on the official transcripts received from those institutions. For consistency, credit awarded on the quarter hour basis is converted to the semester hour system by multiplying the number of quarter hours by 2/3.

Credit from institutions with provisional accreditation is accepted on a deferred basis until it is validated by satisfactory completion of additional work taken in residence at the University or in another fully accredited institution. Credit from unaccredited institutions is not accepted. However, knowledge in courses taken at such institutions may be awarded credit for the equivalent UIC course by successfully passing a UIC proficiency exam. No transfer credit is awarded for any course work completed at an institution external to UIC with a grade of D.

Credit evaluation is done by the Office of the Assistant Dean for Undergraduate Administration in the College of Engineering. In many instances, descriptions, syllabi, etc. are sent to a faculty member in the department offering similar courses for their recommendation as to the equivalency to a UIC course and acceptance for transfer credit. The general principle used in accepting work from another college or university is that of "equivalency." Whether a course taken elsewhere is equivalent to a course at UIC is determined by the college office or in the appropriate department at UIC. Catalog descriptions that show course content and prerequisites for a course are the primary means for determining equivalency. If the catalog description is not sufficient, syllabi, exams, computer programs, homework, textbooks, etc. may be requested from the student.

1.1.2 Evaluation of Progress toward the B.S. Degree

Students are evaluated at the end of every semester during the College's Grade Review process. At that time, the Assistant Dean for Undergraduate Administration reviews the file of each student who has either a term Grade Point Average (GPA) or cumulative UIC GPA below 3.00 (A=5.0).

In addition to monitoring the Grade Point Average of students, the College also uses the Deficit Point system to determine probation and drop decisions. The Deficit Point system has the

advantage over the GPA system in that it clearly indicates the future academic performance that a student must achieve to return to clear status.

The following scale is on a per semester hour basis.

Letter Grade	Grade Points/Hour of Course Credit		Deficit Points
A	5		+2
B	4		+1
C	3	(3.0 Minimum Graduation GPA Required)	0
D	2		-1
E	1		-2

If a student takes one 3-hour class and receives a grade of "D," then this student would have a GPA of 2.00 and –3 deficit points. If another student takes four 3-hour classes and receives all D's, then this student would also have a GPA of 2.00, but would have –12 deficit points. Although they both have the same GPA, the second student with –12 deficit points is having more serious academic difficulty. A student with negative deficit points must earn a positive number of deficit points in the future to bring the total back up to zero. Thus, a student with –12 deficit points must earn a combination of A's and B's for the number of hours necessary to achieve +12 deficit points to return to clear status.

Probation Rules

Rule 1. Any student whose UIC Cumulative GPA falls below 3.00 is placed on probation called 3.25 Pro. In the next semester, the student is expected to earn no grade less than C and at least one B in order to continue. A student is not required to return to clear status in one semester. For example, if a student finishes the first semester with –10 deficit points, then finishes the second semester with 3 hours of B and 3 hours of C, this student will have reduced the total deficit points to –7. Although the student is still on probation, the student satisfied the probation conditions and is allowed to continue. At this rate of +3 deficit points per term, it will take the student 4 semesters to return to clear status, and the student is making progress towards that goal.

Rule 2. A less serious probation level is called 3.00 Pro. This probation is for any student whose Term GPA is below 3.00, but whose Cumulative GPA is above 3.00. In the next semester, the student is expected to earn no grade less than C to continue.

Rule 3. Graduation with a degree from the College of Engineering requires a minimum GPA of 3.00 in the major courses. Major courses are those required in the specific degree program as listed in the UIC Undergraduate Catalog. Rules 1 and 2 described above are also applied to the major courses.

Drop Rules

Rule 1. Any student who was on probation and did not satisfy the conditions of that probation may be dropped from the College of Engineering B.S. degree program.

Rule 2. A student who fails to make satisfactory progress toward a degree in the College of Engineering may be dropped. Examples of unsatisfactory progress are: -12 deficit points, excessive number of incomplete grades, failure to take courses required for the degree.
Rule 3. This rule applies to those students who had previously been dropped, were readmitted, and failed to meet the probation conditions necessary to continue in the College of Engineering. Students who have been dropped multiple times should pursue some other career goals. Only in rare cases will a student be readmitted after being dropped twice.

Advising

The College of Engineering employs a mandatory advising system. Prior to the first semester of attendance, whether entering as freshmen or transferring from other schools, all students are advised by staff from the Office of the Dean for Undergraduate Administration. During their first semester, Civil Engineering students are assigned to faculty advisors in the Department of Civil and Materials Engineering, who will advise them every semester until graduation. Registration holds are utilized to ensure that students meet with their advisors every semester prior to registering for the next term.

Faculty advisors help students with curriculum matters, selection of electives, career path input, etc. The Office of the Dean for Undergraduate Administration maintains an academic counseling staff that helps students with questions related to degree requirements, transfer credit, course substitution, special programs, etc.

Acceptance of Transfer Students/Transfer Credit

Admissions procedures for freshmen and transfer students are delineated in Section 9A1 of Appendix II. Detailed procedures are used for admissions and evaluation of transfer credit as described in that Section. This effort is aided by the Degree Audit Reporting System (DARS); there is an example of a DARS report in Appendix II, pp. 50-55. DARS is also used to insure that all students meet all program requirements upon graduation. A summary for transfer students follows.

All transfer students must have the following to be considered for admission:

1. at least 60 semester hours of credit, including
   English 160, 161;
   Math 180, 181, 210, 220
   Physics 141 and 142
   Chemistry 112

2. GPA of at least 3.5 (A=5.0) including all college and university courses

This GPA is calculated twice: once for all courses at all universities and once for all math, science and engineering courses taken by the student. The student must meet the same minimum GPA requirements for both GPA's. Courses in which grades of "D" are earned are not applied toward the degree but are included in all GPA calculations.

Transfer credit is determined based on course equivalency. Course equivalencies are determined via two processes: a) The State of Illinois has formal articulation agreements between state community colleges and senior public institutions. Credit from a community college is limited in the sense that the last 60 hours of the degree must be completed at a senior institution. b) In addition, the university maintains a general provision that either the first 90 or the last 30 hours of the degree must be earned at UIC.

The College of Engineering maintains transfer guides with the more common "feeder" transfer institutions. These transfer guides provide general information for transfer students and stipulate that courses that are accepted for credit at UIC. The transfer guides are updated annually. Annual Articulation Conferences are also held.

For courses transferred from institutions with which UIC does not have formal articulation agreements, syllabi are supplied by the student and forwarded to the appropriate department for evaluation.

1.2 Additional Materials Available for Review During the Site Visit

The following is a partial list of materials that will be available for review during the ABET visit:

1. Advising forms used
2. Sample of degree plans
3. Summary of exit interviews
4. Course materials that illustrate evaluation of student performance
5. Course portfolios
6. Student surveys to obtain input on the advising process

2. Program Educational Objectives

The program objectives derived to support UIC's mission and meet the needs of the program's constituencies are presented in this section. In addition, ongoing outcomes assessment, evaluation, and the feedback refinement process are also detailed.

2.1 Definition of Educational Objectives

The Department of Civil and Materials Engineering continually assesses its undergraduate program in a process consistent with its established mission and vision, which are consistent with those of the University of Illinois at Chicago.

The mission of the University of Illinois at Chicago includes the following statements:

"The University of Illinois at Chicago (UIC) is a comprehensive public university located in the heart of one of the nation's largest metropolitan areas. It is one of three campuses of the State of Illinois' land-grant university, the University of Illinois. Its mission compromises three traditional elements-teaching, research, and public service, each shaped by and relevant to its metropolitan setting as well as the University of Illinois' traditional pursuit of excellence. UIC serves not only the citizens of the state of Illinois, but also students from throughout the nation and the world who are attracted by both the University's programs and the metropolitan setting on which it draws and to which it contributes."

"UIC seeks to provide its undergraduates with an education which is both broad and deep, to prepare them for responsible citizenship, and to open intellectual and career opportunities which will challenge their abilities. In doing so, UIC takes special account and advantage of the extraordinary ethnic and cultural diversity of the Chicago metropolitan area, which encompasses two-thirds of the population of Illinois and from which it presently draws most of its under-graduate students. Among these students are many for whom a university education is not a long-standing family tradition and who must surmount economic, social, and educational barriers to achieve academic success. UIC endeavors to help these students fully realize their potential.

The mission of the College of Engineering is:

"The mission of the College of Engineering at the University of Illinois at Chicago is to provide the opportunity for each student to become all that he or she is capable of becoming through excellence in education in the three areas of teaching, research and service. In the area of teaching, the College provides academic excellence to its students through 10 B.S. programs in six departments: BioEngineering; Chemical Engineering; Civil and Materials Engineering; Computer Science; Electrical and Computer Engineering; and Mechanical and Industrial Engineering. With the changing dynamics of society, the College continues to strive for excellence and innovation in both its instructional and research programs. In the area of community service and as part of the University's Great Cities Program related to economic development and environmental concerns, the College is continuously strengthening ties with the industrial community, especially the dynamic region of Illinois."

The College of Engineering educational objectives are the following:

"The UIC College of Engineering offers undergraduate and graduate students opportunities to join faculty in cutting-edge research. In the classroom, students become familiar with the fundamental mathematical and scientific principles that are common to engineering and computer science disciplines, and they learn to apply these principles to current engineering and computer science problems of analysis, design and experimentation. Through individual and group projects, students make use of current techniques, instruments, equipment, and computers, and gain proficiency in communicating the results of their work. Study in other disciplines provides students with an understanding of the professional ethical responsibilities of practicing engineers. Students also have the opportunity to participate in a number of the many on-campus student chapters of national engineering professional organizations as a way to supplement their classroom experiences."

In the first two years each student will be required to complete courses in mathematics, chemistry and physics (or other science requirements, for computer science majors), and English composition. Beginning in the second year, the student will begin course work in a particular major that represents the technical phase of the student's academic career and constitutes a cohesive program of advanced work in a chosen field. Although the course work in the major becomes progressively specialized in the junior and senior years, each student is also required to take engineering or computer science courses outside of his or her chosen field.

A student must also complete course work in the general fields of humanities and social sciences. Because engineers and computer scientists are no longer narrow specialists, they must recognize the effects of their work on the general welfare of society. The humanities-social sciences phase of their education helps them to become serious contributors to the quality of life. Requirements for the degrees often include free electives that introduce flexibility into the curricula."

The above statements emphasize quality education, research and service to the Chicago region. The Civil and Materials Engineering Department embraces these mission statements, and proposes its own mission statement in support of the University and College missions. Our departmental objectives were developed in consultation with our constituents (students, alumni and employers), and reads as follows:

“Our graduates will have fundamental knowledge and modern tools necessary for civil engineering practice in industry and government in the areas of: environmental and water resources engineering; geotechnical engineering; structural engineering; and transportation engineering. Our program seeks to produce graduates who are prepared and motivated to pursue graduate studies through understanding the role of basic and applied research in civil engineering. The graduates will understand the significance and the role of ethics and effective communication skills in the practice of civil engineering.”

Assessment of the educational program in light of the stated objectives occurs on a regular basis. At the most basic level, student evaluation in individual courses provides a basic benchmark on the degree to which courses in the curriculum are conveying the desired knowledge. Graduating

students submit an exit interview, and meet with their advisors to review their suggestions and concerns. Alumni are surveyed periodically.

At a more general level, measures of the CE students taking and passing the Engineering-in-Training (EIT) exam, the level of satisfaction expressed by employers and alumni with our graduates through surveys, and faculty and external evaluators assessment of student abilities in teamwork and communications provide an on-going assessment of the degree to which the objectives are being successfully met.

2.2 Process to Define Mission, Vision and Objectives

2.2.1 Process to Establish and Review Program Educational Objectives

The Department of Civil and Materials Engineering has developed an annual process for continuous revision of its educational objectives using outcomes measured internally and externally.

The program educational objectives are a result of collective inputs from students, alumni, employers, advisory board, sponsors of research projects, and academic peers. Such information is gathered by several mechanisms that include the following:

1. Course evaluations every semester by current students and faculty;

2. Exit interviews of graduating seniors every year;

3. Surveys of employers and alumni post-graduation experience periodically;

4. Interactions with employers during job fairs, recruitment visits, and direct contacts, throughout the year;

5. Meetings with the Department's Civil Engineering Program Advisory Council (CEPAC) held twice a year; see Appendix I, Part A for a list of CEPAC members;

6. Surveys of practicing engineers and alumni serving as Engineering EXPO judges and co-op advisors every year;

7. Comparison of curriculum with peer universities, peer publications, etc.

2.2.2 Formulation of Educational Objectives

Our educational objectives listed in Section 2.1 state specifically how we will satisfy the needs of our constituencies as well as the University, College and Program missions. The integration of needs is performed annually, and in an ongoing manner as indicated by problems that arise, by the faculty of the CME Department. During this process, data from internal sources (e.g. student evaluations, exit interviews, etc.) and external sources (e.g. alumni survey, employer surveys, etc.) are summarized, analyzed and discussed by the faculty during regular faculty meetings.

The faculty recognizes that there have to be compromises in attempting to satisfy the needs of all constituents. We also take into account changes in institutional and/or College missions, industry trends, and research directions. The revised objectives are then circulated for comments from program faculty, CEPAC, alumni, the College Educational Policy Committee and the University Senate Committee on Educational Policy.

3. Program Outcomes Selection

The current outcomes selected for the Civil Engineering Program address the a-k outcomes under criterion 3, as well as that under the ASCE program specific criterion (outcome l). The outcomes were selected by the Civil Engineering Program faculty as part of the process to pursue accreditation under ABET EC-2000. The Program Outcomes listed on our departmental web page are as follows:

"Our students will have ability to apply knowledge of mathematics and science in engineering problems. They will design and conduct experiments, analyze and interpret data in geotechnical, structural, transportation, and water resources engineering. Our students will have ability to design civil engineering systems, function effectively in multidisciplinary design teams, and possess the necessary skills to identify and formulate engineering problems. They will understand their ethical responsibilities, and the need for life-long learning. Our students will have the ability to use the techniques, skills, and modern engineering tools for efficient practice of civil engineering. Our graduates will have the broad education necessary to understand the societal and global impact of engineering solutions, they will have knowledge of contemporary issues, and will be able to communicate their engineering solutions in a professional and effective manner."

3.1 Achievement of Educational Objectives

The Civil Engineering curriculum is designed to ensure achievement of our stated educational objectives. A majority of our students go into professional practice after receiving their BSCE degree. Approximately 30 % of our BSCE students continue into MSCE graduate studies directly or within three years. Others seek advanced degrees in engineering or business after working for several years or are sponsored by their employers to enter into graduate programs on a part-time basis. A very small number eventually pursue a Ph.D. degree. The Civil Engineering curriculum, along with other educational and development experiences at the University, prepares our students to pursue professional practice and/or graduate education. We encourage and actively recruit our better students to enter graduate studies at UIC or other institutions.

During the Spring Semester, 2001, instructors reviewed the educational objectives for the required courses in the Civil Engineering curriculum, and proposed program outcomes for their courses, as shown in the individual course syllabi in Appendix I. At a faculty meeting in May 2001, these program outcomes were reviewed on a course-by-course basis, as summarized in Table 3.1. At the close of this review, the faculty adopted these program outcomes for the required courses in the Civil Engineering curriculum.

3.2 Program Assessment

At the beginning of the 2000-2001 academic year, the College of Engineering Assessment Committee was formed to carry out assessments of all required undergraduate courses in the College. These assessments were performed for three consecutive semesters, Fall 2000 through Fall 2001. Students were asked to respond to 20 questions pertaining to four to six outcomes. Each semester, the outcomes and the orientation of the assessment questions were varied. In

Table 3.1 Civil Engineering Program Outcomes

Required Courses	PROGRAM OUTCOMES										
	A Science	B Expt	C Design	D Multi	E Form	F Ethics	G Comm	H Broad	I Life	J Cont	K Tools
CEMM 201	HIGH	NONE	NONE	NONE	HIGH	MOD	NONE	NONE	MOD	MOD	NONE
CEMM 203	HIGH	NONE	MOD	NONE	HIGH	NONE	NONE	NONE	NONE	MOD	MOD
CEMM 205	HIGH	NONE	NONE	NONE	HIGH	MOD	LOW	LOW	NONE	MOD	LOW
CEMM 215	HIGH	HIGH	NONE	NONE	HIGH	NONE	HIGH	MOD	NONE	MOD	MOD
CEMM 216	HIGH	MOD	LOW	MOD	LOW	LOW	MOD	HIGH	HIGH	HIGH	LOW
CEMM 260	HIGH	MOD	MOD	MOD	HIGH	NONE	NONE	MOD	LOW	LOW	MOD
CEMM 300	MOD	HIGH	LOW	LOW*	MOD*	MOD	HIGH	MOD	MOD	MOD	HIGH
CEMM 301	MOD	MOD	HIGH	HIGH	MOD	HIGH	HIGH	LOW	MOD	HIGH	MOD
CEMM 302	MOD	NONE	NONE	NONE	HIGH	MOD	HIGH	HIGH	HIGH	MOD	MOD
CEMM 310	MOD	HIGH	HIGH	MOD	HIGH	HIGH	HIGH	HIGH	MOD	MOD	MOD
CEMM 315	HIGH	HIGH	LOW	NONE	MOD	NONE	MOD	NONE	NONE	NONE	LOW
CEMM 396	HIGH	NONE	MOD	MOD	HIGH	HIGH	MOD	HIGH	MOD	NONE	MOD
CEMM 397	MOD	NONE	HIGH	HIGH	HIGH	NONE	HIGH	NONE	MOD	NONE	MOD
CEMM 434	HIGH	HIGH	MOD	MOD	HIGH	LOW	NONE	MOD	HIGH	LOW	HIGH

Updated by vote of the CME faculty on May 14, 2001.

addition to courses required in engineering, the students were asked about courses in mathematics, science, humanities and social sciences, which make up the requirements in their programs. Examples of the assessment questions are found in Appendix II, pp. 114-131.

3.3 Demonstration of Continuous Improvement of Program Effectiveness

A number of steps have been taken since the last accreditation that has directly impacted both our assessment processes and our curriculum. Changes in curriculum had historically been made based on limited information and through faculty experience and intuition. The process for curriculum change has been formalized during the past two years as a result of the new assessment instruments.

The first review of the curriculum took place during Fall 2000 and Spring 2001. Following the completion of each assessment, the results were tabulated and discussed with individual instructors, by the Civil Engineering Undergraduate Program Committee, and by the Civil and Materials Engineering faculty. Following these discussions, three conclusions were reached in May 2001, as follows:

1. Additional emphasis should be placed on improving Communications abilities of students.

2. Use of personal computers and computer software should receive more emphasis in the Civil Engineering curriculum.

3. Strengthen the laboratory component of required courses.

These three components of the curriculum were discussed and debated in considerable detail, as indicated by the following discussion.

With regard to Communications abilities of our students, oral and written communication was cited by our graduates as the most important area for improvement in the undergraduate curriculum. Current students also expressed in their responses to the course assessments a desire to improve their communication abilities. In response to this identified need, the faculty explored two approaches:

1. introduce a new course on communications of the type required of all students in the College of Business Administration, BA 200.

2. emphasize more strongly the course content related to communications in our own required civil engineering courses.

We reviewed our course objectives with regard to Communications, and found that Communications is stressed quite heavily in the form of term papers, laboratory reports and oral presentations. Because time for new courses is always very limited, we have elected to seek to strengthen the delivery of communications aspects in our own courses. But, at the same time, we have encouraged several students to enroll in BA 200 in order to evaluate the effectiveness of this approach.

One of the problems we recognize with the Communications content of our civil engineering courses is that many of our teaching assistants are international students whose first language is not English. Hence, to strengthen the Communications course content, we also need to improve the English speaking and writing ability of our teaching assistants. UIC has experimented with a special course for these students, and we have encouraged the continuation of this program. With respect to computing in required civil engineering courses, one proposal is to adopt one of the mathematics tools software systems (MATLAB, Mathcad, Mathematica, MAPLE, etc.) as a common tool for several courses. In this way students' knowledge of problem solving will accumulate over their undergraduate program. As an initial step in this direction, MATLAB is being introduced in the Transportation Engineering course in the Fall Semester, 2002.

Strengthening of laboratory courses has been a continuing priority in Civil Engineering for the past three years. Equipment has been updated in the Undergraduate Computing Laboratory and in several laboratories in which experiments are performed by students (geotechnical, concrete, materials, etc.). Much remains to be accomplished, however. As financial resources permit, we plan to continue modernizing equipment and adding additional laboratory sections.

Following these discussions concerning the content of individual courses in relation to the student assessments, in April 2002, individual faculty proposed improvements in each required civil engineering course. These proposals were reviewed at a faculty meeting, and adopted. The planned changes for the 2002-2003 year are the following.

Course	Title	Instructor	Proposed Change
201	Statics	Lemke	Increase computations emphasizing optimization and design
203	Strength of Materials	Wu	Introduce online computer use using UIC Blackboard
205	Structural Analysis	Wu	Introduce online computer use using UIC Blackboard
215	Hydraulics and Hydrology	Burke	Add two laboratory sessions
216	Environmental Engineering	Khodadoust	Add a laboratory session in addition to four added this year; emphasize use of spreadsheet software in lab reports
260	Properties of Materials	Indacochea/ McNallan	Add lecture in the materials selection section of covering the recycling and environmental aspects of materials usage
300	Properties of Concrete	Issa	No changes recommended
301	Behavior and Design of Metal Structures	Masud	Use an on-line AISC manual and Autocad in assignments and in the design project.
302	Transportation Engineering	Boyce	Introduce *MATLAB* for analytical problem solving in homework exercises
310	Design of Reinforced Concrete Structures	Issa	Increase design aspect by adding one hour of lecture

315	Soil Mechanics and Foundation Engineering	Reddy	Introduce commercial geotechnical software and upgrade laboratory equipment, when funds become available
396	Senior Design I	Lemke	Make more use of personal computers for optimization and presentations
397	Senior Design II	Lemke (coordinator)	Emphasize written and oral communication skills for presentation of design projects
434	Finite Element Analysis	Masud	Introduce more computing assignments and apply a commercial code, ANSYS

3.4 Assessment by Alumni

In 2001 as an initial phase of our assessment process, and in conjunction with the Civil Engineering Program Advisory Council, the first survey of alumni in recent history was conducted. A total of 43 responses were received from graduates of the Civil Engineering Program, and predecessor programs in Materials Engineering. The following tables summarize the responses to the survey questionnaire.

Table 3.2 Area of Specialization

Area of Specialization	Number of Responses*
Environmental	3
Geotechnical	9
Structural	23
Transportation	8
None Indicated	3
Total Responses	46

* Some respondents indicated more than one specialization.

Table 3.3 Status of Licensing Registration of Program Graduates

Type of Registration	Engineer in Training	Professional Engineer	Structural Engineer
Took exam	30	24	3
Passed exam	27	22	3

Table 3.4 Suggestions for Improvement of the Program

Suggestion	Number
Add communication courses: writing and speaking	12
Teach business side of engineering (economics, finance, marketing, management, impact analysis, probability and statistics, etc.)	12
Add site design and surveying courses	12
Increase training on computer software	7
Reduce theory and add practical applications	5
Increase number of group projects	5
Increase "real world" experience; require internship and have more field trips	5
Faculty should be licensed, have more professional experience and have improved command of English language	6
Improve course on professional ethics	4
Add coursework on construction management	3
Add more structural engineering options, such as masonry and wood	2

3.5 Additional Materials Available for Review During the Visit

The following is a partial list of materials that will be available for review during the ABET visit:

1. published educational objectives;

2. course assessment forms; see also Appendix II, pp. 114-131;

3. results of student exit surveys/interviews;

4. Civil Engineering Program Advisory Council (CEPAC) meeting agendas/minutes;

5. communications with members of CEPAC with regard to educational objectives.

4. Professional Component

The Civil Engineering curriculum prepares students for engineering practice by integrating mathematics, science, engineering mechanics, civil engineering, communications, humanities, social sciences, economics, and ethics and professionalism. In addition, the curriculum develops skills in problem solving, and design of civil engineering systems and their components. The curriculum sequence culminates in a major design project experience. Table 1 in Appendix I lists the courses in the order they are given. A total of 128 semester credit hours are currently required for graduation. The semester credit hours are distributed as follows: 32 credit hours of mathematics and basic sciences, 70 hours of engineering science and engineering topics and 18 hours of general education and 8 hours of electives outside of Civil Engineering. Therefore, the program curriculum exceeds the ABET's minimum requirements of Criterion 4.

4.1 One Year of Mathematics and Basic Sciences

The one-year of a combination of college level mathematics and basic sciences required by Criterion 4 is satisfied by the 32 credit hours of mathematics (16 hours), chemistry (5 hours), physics (11 hours), engineering science (15 hours), and materials (8 hours) required in the Civil Engineering curriculum. Table I-1 lists the basic science and math courses.

The mathematics sequence consists of the following:

Math 180 Calculus I; (Students not ready for Calculus I must take needed prerequisite courses.)
Math 181 Calculus II;
Math 210 Calculus III;
Math 220 Introduction to Differential Equations.

The basic Freshman and Sophomore science sequence consists of the following:

General College Chemistry I (Chem 112)
General Physics I (Mechanics) (Phys 141)
General Physics II (Electricity and Magnetism) (Phys 142)
General Physics III (Modern Physics) (Phys 244)

The Engineering Science courses that also contribute to this component are:

Statics (CEMM 201)
Engineering Dynamics (ME 210)
Fluid Mechanics I (ME 211)
Electrical Circuit Analysis (ECE 210) or Introduction to Thermodynamics (ME 205)
Fortran Programming for Engineers (CS 108)

The Materials courses required of Civil Engineering students are:

Strength of Materials (CEMM 203)
Properties of Materials (CEMM 260)
Composition and Properties of Concrete (CEMM 310)

4.2 Civil Engineering Topics

The engineering topics covered in the Civil Engineering Curriculum require a total of 70 hours consisting of 23 credits of Engineering Science and Materials courses and 47 credits of required Civil Engineering courses.

The Civil Engineering courses are designed to give students the fundamentals of:

Environmental Engineering, Hydraulics and Hydrology (CEMM 215 and 216)
Geotechnical Engineering (CEMM 315)
Structural Engineering (CEMM 205, 301, 310 and 434)
Transportation Engineering (CEMM 302)

All students register in a 400 level engineering design-oriented technical elective, and two 400 level technical electives, as well as Senior Design I and II. Senior Design I includes optimization methods, probability, ethics and professional concepts. Technical electives are offered regularly on the following civil engineering topics. Courses marked with (*) pertain to two topics.

<u>Environmental Engineering, Hydraulics and Hydrology</u>
CEMM 415 Environmental Geotechnology*
CEMM 420 Water and Wastewater Analysis Laboratory
CEMM 421 Water Treatment Design
CEMM 422 Biological Wastewater Treatment Design
CEMM 425 Environmental Remediation Engineering*
CEMM 427 Engineering Hydrology
CEMM 428 Groundwater Hydrology and Contaminant Transport

<u>Geotechnical Engineering</u>
CEMM 405 Foundation Analysis and Design
CEMM 415 Environmental Geotechnology*
CEMM 425 Environmental Remediation Engineering*

<u>Structural Engineering</u>
CEMM 400 Advanced Design of Reinforced Concrete Structures
CEMM 401 Advanced Design of Medal Structures
CEMM 406 Bridge Design
CEMM 409 Advanced Analysis of Structures
CEMM 410 Design of Prestressed Concrete Structures
CEMM 450 Probability and Reliability in Structural Design
CEMM 454 Structural Analysis & Design of Tall Buildings
CEMM 494 Special Topic - Wind Engineering and Structural Dynamics
CEMM 494 Special Topic - Design of Masonry and Wood Structures

<u>Transportation Engineering</u>
CEMM 402 Geometric Design of Highway Facilities

Two courses, Engineering Economy (IE 201) and Engineering Graphics and Design (ME 250) provide basic engineering skills.

4.3 General Education Component

The Civil Engineering curriculum has 18 credit hours of general education. The general education core strives to develop writing, reading, speaking and listening skills; it provides historical awareness, including an understanding of one's own heritage as well as respect for other people and cultures; it fosters an appreciation for the arts through Humanities electives; and it provides the breadth of understanding necessary to have a familiarity with the various branches of human understanding through Social Science electives. The general education courses provide the necessary awareness of contemporary issues around the world.

4.4 Major Design Experience

Perhaps the best definition of engineering design is that given by ABET: "Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision making process (often iterative), in which the basic sciences, mathematics, and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation."

Civil Engineering students are prepared for engineering practice through the curriculum culminating in the CEMM 396 and 397 Senior Design I and II. The capstone design course, CEMM 397, utilizes the knowledge and skills acquired in earlier course work and incorporates engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; ethical; health and safety; social; and political.

As the culmination of their engineering studies, most students enroll in *Senior Design* in which they demonstrate their mastery of the curriculum through the conception and design of a team project. Selected projects are nominated to participate in Engineering EXPO, an annual judged exhibition of engineering student senior design team projects. Team projects are designed to show how students integrate ideas and knowledge from their engineering studies to create practical applications.

Teams are judged by selected College of Engineering faculty and industry representatives. The students' approach to and handling of the project objective, design alternatives, innovation, practicality, confidence, knowledge of material, organization, spelling, grammar, and visual aids are evaluated by the team of judges. The College provides awards to category winners, and several companies sponsor special specific awards.

In Spring Semester 2002, the following design projects were entered by Civil Engineering students:

1. The John G. Smith Clean Water Education and Conference Center

2. Biaggi's Restaurant Site Development

3. Upgrading for Strength and Repair of Concrete Members Using New Materials and Technology

4. Hydraulic Design of a Stormwater Drainage System

5. Innovative Technology for Production of Intermetallics

6. White Fox LLC - Lot 5, Unit 2, Prairie Glen Corporate Campus

7. U. S. Route 41 over Illinois 132 (Grand Ave.) Interchange Improvements: Construction of a Single Point Urban Interchange (SPUI) to Replace Existing Interchange, and Reconstruction of a Three Span Bridge

Another example of senior design projects is illustrated by the participation of a team of civil engineering undergraduates in the 11th Annual International Environmental Design Contest held April 8-12, 2001, at New Mexico State University in Las Cruces, New Mexico. The UIC students (Daniel Angspatt, David Gunty, John McNelis, and Stephen Vaughn) placed second with their design for *Developing a Sustainable Community off the Grid*. Their project consisted of a master plan for an isolated community in an arid region of the southwestern United States with no municipal water, sanitary sewer, solid waste services, nor electricity. The UIC students were advised by Dr. James Jawitz. The competition was sponsored by the Waste-management Education and Research Consortium (WERC) and included 38 teams from 25 universities.

5. Faculty

The faculty of the Department of Civil and Materials Engineering teach, perform research and contribute their service to the Department and the profession. The faculty are well qualified, and are ranked amongst the best teachers and researchers within the University.

5.1 Size and Background of the Department

Civil and Materials Engineering is a medium sized Department, currently with 14 tenured and tenure-track faculty, two emeriti faculty and one courtesy faculty appointment. In addition, there were six adjunct faculty in 2001-2002. The faculty possess diverse expertise in Materials as well as Civil Engineering.

The Materials Engineering component of the Department relates to the origins of the college. The Department of Materials Engineering was founded in 1965 when the University of Illinois created a new campus in Chicago. At the time, the College of Engineering took a bold approach by developing four interdisciplinary departments of Materials, Energy, Systems, and Information Engineering, in contrast to the usual organization of Engineering into Civil, Environmental, Mechanical, Chemical, and Electrical Engineering departments.

The Department of Materials Engineering brought together faculty with expertise in metallurgy and materials science, cement chemistry, mechanics (theoretical and experimental), biomechanics, structural engineering, numerical methods, geotechnical engineering, and dynamic systems including earthquake engineering. Four undergraduate degrees were offered including Structural Analysis and Materials. In 1982, the College was reorganized in the conventional manner, and the department was renamed Civil Engineering, Mechanics and Metallurgy. Five undergraduate degrees were offered, including both Civil Engineering and Structural Engineering and Materials. In 1994, the department name was again changed to the present Department of Civil and Materials Engineering, and the number of undergraduate degrees was gradually reduced. Presently, the Department offers one undergraduate degree program in Civil Engineering, and two graduate programs in Civil Engineering and Materials Engineering, respectively.

The origins of the Department and its ongoing transformation reflect the diversity of our faculty. Table I-4 includes the entire faculty involved in teaching and research, including emeritus and adjuncts. Most of the faculty, including our adjuncts, earned their Ph.D. degrees in Civil Engineering, or a closely related field. Two of our faculty, Professors Indacochea, and McNallan, earned their Ph.D. degrees in Materials Engineering. Besides teaching the required undergraduate course in Materials Engineering, Professors Indacochea and McNallan are primarily involved in the interdisciplinary graduate program in Materials Engineering, a college-wide interdisciplinary graduate program administered by our Department. Eleven of our faculty are registered Professional Engineers (PE). Professors Issa, and Dranger are also registered as Structural Engineers (SE).

5.2 Current Composition of the Department

Over the years the Department has transformed from a purely Materials/Structural Mechanics entity to a more conventional Civil Engineering Department. A realistic vision for our Department, a medium-size department serving the large metropolis of Chicago, is to train excellent engineers with expertise in the areas of infrastructure (including structures, geotechnical and materials), environmental and transportation engineering. The Department has maintained its strength in the areas of structural mechanics and materials as evident from our undergraduate curriculum. Faculty develop the curriculum through a continuing dynamic process, fulfilling our vision as new faculty join in.

The additions to the faculty since the last ABET visit are:

1. Dr. James Jawitz, whose specialty is in ground water hydrology with emphasis in groundwater contaminant transport. He joined the Department in September 2000 as an Assistant Professor from the University of Florida.

2. Dr. Amid Khodadoust, whose specialty is in Environmental Engineering with emphasis in chemical remediation of groundwater. He joined the Department in September 2000 as an Assistant Professor from the University of Cincinnati.

3. Dr. Sue McNeil, whose area is in Transportation Engineering, and specializes in Infrastructure Management. Although a Civil Engineer by training and research, she holds her tenure in the College of Urban Planning and Policy, where she directs the Urban Transportation Center. Dr. McNeil joined UIC from Carnegie Mellon University in September 2000 as a full professor. Dr. McNeil's interest and enthusiasm for Civil Engineering has been fruitful for our Department. She has a courtesy appointment with the Department, teaches a course in Infrastructure Management in our graduate Transportation Engineering Program.

4. Dr. Karl Rockne, whose specialty is in Environmental Engineering with emphasis in bioremediation of contaminants in groundwater. He joined the Department in September 2000 as an Assistant Professor from the Rutgers University.

5. Dr. Tom Theis, whose specialty is in Environmental Engineering. He joined the Department in January 2002 as a Full Professor from Clarkson University to direct the Institute for Environmental Science and Policy. The Institute is interdisciplinary effort of the University with constituencies from the Civil and Chemical Engineering Departments as well as the Department of Geology, and the School of Public Health.

6. Dr. Farhad Ansari, whose area is Structural Engineering, and specializes in nondestructive testing and condition monitoring of structures, joined the Department in September 1998 as a Full Professor, and in 1999 began his tenure as Department Head. Professor Ansari received his Ph.D. from our Department in 1983, and returned to the Department following a 15-year career as a faculty member at the New Jersey Institute of Technology.

Professors Robert Bryant and Tom Ting retired in 1999 and 2001, respectively, although both are very active in serving the Department; they have been granted Emeritus status, and maintain their offices.

Professor Bryant joined the Department at its inception. His field is Structural Engineering, and he is currently teaching one course per year alternating between two technical electives in Structural Analysis and in Steel Design. Professor Bryant, well regarded in the Chicago area structural and civil engineering community, has provided the Department with many professional opportunities. The Department established the Civil Engineering Program Advisory Council (CEPAC) in Fall 2000; see Appendix I, Part A for a list of members5. Professor Bryant played a key role in formation of CEPAC and currently oversees its activities, organizes two meetings per year, conducts curriculum surveys, and identifies key industrial members from the Chicago area Civil Engineering firms and state agencies to take roles in the activities of CEPAC.

Professor Ting has also served the Department since it early years. Dr. Ting is a scholar with a specialty in Theoretical Mechanics. He taught undergraduate and graduate mechanics courses for the Department for many years. He has published numerous articles and three books in Theoretical Mechanics. He is currently aiding with acquisitions for the Departmental library.

Dr. Jawitz, the newly hired Assistant Professor in Hydrology left the Department to go back to his home in Florida, accepting a position in the Department of Agricultural and Environmental Engineering of the University of Florida. During his short tenure in our Department, Professor Jawitz excelled in teaching, advised and took our undergraduates to a national environmental competition, taking second place, developed new series of environmental engineering technical electives (with collaborations from other members of the environmental group), and developed sponsored research. Dr. Jawitz taught CEMM 215 (Hydraulics and Hydrology), CEMM 427 (Engineering Hydrology, a design technical elective) and two other graduate level courses. The Department wishes Professor Jawitz well in his new position.

Professor Steven Harren, Associate Professor in Mechanics, left the Department for private practice in Fall 2001. Professor Harren taught undergraduate and graduate courses in Mechanics and numerical methods.

5.3 Plans for Recruiting New Faculty

The Civil and Materials Engineering Department has four open faculty positions, which will be filled over the next two years. In the past two years, new faculty and laboratories have been added in Environmental Engineering. Consistent with the vision of our program, the open faculty lines will be filled with two positions in Transportation operations and planning, one position in Hydrology, and another in Mechanics and Materials.

The Department was fortunate to recruit Dr. Chris Burke, president of Chris Burke Engineering in Chicago, and a former faculty member of the School of Civil Engineering at Purdue University, to take over Dr. Jawitz's courses. Dr. Burke, also a CEPAC member for the Department, taught CEMM 427, and CEMM 215 in Fall 2001 and Spring 2002, respectively. Dr. Burke excelled in teaching, and we are planning to ask him to teach for us again, even when

we find a permanent replacement for Dr. Jawitz's position. Dr. Burke brings his real-world experience to the classroom and he is also involved in the professional activities of our ASCE student chapter. Dr. Burke is very enthusiastic about teaching the Civil Engineers of tomorrow, and for this reason he is donating his time, returning his adjunct salary back to the Department for scholarships and faculty teaching awards. We are deeply grateful for his gesture of goodwill, which will impact our students in many ways.

As shown in Table 8.2, p. 44, the department has an adequate number of faculty in the four topical areas of Environmental, Geotechnical, Structural and Transportation Engineering to fulfill the objectives of the undergraduate program.

5.4 Teaching Loads, Research and Service

Over the past few years, consistent with the national trends, there has been a decline in the number of Civil Engineering undergraduates. Currently, there are about 130 students enrolled in our undergraduate program, which results in a very low student to faculty ratio even considering the number of graduate students in the Department. We have already noticed a change in the trends pertaining to the undergraduate enrollment. The College of Engineering registrar reports 61 new incoming freshmen for Fall 2002, which is twice the number of incoming freshmen in the previous year (Fall 2001 at 31 students).

The enrollment in our two graduate programs is 25 Ph.D. and 59 M.S. students. Financial support through teaching and research assistantships are provided to 24 Ph.D. and 19 M.S. students. Twelve of our Ph.D. students serve as teaching assistants by grading homework and providing assistance during laboratory sessions and office hours for various courses.

Teaching loads are kept low to maintain excellence in quality of instruction, cultivate scholarship, and increase the level of sponsored research activity. This strategy has been successful, as evident from the high marks given to the faculty by the students in their teaching evaluations (average of 4.3 out of 5). The teaching load policy of the Department is as follows: Faculty teach four courses per year. The teaching load of faculty with actual research expenditures of $75,000 or more automatically reduces to three courses in the following year.

Our faculty are very active in research, and almost all the faculty, except for one or two, teach three courses per year. The average number of refereed journal publications by the faculty is 2.25, conference papers 2.3, and presentations 5. Faculty involvement with consulting firms and industry is high. For instance, metropolitan planning interest groups, and the Illinois Department of Natural Resources have sponsored Professor Boyce's urban travel forecasting projects. Professor Issa is involved in testing and design of high strength concrete with Chicago area consulting firms in the reconstruction of the Walker Drive in downtown Chicago. Professor Chudnovsky's research expenditures of $350,000 per year are supported by DOW Chemical, Shell Oil, and the Gas Technology Institute. Professor Reddy, a very active member of the local ASCE, has served in various capacities as the officer of local chapter in Chicago, and interacted with the local industry. Professor Bryant has worked with Harza Engineering as a consultant for structural analysis of dams in various countries. Professors McNallan and Indacochea have developed a continuing memorandum of understanding for involvement pertaining to the

projects at Argonne National Laboratory. Professors Rockne and Khodadoust are developing professional relationships with the Chicago District of the Army Corps of Engineers, including class tours of Chicago area locks and dams.

Faculty service to the profession, as evident from their activities in the various societies, is commendable. Examples include faculty activities in the various committees of ASCE including those in the Engineering Mechanics, Geotechnical, Structural, and Environmental divisions. Three of the faculty members are active in the American Concrete Institute (ACI), and precast/prestressed concrete Institute (PCI). Four members of the faculty are members of American Society of Materials (ASM), one holding an officer position. Three faculty members are active in the Transportation Research Board.

Faculty actively participate and provide valuable service for the Department. Professor David Boyce is the Director of Undergraduate Studies. In this capacity, he oversees the processes involved in curriculum and course modifications, enhancements, and serves as the chair of the Undergraduate Committee. Professor Boyce serves in the College Assessment Committee and has been responsible for the documentations pertaining to the re-accreditation process. He has provided leadership in working with faculty to enhance the course contents and procedures per the feedback received from the various surveys.

Professor Michael McNallan is the Director of Graduate Studies, and handles the two graduate programs in Civil and Materials Engineering. In this capacity, Professor McNallan also chairs the Graduate Committee, and provides leadership for selection of graduate students, curriculum modifications, and program enhancements. His tasks are phenomenal as the Materials Engineering program is an interdisciplinary effort involving faculty and students from our Department as well as others across the campus. Both of these faculty are highly active in their teachings, research and profession.

Professor Masud is the chair of the Department's Computer Committee; in this capacity he provides leadership in making computer hardware and software selections for the Civil and Materials Engineering Computer Laboratories, student and faculty use guidelines and long-term planning. The Department has a representative in the College Educational Policy Committee on a two-year rotation basis; Professor Masud is representing the Department in this committee until the end of AY 2003.

Professors Ansari, Boyce, and Issa have represented the Department in the University Senate over the past four years, and Professor Boyce is also a member of the Senate Executive Committee. Professor Ansari chairs the Laboratory Committee including undergraduate teaching and research facilities. Professor Lemke is a member of the College Student Appeals Committee, and several faculty have served in the College Executive Committee, including Professors Chudnovsky, Wang, and more recently Issa. One of the duties of the Executive Committee pertains to the evaluation and decisions pertaining to the promotion and tenure cases of the college.

6. Facilities

Departmental facilities include the following components:

1. Departmental administrative and faculty/grad student offices

2. Departmental Undergraduate Instructional and Graduate Research Laboratories

3. Dedicated facilities: Library; Conference room; Class room; faculty computer room

The Department of Civil and Materials Engineering occupies two adjacent and interconnected buildings: Science Engineering Laboratories (SEL), and the Engineering Research Facility (ERF). The majority of laboratories are located in SEL-east (SEL-E), whereas, the administrative and faculty offices are in the ERF building. Table I lists the Departmental space in the ERF building. As indicated in this table, administrative and faculty/grad student offices are located in the second and third floors. The atrium style architecture with an open hall floor in the middle provides a warm atmosphere for faculty and students interaction. Besides the instructional laboratories that are located in SEL, the Department possesses one dedicated classroom in ERF. All the other large lecture halls and class rooms are located in centralized campus large lecture and instructional hall facilities. In 2000, college provided the Department with $ 130 K for construction of a small library on the existing space (third floor of ERF). The Library was completed in Fall 2001, and serves as a resource and place of study for students and faculty. A dedicated conference room on the first floor of ERF is utilized for Departmental meetings, seminars and conferences.

Figure 6.1 Civil Engineering Offices in the Engineering Research Facility

Table 6.1
Civil and Materials Engineering Offices and Research Laboratories
(located in the Engineering Research Facility)

Floor	Room #	Description
Basement	B025	Transportation Laboratory
First	1047	Conference Room
	1033	Class room
	1068	Research Lab
Second	2067A	Offices
	2067B	
	2069	
	2071	
	2073	
	2075	
	2077	
	2079	
	2081	
	2083	
	2085	
	2087	
	2089	
	2091	
	2093	
	2093A	
	2095	
Third	3067	Offices
	3069	
	3071	
	3073	
	3075	
	3077	
	3079	
	3081	
	3083	
	3085	
	3087	
	3089	
	3091	
	3093	Library
	3099A	Faculty Computer Room
	3026	Research Labs
	3068	
	3070	

In addition to the Civil Engineering Computer Laboratory for use by students (described in a later section), a small computer room is available on the third floor of ERF for the sole use of faculty to prepare slides, color copies and scanning of teaching or research articles/presentations. A few research labs including Transportation and sensors laboratories are also located in ERF. Administrative offices are located on the second floor of ERF. The offices include the reception area, mailroom, Departmental secretary, Graduate Student coordinator office, Departmental budget Coordinator office and the office of the Department head. The floor plan for the administrative space in ERF will be available during the ABET visit.

6.1 Office Personnel

The office support staff is highly adequate for the operation of the Department. There are currently three full time and two part-time staff provide support for the faculty and students:

Pamela Woodard (staff supervisor, and departmental secretary)
Mary Ann Borjal (Business officer)
Rachel Morrow (Graduate student coordinator)

The two part time staff provide help in the reception area, office activities and for assisting the budget coordinator. The Department is in the process of hiring a vacant office position in Fall 2002.

6.2 Instructional Laboratories

Table 6.2 provides a summary of the laboratories utilized for instruction related to the Civil Engineering program. Details pertaining to the adequacy of the instructional laboratories in terms of condition, number of student stations, and square footage of space is also provided in table II. The *Environmental Laboratory* listed in Table 6.2 is a new facility constructed during academic year 2000/2001. Addition of three new faculty in the Environmental and Water Resources area necessitated construction of a new Environmental laboratory. The laboratory encompasses two components: (1) undergraduate instructional laboratory; (2) graduate research and instructional laboratory. The college and office of the Provost provided the $530,000 in funding for the construction of the laboratory in the existing space. The floor plan indicating the location of the various Civil Engineering Laboratories in SEL will be available during the visit.

The modernization and instrumentation of the undergraduate instructional laboratories was implemented through a plan implemented by faculty involved in teaching the laboratory courses in the program. The plan called for annual upkeep of the instructional laboratories by way of infrastructure maintenance/modernization as well as purchase of new instrumentation. Funds for the annual upkeep of the laboratories were allocated from two sources. Funds for infrastructure maintenance were allocated from the Departmental operational budget. Examples of such expenditures include new plumbing and drainage system for the concrete mixing section of the concrete laboratory, benches, cabinets and new floors for the Hydrology/Hydraulics laboratory, etc.
New instrumentation for the undergraduate laboratories were acquired through annual funds set aside by the Illinois Board of Higher Education (IBHE) for laboratory instrumentation. The

amount of IBHE funds allocated to the Department varied depending on the Departmental needs and the needs of other Departments within the college. On the average, programs share of IBHE instrumentation funds amounted to $75 K annually for the past three years. The annual decision making process for allocation of the instrumentation funds involved a three-step procedure:

1. Department Head informs faculty responsible for the undergraduate laboratories to provide a list of equipment needs and justification for the equipment as per the experiments involved in the course.

2. The Department Head would present a synthesized version of the Departmental proposal to the College of Engineering. After review of the proposals from the various Departments, College of Engineering would allocate a portion of the IBHE funds to each Department.

3. Upon disbursement of the Instrumentation funds, the Department Head would call for a meeting of the faculty responsible for the laboratories to decide on the allocation of the funds for the purchase of instrumentation.

This process worked well as it involved the faculty responsible for the laboratories in the decision making process. The faculty worked well together, especially as it came to strategic allocation of the limited funds to meet the needs of one or two laboratories per year. Depending on the immediacy of the instrumentation needs, faculty reached consensus to single out one or two laboratories per year for modernization, with the knowledge that other laboratories would be inline for the next year's allocation of the IBHE funds. This is an ongoing process with an approximate undergraduate laboratory modernization cycle of five-years.

The Civil Engineering computer laboratory received special attention due to the rapidly evolving nature of the computing technologies. A percentage of funds were specifically allocated for constant upkeep of the computer laboratory through purchase of new computers and peripheral systems. Site software license renewals were mostly covered by the Departmental operational budgets. In addition to the above, the University implemented a $ 50 fee per student for the courses involving laboratory in order to offset some of the expense pertaining to purchase of supplies for the laboratories. Description of the individual laboratories is given next.

Table 6.2 Laboratory Facilities

Building and Room Number	Purpose of the Laboratory Including Courses Taught	Condition of Laboratory	Adequacy for Instruction	Area (sq. ft.)
1223, 1227 SEL-W	Soil Mechanics/Geotechnical **CEMM 315**	Excellent	Very adequate	1,270
1253 SEL-E	Hydrology/Hydraulics **CEMM 215**	Excellent	Very adequate	649
1049,1053,1061, 1057,1051 SEL-E	Concrete **CEMM 300**	Excellent	Very adequate	3,317
1264 SEL-E	Civil Engineering Computer Laboratory **All**	Excellent	Very adequate	1,298
1062E, 1070, SEL-E	Environmental **CEMM 216**	Excellent	Very adequate	2,007
1267,1251 SEL-E	Materials **CEMM 260, 470**	Good	Very adequate	1,826
			Total	**10,367**

6.2.1 Soil Mechanics Laboratory

The Soil Mechanics Laboratory is a part of our undergraduate civil engineering course CEMM315- Soil Mechanics and Foundation Engineering. In this lab, students get hands-on experience in conducting various experiments to determine the basic engineering properties of soils. Generally, students are divided into 4 to 5 groups and each group conducts the experiments on given soil samples. A total of 10 experiments are conducted: water content, grain size analysis, Atterberg limits, specific gravity, relative density, compaction, hydraulic conductivity, consolidation, unconfined compressive strength, and direct shear. The laboratory is equipped to conduct all of these basic experiments. In addition, triaxial shear and hydraulic conductivity experiments are demonstrated.

6.2.2 Concrete Laboratory

The Concrete Laboratory in its current state does have the capacity for executing the required ASTM necessary tests that are needed in the engineering practice. The laboratory runs over a three hours session that meets weekly and the students are divided into six groups. Four of the six groups meet on Mondays and the other two meet on Tuesdays. There are four stations that are fully equipped and well maintained to give each student the ability to perform all the required 14 experiments.

The renovations that took place during academic year 2000/2001 pertained to the overhaul of the plumbing system and installation of new tub/basin and cement catch system to facilitate mixing of concrete batches for the various experiments conducted by the students. The renovation project also involved installation of new aggregate bins and shelves. In addition to the closed-loop computer controlled servo-hydraulic compression/tension testing machine and beam testing system, the laboratory is equipped with an environmental chamber (13x6.5x7.6 ft) for a temperature range of -10^0F to 150^0F and a relative humidity range of 5% to 95%. The

laboratory also houses conventional instrumentation such as L.A. Abrasion machine, aggregate shakers, creep apparatus, tension and flexure fixtures, strain indicator electronics, pumps, LVDT's, computer based data acquisition systems, air entrainment pressure meters, thermometers slump cones, Vicat apparatus, Cube and briquette forms for making compression and tension mortar specimens, graduated cylinders Pans, and general miscellaneous tools for mixing, placing, and finishing concrete.

6.2.3 Environmental Engineering Laboratory

The Environmental Engineering Laboratory is newly constructed and equipped with modern testing amenities such as fume hoods and walk-in temperature controlled chambers. In addition to the institutional funds for construction and instrumentation of the laboratory, the IBHE equipment fund was used for undergraduate portion of the laboratory. A listing of various instrumentation and facilities available at the environmental engineering laboratory is given below:

1. Fume Hoods - Total of 24 linear feet of hood space
   3x 4-foot standard hood with ventilated cabinets underneath the hood
   1x 8-foot standard hood with ventilated cabinets underneath the hood
   1x 4-foot walk-in hood

2. Constant Temperature Walk-in Rooms
   Freezer (@ -10^{o} F)
   Cooler/Cold Room (@ 40^{o} F)
   Variable Temperature Control Room (Incubator or warm room), (@ 50-120^{o} F)

3. Number of Stations for use in the Undergraduate Laboratory
   4 x 3-student L-shaped bench spaces (for 12 students)
   island bench space (for 2-4 students)

4. Laboratory Equipment used for the Undergraduate Laboratory
   pH meters and probes
   Conductivity, Total Dissolved Solids (TDS) and salinity meters and probes
   Chemical Oxygen Demand (COD) reactor (oven)
   Spectrophotometers
   UV-Vis Spectrophotometer
   Magnetic stirrers plus heaters
   Turbidimeter
   Dissolved oxygen probes
   Vacuum filteration manifold
   Manual titrators
   Microscopes
   Laboratory glassware (beakers, flasks, pipettes, graduated cylinders, etc.)
   Top loading weighing balances
   Drying oven

6.2.4 Hydraulics/Hydrology Laboratory

The Hydraulic/Hydrology Laboratory encompasses the laboratory component of CEMM 215. It is one of the undergraduate laboratories that has been recently remodeled and provided with new instrumentation through Departmental as well as IBHE instrumentation funds. The new instrumentation together with the existing equipment provides capabilities for experiments in hydraulics and hydrology. The laboratory is capable of accommodating twenty students at a time. The hydraulics aspects of the course focus on pipe flow and open channel flow. The hydrologic aspect of the course include the hydrologic cycle, rainfall-runoff relationships, storm water management and design, and ground water flow and contaminant transport issues. At the present, the laboratory provides the following capabilities:

1. Fluid properties-- density, viscosity, surface tension
2. Hydraulics-- pipe hydraulics: friction, head loss, networks, pumps
3. Open Channel Hydraulics - open channel friction, weirs, water surface profiles, hydraulic pumps
4. Hydrology-- Surface Hydrology---Drainage and Culverts
5. Subsurface Hydrology – Well Hydraulics, Solute/contaminant Transport

6.2.5 Civil Engineering Computer Laboratory

As discussed earlier, the computer laboratory has received annual upgrade in terms of computers and networking capabilities. During the academic year 2001/2002, eleven (11) new computers were acquired. All the computers have INTEL PENTIUM 4 with 1.5GHZ speed, 256MB RAM, 20GB Hard Drive, Floppy and Zip Drives, and 17 inch Superscan Color Monitors. These computers join the already existing 10 computers (purchased during AY 2000/2001) with INTEL PENTIUM 3 processor, 866MZH speed, 20GB Hard Drives, and five computers (purchased in 1999) having PENTIUM II Processor. With this addition, the CME Computer Lab stands as the most modern Lab in the College of Engineering.

One of the new computers has 1GB Ram, and is being installed with software developed in the Computer Science Department at UIC to help convert our local area network into a Cluster Computing Network. With this development the department will acquire an in house mini-super computing capability. Besides CAD and modeling software, word processing and basic computational capabilities, teaching software is recommended by faculty and licensed for use by the students. A listing of the software is given below.

1. Internet:
    - Internet Explorer 6.0
    - Netscape 6.2
    - Network Services Kit
    - WS FTP
    - Shortcuts to Hosts like Icarus, Tigger, etc.
    - Ping Tools
    - Dream Weaver 4.0

2. Office Software:
    Office XP :
        Microsoft Excel
        Microsoft Word
        Microsoft Access
        Microsoft PowerPoint
    Microsoft Project
    Microsoft Visio
    Microsoft Publisher
    Adobe Acrobat 5.0
    Adobe Distiller

3. Math, Science and Design:
    ANSYS Finite Element software license for 20-seatings
    Adobe Photoshop 6.0
    Microsoft Photo Editor
    AutoCAD 2002
    Fortran PowerStation
    Maple 7
    MathCAD 2001
    Sigma Plot 2001
    Smartsketch LE
    Voloview Express
    VisSim SigPro
    C++, Visual Basic, Java

4. Software recommended by Instructors:
    EPI Suite
    AISC Search
    SciFinder Scholar
    HCS 2000 Transportation Software
    ACI-Frame

5. Multi-media support:
    Free Real One
    Windows Media Player 7.0
    Quick Time 5.0

6.2.6 Materials Laboratory

The Materials Laboratory is used for CEMM 260, the undergraduate Materials Engineering course for Civil Engineering students as well as CEMM 470, which is a graduate course for Materials Engineering students. Materials processing and characterization and mechanical testing of materials is performed in the materials laboratory. The equipment list includes furnaces for heat treatment of metals and ceramics, a rolling mill for mechanical processing, and hardness testers and an Instron tensile tester for mechanical testing. This equipment is used for a

demonstration of materials processing and testing in CEMM 260 and for more advanced materials characterization in CEMM 470.

In addition to the equipment listed above, the laboratory also includes a Charpy impact tester and creep test stations which are used in some laboratory exercises. Other materials characterization equipment, including optical and electron microscopes, an X-ray diffractometer, and sample preparation equipment, is kept in a different location.

6.2.7 Laboratory Personnel

Two full time and one part-time staff members maintain the Department's laboratories:

Kassem Saad, Technical Supervisor
Arkadiusz Piorrowski, Technician
Part-time student help

The above members of technical staff are responsible for day-to-day operations of the instructional laboratories including purchasing, maintenance and storage of equipment, and performing simple repairs. Special tasks are contracted out on a service-call basis, and as a rule, maintenance contracts are avoided.

The machine shop and model building facilities is a centralized unit providing service for the college of engineering. This facility is located near the Civil Engineering laboratories in SEL-East. The machine shop employs three full-time machinists to assist the Departments of the College.

7. Institutional Support and Financial Resources

This section describes the sources of funding for the program and the types of institutional support available to the Civil Engineering students, faculty and staff.

7.1 Process for Determining Budget for Programs and Institutional Support

Program budgets are departmental budgets, as departments are the fundamental units at the University. Departmental financial resources come under a variety of budget headings, including:

Faculty Salaries
Staff Salaries
Graduate Teaching Assistant Salaries
Part-time Assistant Wages
Operations and Travel
Equipment
Grants and Gifts
Indirect Cost Return

Various salary accounts are used to pay faculty, staff, part-time instructors, and Teaching Assistants (TAs). Research Assistants are generally paid from research contracts and grants. The staff salary account pays the salaries of permanent technical and clerical support staff. The faculty salary account is based on the faculty appointed in the department. As a rule, half of the faculty salaries available due to retirement and resignations remain in the department account for support of part-time instructors and TAs. The other half reverts to the College of Engineering account. Funds for TAs are also included in the salary account, but the funds allocated have never been sufficient to support the TAs for all courses. These funds are, however, supplemented by funds from the faculty salary account, if available.

Funds from the University for faculty travel are very limited. The Department has had an annual allocation of $8,000. Travel funds are supplemented from Indirect Cost Return, Start-up funds for newly hired faculty from the College and Department, and Gift Funds. Faculty travel, conferences and professional meetings are largely paid from research grants and contracts. Indirect Cost Return funds have also been used for small laboratory equipment, faculty office supplies, conference fees and office staff salaries.

The Operations account has been funded by the University at a constant level of $92,000 for the past several years. The Operations account is used to pay for CME office equipment and supplies, laboratory equipment repairs and calibration, laboratory supplies, technician tools and materials, promotional material for the program, meeting and reception expenses, copy machine, mail and telephone.

Several items in Table I-5, Support Expenditures, merit some elaboration.

1. During recent years, the CME Department has been successful in competing within the College of Engineering for equipment grants from the Illinois Board of Higher Education (IBHE). These funds have been used to refurbish and upgrade the equipment in instructional laboratories, as described in Section 6. In particular, the Personal Computers in the Civil Engineering Undergraduate Laboratory have been replaced, and additional software acquired.

2. In 2000 funding was obtained from the College of Engineering to construct a department library and conference room by converting underused space in the area of 3093 ERF; for expenditure of these funds, see Grants and Gifts, FY2002. Before this facility was completed the Department had no meeting space for smaller groups such as the Civil Engineering Program Advisory Committee, visitors from industry or faculty from other institutions, or for departmental committee meetings. By combining the meeting room function with shelving and workspace for a departmental library, both functions are efficiently met.

3. In FY 2002 and FY2003, equipment grants from IBHE are being allocated to more pressing needs arising from the extremely difficult budget situation faced by the State of Illinois. Even so, the ongoing refurbishing and updating of equipment in instructional laboratories has continued in the form of Start-up Funds received for the construction of a new Environmental Engineering Laboratory combining instructional and research functions.

7.2 Faculty Development

Faculty development can be categorized into support for teaching and for research. Support for faculty to develop their teaching philosophies and techniques begins with reduced teaching loads during the first year at the University.

The Office of Electronic Media Production, eMedia for short, develops graphic, video and audio content for all electronic environments and assists faculty in developing entire projects or parts of it. With our production/distribution facility and fiberoptic links with the Academic Computing and Communications Center, eMedia can deliver content in any format, including satellite broadcasting, streaming over the internet, video clips for your web site, large group multi-point videoconferencing, local cable distribution, CD and DVD mastering, or videotape. Budget development and all consultations are free of charge.

The Teaching and Learning Center (TLC) strives to enrich the learning experience by supporting the teaching efforts of faculty and teaching assistants through its various services. The TLC is driven by one purpose - to help faculty and teaching assistants meet their instructional goals. TLC assists faculty every step of the way, from project planning to successful implementation.

Blackboard CourseInfo is a Web-based integrated teaching and learning environment, which has been available at UIC since the May of 1999. Course site development and navigation is accomplished through a consistent and easy-to-use web browser user interface. *Blackboard CourseInfo* stands out among other courseware and online learning environments due to its exceptional ease of use and its rich functionality. It supports content creation and distribution, announcements, threaded discussions, course study groups, real-time chat with Whiteboard and

Web-tours, electronic homework collection, integrated learning units, student assessment with instant grading and feedback, random quizzes, anonymous course evaluations, student tracking and course statistics.

Blackboard CourseInfo is being introduced in CEMM 205, as discussed in Section 4.

7.3 Plan and Sufficiency of Resources for Facilities and Equipment

Ongoing equipment support is needed for instructional laboratories, general computational laboratories, faculty offices and CME office equipment. Funds for these needs comes from three sources:

1. annual grants from the Illinois Board of Higher Education;

2. start-up funds for hiring of new faculty from the Office of the Provost and the Office of the Vice-Chancellor of Research;

3. gifts and instructional grants.

The Department has established a procedure for soliciting and ranking requests from faculty for upgrading instructional laboratories, as described in Section 6. This procedure has been implemented for the past two years, and is working well. However, additional funds are needed.

A second source of funds for a new Environmental Laboratory were acquired from the UIC Campus Administration through the hiring of three new faculty in environmental engineering and water resources. As new faculty are hired in the future in transportation engineering and water resources, additional funding in support of these new faculty will be requested.

Software in support of the transportation engineering curriculum was acquired in 1994 through a grant from a major software vendor, INRO Consultants. Through payment of maintenance fees from research and University accounts, this software has been kept current. A second grant of software is presently being solicited from a competing vendor. Additional grants will be solicited in the future in connection with ongoing research activities.

Gifts from alumni and industry represent a final source of funding for equipment and related laboratory facilities. The College of Engineering has a full-time Development Officer, and is actively pursuing gifts from alumni, emeritus faculty and industry. Through the Civil Engineering Program Advisory Committee, the Department is making new contacts that may yield future gifts.

7.4 Adequacy of Support Personnel

The CME Department is fortunate to have excellent support personnel. The number of people however is minimally adequate. Our staff is dedicated to serving the faculty and student's needs. Support personnel include office staff, two technicians, student assistants, and teaching assistants. See Sections 6.1 and 6.3 for details.

Teaching Assistants assist faculty in the laboratories and grading. Each laboratory section has a TA assigned but a faculty member maintains responsible charge of the Lab and its course content. TAs set up the experiments according to the course syllabus and the faculty member's directions. They instruct the students in the safe operation of equipment or the handling of chemicals, operation of complex machinery, verify data and assist the faculty member in grading and other assignments. TA's also serve as graders and mentors in large section courses and other courses depending on faculty loads.

7.5 Adequacy of Institutional Services

The Academic Center for Excellence (ACE) is a multifaceted academic support program open to all UIC students, from freshman through graduate level. Access to ACE is provided through the UIC website at: http://www.uic.edu/depts/counselctr/ace/center.htm.

A variety of resources are available through ACE to assist students:

1. The Writing Center is a community of faculty and students interested in improving the writing experience of students at UIC. Our most noteworthy resource is our team of undergraduate peer tutors, who learn to complement classroom writing instruction with student-centered strategies for motivation, step by step attention to writing, and meaningful conversation beyond the requirements of an assignment. The Writing Center is part of the English Department and funded by LAS to serve all UIC students.

2. Academic Skills Program (ASP) courses are designed to help students meet the reading, writing, study, and learning demands at UIC. The courses carry 0-3 equivalency credit hours (no graduation credit). For example, A.S.P. 090 CRITICAL READING & THINKING I is designed to teach students how to understand textbook material representing different disciplines. In addition, this course teaches students how to analyze their reading and how to write about it, especially how to write summaries and syntheses of their reading.

3. Tutoring services are offered by subject area for a variety of disciplines, especially outside Engineering.

4. Course materials are provided online through the *Blackboard CourseInfo* service described in Section 7.3.

8. Program Criteria

The program awards the B.S. degree in Civil Engineering with proficiency areas in structural, geotechnical, environmental and transportation engineering. The curriculum specifications and faculty qualifications satisfy ABET criteria. This section documents the adequacy of the curriculum and faculty in meeting the above criteria and guidelines as well as the educational objectives of the program.

8.1 Curriculum

Details of the Civil Engineering curriculum are given in Tables A1 and A2 of Appendix I. Specific criteria to be met under ASCE requirements are discussed in the following sections.

8.1.1 Proficiency in Math, Probability, Statistics, Physics, and Chemistry

The program curriculum (as detailed in Section 4 and summarized in Table A-1) ensures that all graduates will have proficiency in the following subjects by completing the indicated courses:

Math through differential equations (16 hr.): Math 180, 181, 220, 221
Probability and statistics (3 hr.): introduced in CEMM 396
Calculus-based physics (11 hr.): Phys 141, 142, 244
General chemistry (5 hr.): Chem 112

The above subject areas are further reviewed, reiterated, and built upon in several other courses taught within the college and the program. Math is used in all classes, physics in hydraulic engineering, statics, and dynamics; chemistry in CEMM 216 and 260.

8.1.2 Proficiency in Four Areas of Civil Engineering

The program provides for proficiency in four topical areas of civil engineering: environmental, geotechnical, structural, and transportation engineering. The areas and the courses associated with each area are shown in the table below. In addition to the courses in Table 8.1, each student selects three elective 400-level courses, including at least one design course, in their topical area of interest.

Table 8.1 Four Topics of Proficiency and Associated Required Courses

Topic	Hours	Courses
Environmental	6	CEMM 215, 216
Geotechnical	3	CEMM 315
Structural	12	CEMM 205, 301, 310, 434
Transportation	3	CEMM 302

8.1.3 Ability to Conduct Experiments and Analyze/Interpret Data

All graduates acquire laboratory experience and the skills to critically analyze and interpret data. The following courses either have laboratories associated with the course or are laboratory courses themselves:

Chemistry 112
Physics 141, 142 and 244
CEMM 215 Hydraulics and Hydrology
CEMM 216 Introduction to Environmental Engineering
CEMM 260 Properties of Materials
CEMM 300 Composition and Properties of Concrete
CEMM 315 Soil Mechanics and Foundation Engineering

8.1.4 Ability to Perform Design

The ability to design and analyze components, processes or elements is integrated into the curriculum from early stages. Design starts with Engr 100 Orientation and continues through to the capstone course, CEMM 397 Senior Design II. Design is incorporated into most of the courses taught by the Department and many require design projects as part of the course. Examples of this process are presented for each of the areas of proficiency.

Design in Environmental Engineering

The two design courses in this area provide the student with an introduction to the science and design of water treatment and wastewater treatment systems that support society. Both courses contain significant design components in addition to science content. In addition, students may take courses in Environmental Hydrology and Environmental Remediation Engineering.

Design in Geotechnical Engineering

In CEMM 405 students learn the fundamentals of foundation analysis and design.

Design in Structural Engineering

The two basic courses in structural engineering are design of metal and reinforced concrete structures. Then, students have the option of taking one or more advanced courses in reinforced concrete design, design of metal structures, bridge design or prestressed concrete design. In addition, based on feedback from students, alumni and industry, two new courses on design of tall buildings and on design of timber and masonry structures were introduced.

Design in Transportation Engineering

The transportation design course includes geometric design of highways and related topics on traffic engineering that determine the capacity of the roadway.

The material aspect of designs is covered in CEMM 260 Properties of Materials and CE 300 Composition and Properties of Concrete.

8.1.5 Understanding of Professional Practice Issues

Civil Engineering students learn about professional practice issues in the senior design course. During the time students develop their projects they maintain close contacts with professionals involved in their projects. Senior Design I introduces students to professional practice issues; in addition, guest speakers deal with current Civil Engineering problems, professionalism, ethics, and related topics.

The student chapter of ASCE regularly has seminars given by local professionals. Students also learn about professional practice by interacting with the CE faculty in research and consulting projects or during Summer internships and part-time work activities during the academic year.

The importance of professional licensure is stressed throughout the program. Currently, most of our students take the EIT exam prior to graduation.

8.2 Faculty

There are presently13 full-time teaching faculty in the Department plus several adjuncts, most of whom have design experience outside of academia as shown in the Table 8.2. Nine members of the faculty are registered professional engineers.

Table 8.2 Civil Engineering Faculty Experience

Proficiency Area	Design Courses	Faculty Member	Years of Experience	
			Teaching	Consulting
Environmental Engineering	CEMM 421	Khodadoust	2	3
	CEMM 422	Rockne*	2	1
	CEMM 427	Burke*	5	20
	center director	Theis*	30	4
Geotechnical Engineering	CEMM 405	Reddy*	9	5
Structural Engineering	CEMM 301	Masud	8	2
	CEMM 310 CEMM 406	Issa**	13	4
	CEMM 410	Wang	20	3
	CEMM 401 CEMM 494 CEMM 454	Bryant Dranger** Elnimeiri *	40 2 12	15 24 12
Transportation Engineering	CEMM 302 CEMM 402	Boyce* Fazio	36 8	5 8
General	CEMM 396, 397	Lemke*	37	20

* denotes registered Professional Engineer

** denotes registered Professional and Structural Engineer