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# Minnesota State University, Mankato HOLD and CLEAR buttons only compatible with Acrobat 5.0 and 5 Curriculum Proposal

Please type or select the requested information. Print completed forms, add appropriate paper attachments, and route through MSU's curricular process for recommendations and decisions.

(Check all that apply):

College: <u>Science, Engineering and Technology</u>	<input checked="" type="checkbox"/> Undergraduate	Proposal # <u>354</u>	
Department: <u>Mechanical Engineering &amp; Civil Engineer</u>	<input type="checkbox"/> Graduate	Effective Date of Change:	
Program: <u>Civil Engineering</u>	CIP # _____	Academic Year <u>06-07</u>	
Type of Change: <u>N/A Bulletin Changes</u>		(For Office Use Only)	
Proposed: <u>N/A</u>		<b>Course Designator</b>	<b>Number of Credits</b>
Title Current: _____			
Title Proposed: _____			
24-Char. Abbrev: _____		(if applicable)	

Include a course or program description for the Bulletin (30-40 words maximum for courses, 100 for programs):

Rationale or Justification for change:

Clarification of admission requirements and change in probation policy.

**\*\*\*For General Education or Cultural Diversity Courses Only\*\*\***

General Education Course:	Cultural Diversity Course:
GE Category #    GE Category Name (Maximum of 3 Categories)	(Please check one.)
<u>N/A</u>	<input type="checkbox"/> <b>Core</b> (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)  <input type="checkbox"/> <b>Related</b> (At least 25% devoted to the above topics or to a global perspective on topics related to African American, Asian, Hispanic, and Native American inhabitants of the United States.)
<u>N/A</u>	
<u>N/A</u>	

For Writing Intensive Courses, attach a description of the kind and quantity of writing.  
 For Upper Division Courses, include a description of the respects in which it is broad and general rather than narrow and specific, and so suitable as GE.

Attach paper copies of the following:

- Syllabus or course outline.
- Course's student learning outcomes associated with each GE competency or CD designation.
- List of strategies to be used to assess students' achievement of each GE competency or CD designation.

**\*\*\*For New Courses\*\*\***

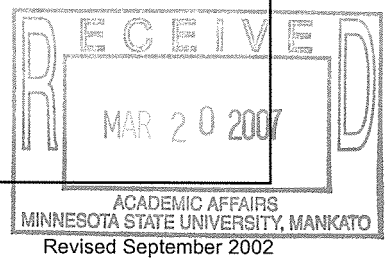
(Check all that apply):

<input type="checkbox"/> Course is an elective. <input type="checkbox"/> Course is required for program <input type="checkbox"/> Pre- or Co-requisites: <input type="checkbox"/> Other courses are being changed or eliminated. (Explain.) _____	Instructional Type: <u>Lecture</u> Grading Format: <input type="checkbox"/> Grade <input type="checkbox"/> P/N _____ _____	Course will be offered: <input type="checkbox"/> Fall Semester <input type="checkbox"/> Spring Semester <input type="checkbox"/> Summer Session
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Course content or title is similar to courses in other departments. (Attach copy of letter of agreement with other program(s) contacted. Indicate the nature of the discussions and/or resolution of differences or potential conflicts.)

Attach paper copies of the following:

- Syllabus or course outline.
- Course's student learning outcomes.
- A list of resources required to offer and support this course.
- A description of how teaching this course will affect department staffing.
- If 400/500 level course, an explanation of added expectations of graduate students.





Minnesota State University, Mankato  
Curriculum Proposal

\*\*\*Signature Page\*\*\*

**Department**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

Charles [Signature] (March 2007)  
 Department Chair Date

Comments:

**College Curriculum Committee**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

Karen C. Chron 3/9/07  
 Committee Chair Date

Comments:

**College Dean**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

[Signature] 3/19/07  
 Dean Date

Comments:

**General Education Subcommittee**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

\_\_\_\_\_  
 General Education Subcommittee Chair Date

Comments:

**Undergraduate Curriculum and Academic Policy Committee**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

\_\_\_\_\_  
 UCAP Faculty Chair Date

Comments:

**Faculty Association Graduate Committee**

Recommended  
 Not Recommended

\_\_\_\_\_  
 Faculty Association Graduate Chair Date

Comments:

**Graduate Dean**

Recommended  
 Not Recommended

\_\_\_\_\_  
 Graduate Dean Date

Comments:

**Academic Affairs Council**

Recommended (Category/ies \_\_\_\_\_)  
 Not Recommended (Category/ies \_\_\_\_\_)

\_\_\_\_\_  
 Assistant Vice President Date

Comments:

**Senior Vice President and Vice President for Academic Affairs**

Approved (Category/ies \_\_\_\_\_)  
 Not Approved (Category/ies \_\_\_\_\_)

\_\_\_\_\_  
 Sr. Vice President / Vice Pres. Academic Affairs Date

Comments:

Department of Mechanical & Civil Engineering  
Minutes of Meeting  
2/23/2007

The meeting started at 1:02 p.m. with all department members present.

0. Minutes: The minutes of the two previous meetings of 1/30/07 and 2/6/07 were approved for issue.

1. Announcements:

- C. Johnson announced that research release time applications are due February 28.
- There was continuing discussion of the graduate faculty status. This included the idea of release time and the cycle times for applying for graduate faculty status.
- K. Chou brought up the selection process for the Dean search. The evaluations will be done by departments.
- D. Nykanen requested we announce the MAX Scholarship in our classes.
- P. Tebbe reminded department members there will be a graduate coffee hour this coming Tuesday, February 27.
- V. Nikolic raised some questions regarding graduate faculty status. There are levels of graduate faculty status. For the regular level, the department members are grandfathered and automatically become graduate faculty if they were previously graduate faculty. A next level of research graduate faculty will require the faculty apply for this. C. Johnson hopes to form a department committee to address the graduate faculty status question soon.
- J. Wilde announced that in two weeks the Civil Engineering Department will be hosting a Regional Conference involving eight other universities and a large number of students.

2. Bulletin Change: J. Wilde reviewed the proposed bulletin changes for the Civil Engineering Program that had earlier been forwarded to department members. There was some discussion of this in the area of the probationary status and a wording change was made. A motion was made by P. Tebbe that the same bulletin description be applied to Mechanical Engineering. This was seconded by J. Wilde. The motion passed.

C. Johnson suggested that the department keep a record of documents that are discussed in the meeting and acted on, such as the new bulletin change. The department will ask J. Willaert to keep a copy of attachments for the department record. It will not be necessary to attach these to emails to the larger CSET minutes distribution.

3. Teaching Assignments: C. Johnson handed out a listing of teaching assignments for the coming academic year. There was general discussion regarding the load assignment for various courses, especially labs. There is concern about staffing the courses in Spring 2008 as two department members will be on sabbatical. C. Johnson will request an additional person for Spring 2008. K. Chou suggested that people consider indicating courses they would be interested in teaching in rotation to fill in for the sabbatical leave faculty. The need to fill in for faculty who are on sabbatical will be a continuing need. C. Johnson requested department members let him know if we have any comments or questions regarding the teaching assignments.

The meeting adjourned at 1:57 p.m.

Respectfully submitted,

Vance Browne

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## CIVIL ENGINEERING

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### Civil Engineering

College of Science, Engineering and Technology  
 Department of Mechanical & Civil Engineering  
 205 Trafton Science Center E • 507-389-6383  
 Fax 507-389-5002  
 Web site: ce.mnsu.edu

Chair: Saeed Moaveni, Ph.D., P.E.

Vance Browne, Ph.D., P.E.; Aaron S. Budge, Ph.D.; Karen C. Chou, Ph.D., P.E.; Jerzy Fiszdon, Ph.D., P.E.; Charles W. Johnson, Ph.D., P.E.; Vojin Nikolic, Ph.D.; Deborah K. Nykanen, Ph.D., P.E.; Jin Park, Ph.D.; Patrick A. Tebbe, Ph.D., P.E.; W. James Wilde, Ph.D., P.E.

Adjunct Faculty: William J. Billett, P.E.; Herman A. Dharmarajan, Ph.D., P.E.; DEE; William R. Douglass, P.E.; D. Joseph Duncan, P.E.; Theodore V. Galambos, Ph.D., P.E.; Jon Huseby, P.E.; Peter Kjeer; Mark R. Knoff, Ph.D., P.E.; Timothy O. Loose, P.E.; Omid Mohseni, Ph.D., P.E.; Ken Saffert, P.E.; Mark B. Snyder, Ph.D., P.E.; Chad Surprenant, P.E.

Civil Engineering, as defined by the American Society of Civil Engineers, is a profession in which a knowledge of the mathematical and physical science gained by study, experience, and practice is applied with judgement to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of humanity in creating, improving and protecting the environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of humanity.

Civil engineers design and supervise, among others, the construction of roads, buildings, airports, tunnels, dams, bridges, and water supply and water and wastewater treatment systems. Major specialties within civil engineering are: structures, geotechnical engineering, water resources, transportation, environmental engineering, and construction.

Many civil engineers hold administrative positions, from city engineers to deputy commissioner of state department of transportation. Others may work in design, construction, research, and teaching. Most civil engineers hold supervisory positions such as project engineers.

#### Accreditation

The Civil Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700.

**Program Objectives.** The Mission of the Civil Engineering Program at Minnesota State Mankato, is to provide a broad-based education that will enable graduates to enter practice in the civil engineering profession, serving the needs of the State of Minnesota and the Nation.

Graduates of the civil engineering program at Minnesota State Mankato will be prepared:

1. with a strong technical foundation to practice civil engineering, or to pursue graduate studies, particularly in four major disciplines: geotechnical, structural, transportation, and water resources engineering;
2. to become registered professional engineers;
3. to communicate technical information effectively with the public, their peers, and clients;
4. with an understanding of the need for life-long learning and of the importance for community and professional involvement; and
5. with an awareness of cultural, societal, and professional issues.

The program mission and educational objectives are fully compatible with the mission of Minnesota State Mankato and the College of Science, Engineering, and Technology. Program objectives are monitored by the constituencies (civil engineering profession through the program's Industrial Advisory Board and employers, alumni, students, and faculty of the program).

Other important features of an education in civil engineering at Minnesota State Mankato include:

- Senior students work together as a design team in a full academic year course incorporating multiple civil engineering disciplines in comprehensive design project.
- Students work closely with engineers from design firms and government agencies and with faculty and students from other engineering courses in the senior design project.
- Students are required to take the Fundamentals of Engineering exam in their senior year – the first step towards professional registration.
- The flexible curriculum allows the students to have either a diverse or focused civil engineering study.
- The faculty maintains ties to industry, thereby keeping current with new technologies, design methodologies, and the world of civil engineering practice – a valuable resource for students.

#### Preparations

Recommended high school preparation is two years of algebra, one year of geometry, one-half year of trigonometry, one-half year of college algebra, and a year each of physics and chemistry. Computer skills such as word processors, spreadsheets, and PowerPoint presentation or similar are also recommended. Without this background it may take longer than four years to earn the degree.

Admission to Program is necessary before enrolling in 300- and 400-level courses. Admission to the program is granted by the department. Near the end of the sophomore year, students should submit an application for admission to the civil engineering program. Applications to the program may be obtained from the Department of Mechanical and Civil Engineering or downloaded from the department homepage.

Admission to the program is based on GPA and performance in selected courses and is subject to approval by the Department of Mechanical and Civil Engineering. Only students admitted to the program are permitted to enroll in upper-division civil engineering courses. Generally, no transfer credits are allowed for upper-division civil engineering courses. For any exceptions to this policy, special written permission must be obtained and will be reviewed by the department. The department makes a special effort to accommodate transfer students. Transfer students are encouraged to contact the department as soon as possible to facilitate a smooth transition. Please feel free to write, call, or visit the department.

Before being admitted to upper-division civil engineering courses, a student must complete a minimum of 50 credits, including the following courses: General Physics (calculus based) 10 credits; Calculus and Differential Equations 16 credits; Introduction to Engineering 2 credits; Computer Graphics 2 credits; Introduction to Problem Solving and Civil Engineering Design 2 credits; Engineering Mechanics (Statics, Dynamics, and Mechanics of Materials) 9 credits; Chemistry 5 credits; and English Composition 4 credits. Moreover, students are required to take a diagnostic test. The purpose of the test is to identify areas of weakness so that we can provide future improvements in those areas.

For transfer students the distribution of credits specified in the previous paragraph may vary, but the total credits must satisfy departmental transfer requirements. Transfer students should contact the department for individual evaluation.

All courses and credits shown above must be completed before enrollment in 300-level engineering courses. All of the above courses except internship credits must be taken for "grade". It is not acceptable for the student to take any of these courses on a pass/no credit basis. A grade of "C" or better must be achieved in each course. To be considered for admission, the student must have a cumulative GPA of 2.5 for all science, math, ME, and CIVE courses. Admission to the Civil Engineering Program is selective and subject to approval of the Civil Engineering Academic Standards Committee. Failure to submit an application could result in the student being denied admission to the program and registration in junior or higher level classes in the Civil Engineering Program. If a student is denied admission to the Civil Engineering Program, he/she can reapply to the Civil Engineering Program for admission in subsequent years. If the applicant has attended Minnesota State Mankato only the application form is submitted to the Department of Mechanical and Civil Engineering along with

a copy of that student's Minnesota State Mankato transcript obtained from "The Hub". If the applicant has transfer credits from another college or university, or expects to be admitted as a transfer student, all transfer courses/credits must be evaluated by the Office of Admissions at Minnesota State Mankato. The transfer student will need to refer to the Supplemental Information and/or the Minnesota State Mankato, Undergraduate Bulletin for information about procedures that need to be followed when making application for admission as a transfer student. Applicants for admission to the program must also submit a complete plan of study.

#### CIVIL ENGINEERING BSCE

Required (Special General Education, 23 credits):

The Bachelor of Science in Civil Engineering degree does NOT adhere to the 44 credits of general education required by other programs. Rather it requires a special distribution of communication, humanities, and social science courses. Courses should be chosen to simultaneously satisfy the university cultural diversity requirement.

Required Communication Courses (7 credits):

ENG	101	Composition (4) AND
SPEE	102	Public Speaking (3) OR
SPEE	233	Public Speaking for Technical Professionals (3) OR
ENG	271	Technical Communication (4)

Required Humanities and Social Science Courses (minimum of 16 credits):

To satisfy this requirement, the courses selected must provide both breadth and depth and not be limited to a selection of unrelated introductory courses. Not all courses in humanities and social sciences are acceptable. Courses should be chosen to simultaneously satisfy the university cultural diversity requirement. Each student should discuss with his/her civil engineering advisor on the selection of courses to meet this requirement. All students are urged to discuss this plan with their civil engineering advisors early in their academic career. An updated list of acceptable courses is posted in the department office and on the web.

Specifically, the minimum requirements consist of (a) three credits of micro-economics or macroeconomics, (b) at least 6 credits in the humanities area, and (c) at least 6 credits in the social science area; again (a), (b), and (c) must total at least 16 credits.

To provide the measure of depth to the course of study, at least 3 credits at the 300-level or above must be included in the 16 credit requirement. At least one upper division course must follow a course in the same subject area.

Required for Major (Prerequisites, 62-63 credits):

Mathematics (16 credits):

MATH	121	Calculus I (4)
MATH	122	Calculus II (4)
MATH	223	Calculus III (4)
MATH	321	Ordinary Differential Equations (4)

Basic Science (19-20 credits):

CHEM	201	General Chemistry I (5)
PHYS	221	General Physics I (5)
PHYS	222	General Physics II (5)

Science Elective from approved list (4-5)

Engineering Science (27 credits):

CIVE	101	Introduction to Engineering-Civil (2)
CIVE	145	CAD for Civil Engineering (2)
EE	230	Circuit Analysis I (3)
ME	206	Materials Science (3)
ME/CIVE	212	Statics (3)
ME/CIVE	214	Dynamics (3)
ME	291	Engineering Analysis (3)
ME/CIVE	223	Mechanics of Materials (3)
ME	299	Thermal Analysis (2) OR
ME	241	Thermodynamics (3)
ME/CIVE	321	Fluid Mechanics (3)

Required for Major (42-43 credits):

CIVE	201	Intro. to Problem Solving and Civil Engineering Design (2)
CIVE	271	Civil Engineering Measurements (2)

CIVE	340	Structural Analysis (3)
CIVE	350	Hydraulics & Hydrology (4)
CIVE	360	Geotechnical Engineering (4)
CIVE	370	Transportation Engineering (4)
CIVE	401	Civil Engineering Design I (2)
CIVE	402	Civil Engineering Design II (3)
CIVE	435	Civil Engineering Experimentation I (2)
CIVE	436	Civil Engineering Experimentation II (2)
CIVE	446	Reinforced Concrete Design (3) OR
CIVE	448	Steel Design (3)
CIVE		electives (7-10 credits)
		Technical electives from approved list (2-4 credits)

Required Minor: None.

Civil, Science and Technical Electives

A civil engineering student is required to choose a minimum of 16 credits in CIVE, science and technical electives: science elective (4-5 credits), technical electives (2-4 credits), and CIVE electives (7-10 credits). The science and technical electives are recommended to be taken after the student has identified his/her area of interest in consultation with his/her academic advisor. Science elective must be selected from the approved list (shown below) which would complement the student's area of interest in civil engineering. Technical electives must be selected from the approved list (shown below) which would enhance the student's experience in civil engineering.

Approved Science Electives:

BIOL	105W	General Biology I (5)
CHEM	202	General Chemistry II (5)
ENVR	101	Persp. in Environ. Science (4)
GEOL	121	Physical Geology (4)

Approved Technical Electives:

All CIVE courses except required courses

All EE courses 300-level and above and EE 250 (Engineering Economics)

All ME courses 300-level and above except required courses

BIO	270	Microbiology (4)
BLAW	450	Contracts, Sales & Prof. Responsibility (3)
BLAW	453	International Legal Environ. of Business (3)
BLAW	474	Environ. Regulation & Land Use (3)
BLAW	476	Construction and Design Law (3)
CHEM	305	Analytical Chemistry (4)
CHEM	407	Water Chemistry (3)
ENVR	440	Environmental Regulations (3)
ENVR	450	Environmental Pollution & Control (3)
ENVR	460	Analysis of Pollutants (4)
GEOL	270	Structural Geology (4)
GEOL	351	Engineering Geology (2)
GEOL	450	Hydrogeology (3)

#### POLICIES/INFORMATION

**GPA Policy.** To maintain satisfactory progress in the upper-division Civil Engineering Program, a student must: (1) maintain a GPA of 2.3 for all upper-division engineering courses required for the major; and (2) achieve a GPA of at least 2.0 each semester.

**P/N Grading Policy.** P/N credit may not be applied to any course in the civil engineering curriculum except for internship credits and courses designated as P/N only.

**Probation Policy.** A student who does not maintain satisfactory progress as defined above will be placed on academic probationary status for a maximum of one semester. During the probationary period, the student must maintain satisfactory progress in addition: (a) must complete at least 8 credits for grade from the prescribed Civil Engineering curriculum; and (b) shall not receive a degree without first conforming to the satisfactory progress criteria. A student who does not maintain satisfactory progress during the probationary period will not be allowed to continue in the program. The student may later reapply for admission to the program.

Refer to the College policies regarding advising for students on academic proba-

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**CIVIL ENGINEERING**


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tion.

Appeals. A student has the right to appeal a department decision in writing. The department will consider such appeals individually.

Course Repeat Policy: Only the first 12 semester credits of repeated classes will be exempted from GPA calculation.

For the most up-to-date list of Civil Engineering courses, please visit our web site at [ce.mnsu.edu](http://ce.mnsu.edu). Also see the Mechanical Engineering program for detailed description of ME courses and ME/CIVE dual listing courses, that are required for the Civil Engineering Program.

**COURSE DESCRIPTIONS**
**CIVE 101 (2) Introduction to Engineering - Civil**

To prepare the students for a career in engineering with some emphasis in civil; introduce the engineering fundamentals and the skills necessary to have a successful learning experience; and to prepare students for engineering education and profession through interactions with upper-class engineering students and practicing engineers.

**CIVE 145 (2) CAD for Civil Engineering**

Basic computer applications for drafting and designing civil engineering projects. Structure and use of standard CAD software. Basic orthographic construction and projections, and development of different types of drawings - sections, plan and profile, and construction details.

**CIVE 201 (2) Introduction to Problem Solving and Civil Engineering Design**

Introduction to the design concepts of civil engineering projects including presentations, codes and standards, construction drawings, and public hearing; problem solving skills for civil engineering analysis and design including the use of appropriate computational tools and programming logic.

Pre-req: CIVE 101, Co-Req: CIVE 145, MATH 121 F, S

**CIVE 212 (3) Statics**

Same as ME 212.

**CIVE 214 (3) Dynamics**

Same as ME 214.

**CIVE 223 (3) Mechanics of Materials**

Same as ME 223.

**CIVE 271 (2) Civil Engineering Measurements**

Basic civil engineering measurements as relates to construction layout, including distances, angles, bearings, elevations, mapping, and positioning.

Co-req: MATH 121 or instructor consent

**CIVE 321 (3) Fluid Mechanics**

Same as ME 321.

**CIVE 340 (3) Structural Analysis**

Analysis of determinate and indeterminate structural systems using classical methods such as consistent displacements, energy method, slope-deflection and moment distribution. Use of computer software is expected.

Pre: ME/CIVE 223

**CIVE 350 (4) Hydraulics and Hydrology**

Concept of hydraulics such as pipe flow and open channel flow. Hydrologic principles such as weather patterns; precipitation measurement and distribution, abstractions, and runoff; storm hydrograph and peak flow analysis. Design includes flood design, reservoir and channel routing.

Pre: ME/CIVE 321

**CIVE 360 (4) Geotechnical Engineering**

Study of soil behaviors and their classifications; index properties. Applications of mechanics principles to soils as an engineering material, consolidation

theory, compaction theory, effective stresses, shear strength; earth pressure and slope stability. Elements of foundation designs.

Pre: ME/CIVE 223 and Co-req.: ME/CIVE 321

**CIVE 370 (4) Transportation Engineering**

Introduction to Transportation systems; land use and transportation interaction, planning, and traffic operations; transportation decision making using economic analysis. Introduction to design, construction, maintenance, and operation of various transportation modes.

Pre-req: CIVE 271 or consent of instructor.

**CIVE 380 (3) Environmental Engineering**

Introduction of the fundamental chemical, biological and physical principles of environment engineering for water and wastewater treatment and distribution systems, solid waste management, air pollution control, and the analysis of air quality, surface water, and ground water.

Prereq: CHEM 201, MATH 321, and Coreq: ME 321 or instructor consent.

**CIVE 401 (2) Civil Engineering Design I**

Practical civil engineering design project with "real world" constraints. This course focuses on the planning and formulation of project, and the presentation of the preliminary findings to the public.

Pre-req: senior civil engineering standing

**CIVE 402 (3) Civil Engineering Design II**

Practical civil engineering design project with "real world" constraints. Focuses on the engineering analysis, design, and economic analysis of the project. Includes a design lab.

Pre-req: CIVE 401

**CIVE 432 (3) Properties of Concrete**

Selected studies in the properties and design of concrete mixtures, cement chemistry, concrete durability, specialty concrete construction, admixtures, and quality control.

Prereq: CIVE 435 or consent of instructor

**CIVE 435 (2) Civil Engineering Experimentation I**

To provide students with hands-on experience in the testing of civil engineering materials such as concrete and metals and structural systems. The course also provides students with experiments in transportation.

Pre-req.: CIVE 340 & 370

**CIVE 436 (2) Civil Engineering Experimentation II**

To provide students with hands-on experience in testing civil engineering materials such as soil and asphalt. The course also provides students with experiments in fluid mechanics, hydraulics, and hydrology.

Pre-req: CIVE 350, 360

**CIVE 446 (3) Reinforced Concrete Design**

Design of reinforced concrete beams, columns, slabs and structural foundations. Use of standard specifications is required. Use of computer software is expected

Pre: CIVE 340

**CIVE 448 (3) Steel Design**

Behavior and properties of structural steel; proportionality of tension members, beams, and columns and design of connections using LRFD specifications.

Pre: CIVE 340

**CIVE 450 (3) Finite Element Method**

Same as ME 450

**CIVE 452 (3) Open Channel Flow**

Analysis of open channel flow systems. Includes natural channels, designed channels, flow transitions, steady flow, unsteady flow, uniform flow, and non-uniform flow.

Pre-req: CIVE 350

**CIVE 454 (3) Hydraulic Structures**

Analysis and design of water regulating structures. Includes dams, spillways,

## Civil Engineering

College of Science, Engineering and Technology  
Department of Mechanical & Civil Engineering  
205 Trafton Science Center E • 507-389-6383  
Fax 507-389-5002

Web site: ce.mnsu.edu

Chair: Saeed Moaveni Charles W. Johnson, Ph.D., P.E.

Vance Browne, Ph.D., P.E.; Aaron S. Budge, Ph.D.; Karen C. Chou, Ph.D., P.E.;  
Jerzy Fiszdon, Ph.D., P.E.; ~~Charles W. Johnson~~ Saeed Moaveni, Ph.D., P.E.;  
Vojin Nikolic, Ph.D.; Deborah K. Nykanen, Ph.D., P.E.; Jin Park, Ph.D.; Patrick  
A. Tebbe, Ph.D., P.E.; W. James Wilde, Ph.D., P.E.

Adjunct Faculty: William J. Billett, P.E.; Herman A. Dharmarajan, Ph.D., P.E., DEE;  
William R. Douglass, P.E.; D. Joseph Duncan, P.E.; Theodore V. Galambos, Ph.D.,  
P.E.; Jon A. Huseby, P.E.; Peter Kjeer; Mark R. Knoff, Ph.D., P.E.; Timothy O. Loose,  
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- Students are required to take a diagnostic test. The purpose of the test is to identify areas of weakness so that we can provide future improvement in those areas.

#### Preparations

Recommended high school preparation is two years of algebra, one year of geometry, one-half year of trigonometry, one-half year of college algebra, and a year each of physics and chemistry. Computer skills such as word processors, spreadsheets, and PowerPoint presentation or similar are also recommended. Without this background it may take longer than four years to earn the degree. Admission to Program is necessary before enrolling in 300- and 400-level courses. Admission to the program is granted by the department. Near the end of the sophomore year, students should submit an application for admission to the civil engineering program. Applications to the program may be obtained from the Department of Mechanical and Civil Engineering or downloaded from the department homepage. Failure to submit an application will result in the student being denied registration in upper division courses in the Civil Engineering Program.

Admission to the program is based on GPA and performance in selected courses and is subject to approval by the Department of Mechanical and Civil Engineering. Only students admitted to the program are permitted to enroll in upper-division civil engineering courses. Generally, no transfer credits are allowed for upper-division civil engineering courses. For any exceptions to this policy, special written permission must be obtained and will be reviewed by the department. The department makes a special effort to accommodate transfer students. Transfer students are encouraged to contact the department as soon as possible to facilitate a smooth transition. Please feel free to write, call, or visit the department.

Before being admitted to upper-division civil engineering courses, a student must complete a minimum of 50 credits, including the following courses: calculus based General Physics (calculus-based) 10 credits; Calculus and Differential Equations 16 credits; Introduction to Engineering 2 credits; Computer Graphics 2 credits; Introduction to Problem Solving and Civil Engineering Design 2 credits; Engineering Mechanics (Statics, Dynamics, and Mechanics of Materials) 9 credits; Chemistry 5 credits; and English Composition 4 credits. ~~Moreover, students are required to take a diagnostic test. The purpose of the test is to identify areas of weakness so that we can provide future improvements in those areas.~~ For transfer students the distribution of credits specified in the previous paragraph may vary, but the total credits must satisfy departmental transfer requirements. Transfer students should contact the department for individual evaluation. Transfer students must take a minimum of 12 credits at MSU prior to being considered for full admission to the program.

All courses and credits shown above must be completed, for grade, before enrollment in 300-level engineering courses. ~~All of the above courses except internship credits must be taken for grade. It is not acceptable for the student to take any of these courses on a pass/no credit basis. A grade of "C" or better must be achieved in each course. To be considered for admission a grade of C or better must be achieved in each course, and a~~ the student must have a cumulative GPA of 2.5 for all science, math, ME and EE courses listed above. All courses taken from the list above (including those for repeated courses) will be considered in the computation of the GPA for admission to the program. Transfer credits will not be used in the computation of the GPA for admission to the program. Admission to the Civil Engineering Program is selective and subject to approval of the Civil Engineering Academic Standards Committee. ~~Failure to submit an application could result in the student being denied admission to the program and registration in junior or higher level classes~~

Mankato

in the CIVE program. If a student is denied admission to the Civil Engineering Program, he/she can reapply to the program for admission in subsequent years. If the applicant has attended Minnesota State Mankato only, the application form is submitted to the Department of Mechanical and Civil Engineering along with a copy of that student's Minnesota State Mankato transcript obtained from "The Hub". Pre-engineering students at Minnesota State Mankato are not guaranteed admission to the junior-level CIVE Program. If the applicant has any transfer credits from another college or university, or expects to be admitted as a transfer student, all transfer courses/credits must be evaluated by the Office of Admissions at Minnesota State Mankato. The transfer student will need to Transfer students should refer to the Supplemental Information and/or in the Minnesota State Mankato Undergraduate Bulletin for information about procedures that need to be followed when making application applying for admission as a transfer student. Applicants for admission to the program must also submit a complete plan of study to the university. If a student is denied admission to the Civil Engineering Program, he/she can reapply to the Civil Engineering Program for admission in subsequent years.

#### CIVIL ENGINEERING BSCE

Required (Special General Education, 23 credits):

The Bachelor of Science in Civil Engineering degree does NOT adhere to the 44 credits of general education required by other programs. Rather it requires a special distribution of communication, humanities, and social science courses. Courses should may be chosen to simultaneously satisfy the university cultural diversity requirement concurrently.

Required Communication Courses (7 credits):

ENG 101 Composition (4) AND

SPEE 102 Public Speaking (3) OR

SPEE 233 Public Speaking for Technical Professionals (3) OR

ENG 271 Technical Communication (4)

Required Humanities and Social Science Courses (minimum of 16 credits):

~~In the interest of making engineers fully aware of their social responsibilities and better able to consider related factors in the decision-making process, course work in the humanities and social sciences is required as an integral part of our civil engineering program. To satisfy this requirement, the course selected must provide both breadth and depth and not be limited to a selection of unrelated introductory courses. Not all courses in humanities and social sciences are acceptable, i.e. skill-developing courses are not acceptable. Courses should be chosen to simultaneously satisfy the university cultural diversity requirement. Each student should discuss with his/her civil engineering advisor the selection of courses to meet this requirement. All students are urged to discuss this plan with their civil engineering advisors early in their academic career. An updated list of acceptable courses is posted in the department office and on the web site.~~

~~Specifically, the minimum requirements consist of (a) three credits of Microeconomics or macroeconomics, (b) at least 6 credits in the humanities area, and (c) (b) at least 9 credits in the social science area, of which 3 credits must be either microeconomics or macroeconomics; again, (a), (b), and (c) (b) must total at least 16 credits.~~

To provide the measure of depth to the course of study, at least three credits at the 300 level or above must be included in the 16 credit requirement. At least one upper-division course must follow a course in the same subject area.

Required for Major (Prerequisites, 62-63 credits):

Science and Mathematics (35 credits):

~~Mathematics (16 credits):~~

MATH 121 Calculus I (4)

MATH 122 Calculus II (4)

MATH 223 Calculus III (4)

MATH 321 Ordinary Differential Equations (4)

~~Basic Science (19-20 credits):~~

CHEM 201 General Chemistry I (5)

PHYS 221 General Physics I (5)

PHYS 222 General Physics II (5)

Science Elective from approved list (4-5 4)

Basic Engineering Science (27 25 credits):

CIVE 101 Introduction to Engineering-Civil (2)  
CIVE 145 CAD for Civil Engineering (2)  
CIVE 201 Intro. to Problem Solving and Civil Engineering Design (2)  
CIVE 271 Civil Engineering Measurements (2)  
EE 230 Circuit Analysis I (3)  
ME 206 Materials Science (3)  
ME/CIVE 212 Statics (3)  
ME/CIVE 214 Dynamics (3)  
ME 291 Engineering Analysis (3)  
ME/CIVE 223 Mechanics of Materials (3)  
ME 299 Thermal Analysis (2) OR  
ME 241 Thermodynamics (3)  
ME/CIVE 321 Fluid Mechanics (3)

Required for Major (42-43 45 credits):

CIVE 201 Intro. to Problem Solving and Civil Engineering Design (2)  
CIVE 271 Civil Engineering Measurements (2)  
ME/CIVE 321 Fluid Mechanics (3)  
CIVE 340 Structural Analysis (3)  
CIVE 350 Hydraulics & Hydrology (4)  
CIVE 360 Geotechnical Engineering (4)  
CIVE 370 Transportation Engineering (4)  
CIVE 380 Environmental Engineering (3)  
CIVE 401 Civil Engineering Design I (2)  
CIVE 402 Civil Engineering Design II (3)  
CIVE 435 Civil Engineering Experimentation I (2)  
CIVE 436 Civil Engineering Experimentation II (2)  
CIVE 446 Reinforced Concrete Design (3) OR  
CIVE 448 Steel Design (3)  
CIVE electives (7-10 credits)  
Technical electives from approved list (2-4 credits)

Required Minor: None.

Civil, Science and Technical Electives

A civil engineering student is required to choose a minimum of 16 credits in CIVE-civil, science and technical electives as follows: science elective (4-5 4 credits), technical electives (2-4 credits), and CIVE electives (7-10 credits). The science and technical electives are recommended to be taken after the student has identified his/her area of interest in consultation with his/her academic advisor. Science and technical electives must be selected from the approved lists (shown below) which would complement the student's area of interest in civil engineering. Technical electives must be selected from the approved list (shown below) which would and enhance the student's experience in civil engineering.

Approved Science Electives:

BIOL 105W General Biology I (5)  
CHEM 202 General Chemistry II (5)  
ENVR 101 Persp. in Environ. Science (4)  
GEOL 121 Physical Geology (4)

Approved Technical Electives:

All CIVE courses except required courses  
All EE courses 300-level and above and EE 250 (Engineering Economics)  
All ME courses 300-level and above except required courses  
BIO 270 Microbiology (4)  
BLAW 450 Contracts, Sales & Prof. Responsibility (3)  
BLAW 453 International Legal Environ. of Business (3)  
BLAW 474 Environ. Regulation & Land Use (3)  
BLAW 476 Construction and Design Law (3)  
CHEM 305 Analytical Chemistry (4)  
CHEM 407 Water Chemistry (3)  
ENVR 440 Environmental Regulations (3)  
ENVR 450 Environmental Pollution & Control (3)  
ENVR 460 Analysis of Pollutants (4)  
GEOL 270 Structural Geology (4)  
GEOL 351 Engineering Geology (2)  
GEOL 450 Hydrogeology (3)

NA or 12 up

## POLICIES/INFORMATION

GPA Policy To maintain satisfactory progress in the upper-division Civil Engineering Program Satisfactory Progress. Once admitted to the civil engineering program, a student must maintain satisfactory progress in the upper-division Civil Engineering program, a student must by:

(1) maintaining a cumulative GPA of 2.3 for all upper-division engineering courses required for the major; and (2) achieving a GPA of at least 2.0 each semester for all courses required for the major. All courses, including repeated courses, will be used in the GPA calculations above.

P/N Grading Policy. P/N credit may will not be applied to any course in used to meet the civil engineering curriculum except for internship credits and courses designated as P/N only degree requirements.

Probation Policy. Once admitted to the program, a A student who does not maintain satisfactory progress as defined above will be placed on academic program probationary status for a maximum of one semester. During the probationary period, the student must maintain achieve satisfactory progress and, in addition: (a) must complete at least 8 credits, approved by the department, of upper-division engineering courses for grade from the prescribed Civil Engineering curriculum; and (b) shall not receive a degree without first conforming to the satisfactory progress criteria. A student who does not maintain satisfactory progress during the probationary period will not be allowed to continue in the program. The student may later reapply for admission to the program. If readmitted, only probationary status will be granted, and continuation in the program will be based on performance in courses specified in a contract with the department.

Refer to the College policies regarding required advising for students on academic probation.

Appeals. A student has the right to may appeal a any department decision in writing. The department will consider such appeals individually.

Course Repeat Policy. Only the first 12 semester credits of repeated classes will be exempted from GPA calculation.

For the most up-to-date list of Civil engineering courses, please visit our web site at [me.mnsu.edu](http://me.mnsu.edu). Also see the Mechanical Engineering program for detailed description of ME courses and ME/CIVE dual listing courses, that are required for the Civil Engineering Program

Civil Engineering  
College of Science, Engineering and Technology  
Department of Mechanical & Civil Engineering  
205 Trafton Science Center E  
507-389-6383  
Fax 507-389-5002  
Web site: ce.mnsu.edu

Chair: Charles W. Johnson, Ph.D., P.E.

Vance Browne, Ph.D., P.E.; Aaron S. Budge, Ph.D.; Karen C. Chou, Ph.D., P.E.; Jerzy Fiszdon, Ph.D., P.E.; Saeed Moaveni, Ph.D., P.E.; Vojin Nikolic, Ph.D.; Deborah K. Nykanen, Ph.D., P.E.; Jin Park, Ph.D.; Patrick A. Tebbe, Ph.D., P.E.; W. James Wilde, Ph.D., P.E.

Adjunct Faculty: William J. Billett, P.E.; Herman A. Dharmarajan, Ph.D., P.E.; DEE; William R. Douglass, P.E.; D. Joseph Duncan, P.E.; Theodore V. Galambos, Ph.D., P.E.; Jon Huseby, P.E.; Peter Kjeer; Mark R. Knoff, Ph.D., P.E.; Timothy O. Loose, P.E.; Omid Mohseni, Ph.D., P.E.; Ken Saffert, P.E.; Chad Surprenant, PE.

Civil Engineering, as defined by the American Society of Civil Engineers, is a profession in which a knowledge of the mathematical and physical science gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of humanity in creating, improving and protecting the environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of humanity.

Civil engineers design and supervise, among others, the construction of roads, buildings, airports, tunnels, dams, bridges, and water supply and water and wastewater treatment systems. Major specialties within civil engineering are: structural, geotechnical, water resources, transportation, environmental, and construction engineering.

Many civil engineers hold administrative positions, from city engineers to deputy commissioner of state department of transportation. Others may work in design, construction, research, and teaching. Most civil engineers hold supervisory positions such as project engineers.

#### Accreditation

The Civil Engineering program is accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; telephone: (410) 347-7700.

Program Objectives. The Mission of the Civil Engineering Program at Minnesota State Mankato, is to provide a broad-based education that will enable graduates to enter practice in the civil engineering profession, serving the needs of the State of Minnesota and the Nation.

Graduates of the civil engineering program at Minnesota State Mankato will be prepared:

1. with a strong technical foundation to practice civil engineering, or to pursue graduate studies, particularly in four major disciplines: geotechnical, structural, transportation, and water resources engineering;
2. to become registered professional engineers;
3. to communicate technical information effectively with the public, their peers, and clients;

4. with an understanding of the need for life-long learning and of the importance for community and professional involvement; and
5. with an awareness of cultural, societal, and professional issues.

The program mission and educational objectives are fully compatible with the mission of Minnesota State Mankato and the College of Science, Engineering, and Technology. Program objectives are monitored by the constituencies (civil engineering profession through the program's Industrial Advisory Board and employers, alumni, students, and faculty of the program).

Other important features of an education in civil engineering at Minnesota State Mankato include:

- Senior students work together as a design team in a full academic year course incorporating multiple civil engineering disciplines in comprehensive design project.
- Students work closely with engineers from design firms and government agencies and with faculty and students from other engineering courses in the senior design project.
- Students are required to take a department-administered diagnostic test in their junior year. The purpose of this test is to provide feedback which will be used to strengthen the curriculum and to improve the preparation of students.
- Students are required to take the Fundamentals of Engineering exam in their senior year – the first step towards professional registration.
- The flexible curriculum allows the students to have either a diverse or focused civil engineering study.
- The faculty maintains ties to industry, thereby keeping current with new technologies, design methodologies, and the world of civil engineering practice – a valuable resource for students.

#### Preparation

Recommended high school preparation is two years of algebra, one year of geometry, one-half year of trigonometry, one-half year of college algebra, and a year each of physics and chemistry. Computer skills such as word processing, spreadsheets, and presentations are also recommended. Without this background it may take longer than four years to earn the degree.

#### Program Admission

Admission to the Civil Engineering Program is necessary before enrolling in 300- and 400-level courses. Admission to the program is granted by the department. Near the end of the sophomore year, students should submit an application for admission to the civil engineering program. Applications to the program may be obtained from the Department of Mechanical and Civil Engineering or downloaded from the department homepage. Failure to submit an application will result in the student being denied registration in upper division courses in the Civil Engineering Program.

Admission to the program is based on GPA and performance in selected courses and is subject to approval by the Department of Mechanical and Civil Engineering. Only students admitted to the program are permitted to enroll in upper-division civil engineering courses. Generally, no transfer credits are allowed for upper-division civil engineering courses. For any exceptions to this policy, special written permission must be obtained and will be reviewed by the department. The department makes a special effort to accommodate transfer students. Transfer students are encouraged to contact the department as soon as possible to facilitate a smooth transition. Please feel free to write, call, or visit the department.

Before being admitted to upper-division civil engineering courses, a student must complete a minimum of 50 credits, including the following courses: calculus-based Physics, 10 credits; Calculus and Differential Equations, 16 credits; Introduction to Engineering, 2 credits; Computer Graphics, 2 credits; Introduction to Problem Solving and Civil Engineering Design, 2 credits; Engineering Mechanics (Statics, Dynamics,

and Mechanics of Materials), 9 credits; Chemistry, 5 credits; and English Composition, 4 credits. Provisional admission to the program for one semester may be granted in limited cases.

For transfer students the distribution of credits specified in the previous paragraph may vary, but the total credits must satisfy departmental transfer requirements. Transfer students should contact the department for individual evaluation. Transfer students must take a minimum of 12 credits at MSU prior to being considered for full admission to the program.

All courses and credits shown above must be completed, for grade, before enrollment in 300-level engineering courses. To be considered for admission a grade of C or better must be achieved in each course, and a student must have a cumulative GPA of 2.5 for all courses listed above. All courses taken from the list above (including those for repeated courses) will be considered in the computation of the GPA for admission to the program. Transfer credits will not be used in the computation of the GPA for admission to the program. Transfer students should refer to the Supplemental Information in the Undergraduate Bulletin for information about procedures to be followed when applying for admission to the University. If a student is denied admission to the Civil Engineering Program, he/she may reapply to the Civil Engineering Program for admission in subsequent years.

#### CIVIL ENGINEERING BSCE

Required (Special General Education, 23 credits):

The Bachelor of Science in Civil Engineering degree does NOT adhere to the 44 credits of general education required by other programs. Rather it requires a special distribution of communication, humanities, and social science courses. Courses may be chosen to satisfy the university cultural diversity requirement concurrently.

Required Communication Courses (7 credits):

ENG 101 Composition (4) AND

SPEE 102 Public Speaking (3) OR

SPEE 233 Public Speaking for Technical Professionals (3) OR

ENG 271 Technical Communication (4)

Required Humanities and Social Science Courses (minimum of 16 credits):

To satisfy this requirement, the courses selected must provide both breadth and depth and not be limited to a selection of unrelated introductory courses. Not all courses in humanities and social sciences are acceptable. Each student should discuss with his/her civil engineering advisor on the selection of courses to meet this requirement early in their academic career. A current list of acceptable courses is posted in the department office and on the department web site.

Specifically, the minimum requirements consist of (a) at least 6 credits in the humanities area, and (b) at least 9 credits in the social science area, of which 3 credits must be either microeconomics or macroeconomics; (a) and (b) must total at least 16 credits.

To provide the measure of depth to the course of study, at least 3 credits at the 300-level or above must be included in the 16 credit requirement. At least one upper division course must follow a course in the same subject area.

Science and Mathematics (35 credits):

Mathematics (16 credits):

MATH 121 Calculus I (4)

MATH 122 Calculus II (4)  
MATH 223 Calculus III (4)  
MATH 321 Ordinary Differential Equations (4)  
CHEM 201 General Chemistry I (5)  
PHYS 221 General Physics I (5)  
PHYS 222 General Physics II (5)  
Science Elective from approved list (4)

Basic Engineering Science (25 credits):

CIVE 101 Introduction to Engineering-Civil (2)  
CIVE 145 CAD for Civil Engineering (2)  
CIVE 201 Intro. to Problem Solving and Civil Engineering Design (2)  
CIVE 271 Civil Engineering Measurements (2)  
ME 206 Materials Science (3)  
ME/CIVE 212 Statics (3)  
ME/CIVE 214 Dynamics (3)  
ME/CIVE 223 Mechanics of Materials (3)  
ME 291 Engineering Analysis (3)  
ME 299 Thermal Analysis (2) OR  
ME 241 Thermodynamics (3)

Upper Division (45 credits):

ME/CIVE 321 Fluid Mechanics (3)  
CIVE 340 Structural Analysis (3)  
CIVE 350 Hydraulics & Hydrology (4)  
CIVE 360 Geotechnical Engineering (4)  
CIVE 370 Transportation Engineering (4)  
CIVE 380 Environmental Engineering (3)  
CIVE 401 Civil Engineering Design I (2)  
CIVE 402 Civil Engineering Design II (3)  
CIVE 435 Civil Engineering Experimentation I (2)  
CIVE 436 Civil Engineering Experimentation II (2)  
CIVE 446 Reinforced Concrete Design (3) OR  
CIVE 448 Steel Design (3)  
CIVE electives (7-10 credits)  
Technical electives from approved list (2-4 credits)

Required Minor: None.

Civil, Science and Technical Electives

A civil engineering student is required to choose a minimum of 16 credits in civil, science and technical electives as follows: science elective (4 credits), technical electives (2-4 credits), and CIVE electives (7-10 credits). The science and technical electives are recommended to be taken after the student has identified his/her area of interest in consultation with his/her academic advisor. Science and technical electives must be selected from the approved lists below which complement the student's area of interest and enhance the student's experience in civil engineering.

Approved Science Electives:

BIOL 105W General Biology I (4)  
CHEM 202 General Chemistry II (5)  
ENVR 101 Perspectives in Environmental. Science (4)

GEOL 121 Physical Geology (4)

Approved Technical Electives:

All CIVE courses except required courses

All EE courses 300-level and above and EE 250 (Engineering Economics)

All ME courses 300-level and above except required courses

BIO 270 Microbiology (4)

BLAW 450 Contracts, Sales & Prof. Responsibility (3)

BLAW 453 International Legal Environ. of Business (3)

BLAW 474 Environ. Regulation & Land Use (3)

BLAW 476 Construction and Design Law (3)

CHEM 305 Analytical Chemistry (4)

CHEM 407 Water Chemistry (3)

ENVR 440 Environmental Regulations (3)

ENVR 450 Environmental Pollution & Control (3)

ENVR 460 Analysis of Pollutants (4)

GEOL 270 Structural Geology (4)

GEOL 351 Engineering Geology (2)

GEOL 450 Hydrogeology (3)

POLICIES/INFORMATION

**Satisfactory Progress.** Once admitted to the civil engineering program, a student must maintain satisfactory progress in the upper-division Civil Engineering Program by: (1) maintaining a cumulative GPA of at least 2.30 for all upper-division engineering courses; and (2) achieving a GPA of at least 2.00 each semester for all courses required for the major. All courses, including repeated courses will be used in the GPA calculations above.

**P/N Grading Policy.** P/N credit will not be applied to any course used to meet civil engineering degree requirements.

**Probation Policy.** Once admitted to the program, a student who does not maintain satisfactory progress as defined above will be placed on program probationary status for a maximum of one semester. During the probationary period, the student must achieve satisfactory progress and, in addition: (a) must complete at least 8 credits, approved by the department, of upper-division engineering courses for grade from the prescribed Civil Engineering curriculum; and (b) shall not receive a degree without first conforming to the satisfactory progress criteria. A student who does not maintain satisfactory progress for a second semester (consecutive or non-consecutive) will not be allowed to continue in the program. The student may later reapply for admission to the program. If readmitted, only probationary status will be granted, and continuation in the program will be based on performance in courses specified in a contract with the department.

**Appeals.** A student may appeal any departmental decision in writing. The department will consider such appeals individually.

For the most up-to-date list of Civil Engineering courses, please visit our web site at [ce.mnsu.edu](http://ce.mnsu.edu). Also see the Mechanical Engineering program for detailed description of ME courses and ME/CIVE dual listing courses, that are required for the Civil Engineering Program.