05-82

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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: Science, Engineering and Technology ☒ Undergraduate
Department: Mechanical Engineering ☒ Graduate
Program: Civil Engineering CIP # _____
Type of Change Proposed: COURSE PROPOSALS / New Course
Title Current:
Title Proposed: Earth Structures
24-Char. Abbrev: Earth Structures

Proposal # 245
Effective Date of Change:
Academic Year 05-06
(For Office Use Only)

Course Designator and Number	Number of Credits
CIVE 467/567	3

(if applicable)

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

Design and construction of traditional embankments, including slope stability analysis; earth and rockfill dams, including introduction to seepage analysis; excavations, earth retaining structures, and other geotechnical structures. Geotechnical software application in analysis and design. Pre-req: CIVE 360.

Rationale or Justification for change:

This new course is developed to expand the electives in the Geotechnical Engineering area. CIVE students are required to take a minimum of 3 CIVE electives for their program.

For General Education or Cultural Diversity Courses Only

General Education Course:

GE Category # **GE Category Name (Maximum of 3 Categories)**

N/A
N/A
N/A

? 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.

Cultural Diversity Course:

(Please check one.)

☐ **Core** (At least 75% devoted to topics of race, gender, sexual orientation, age, class, and disabilities as they occur in United States Society.)

☐ **Related** (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.)

Attach paper copies of the following:
a. Syllabus or course outline.
b. Course's student learning outcomes associated with each GE competency or CD designation.
c. List of strategies to be used to assess students' achievement of each GE competency or CD designation.

For New Courses

(Check all that apply:)
☒ Course is an elective.
☐ Course is required for program
☒ Pre- or Co-requisites: CIVE 360
☐ Other courses are being changed or eliminated. (Explain.)

Instructional Type: Lecture
Grading Format: ☒ Grade ☐ P/N

Course will be offered:
☒ Fall Semester
☐ Spring Semester
☐ Summer Session

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

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MINNESOTA STATE UNIVERSITY, MANKATO

CIVE 467/567 – Earth Structures
Elective Course

Department, number, and title of course: Mechanical and Civil Engineering, CIVE 467/567, Earth Structures

Course (catalog) description: Design and construction of traditional embankments, including slope stability analysis; earth and rockfill dams, including introduction to seepage analysis; excavations, earth retaining structures, and additional geotechnical structures. Geotechnical software application in analysis and design. (3 credits)

Prerequisite: CIVE 360

Textbooks & other required material:

Advanced Dam Engineering for Design, Construction, and Rehabilitation, by R.B. Jansen, published by Springer.

Course objectives: This course will build on the soil mechanics principles and the design procedures presented in the CIVE 360 course – Geotechnical Engineering. Traditional embankments (highway embankments, for example) will be discussed, with topics relating to design and construction procedures, and significant discussion of slope stability analyses which were introduced in CIVE 360. Software packages will allow the students to perform slope stability investigations of existing natural embankments, existing structural earth fill embankments, and to determine efficient options for using staged construction. Design and construction of earth and rock fill dams will be presented, as well as the impact of seepage analysis and construction issues and topics related to rehabilitation of existing structures. The students will use geotechnical engineering software to verify seepage and stability predictions for embankment dams. A brief discussion of risk assessment for earth dam structures will be presented. Design procedures for additional geotechnical structures (including excavations, retaining walls, mechanically stabilized earth walls, tieback walls, etc.) will be discussed, and construction procedures explained.

Topics covered (50-minute lecture hours):

1. Introduction (1)
2. Soil Properties (2)
3. Embankment Construction Methods (2)
4. Settlement Analysis (3)
5. Slope Stability / Software (4)
6. Staged Construction (1)
7. Earth Dam Construction Methods / Details (4)
8. Seepage Analysis / Flow Nets / Software (4)
9. Soft Foundations - Stability (2)
10. Soft Foundations - Settlement (3)
11. Geologic Considerations (2)
12. Internal Failure Modes (4)
13. Failure Mode Mitigation (1)
14. Mechanically Stabilized Earth Walls (4)
15. Other Retaining Walls (2)
16. Excavations (3)
17. Field trip / Guest Lectures (2)
18. Exams (2)

Class schedule: Three 50-minute lectures per week

Contribution of course to meeting the professional component: This elective course is used to achieve proficiency in geotechnical engineering. This is an important geotechnical engineering design course, and emphasizes the concepts of uncertainty and reliability, and the necessity for engineering judgment in making assumptions and decisions in design.

Relationship of course to program outcomes: This course meets the following ABET and program outcomes:

3a) an ability to apply knowledge of mathematics, science, and engineering
3c) an ability to design a system, component, or process to meet desired needs
3e) an ability to identify, formulate, and solve engineering problems
3f) an understanding of professional and ethical responsibility
3g) an ability to communicate effectively
3i) a recognition of the need for, and an ability to engage in life-long learning
3k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

No additional resources are required to offer and support this course.

No department staffing issues are affected in teaching this course.

For graduate students participating in the course, additional expectations would be required to complete the course. Such additional efforts would be required for more extensive design projects, more involved homework assignments relating to the theoretical aspects of the material, and in-depth research reports and projects relating to the various topics of the course. The lecture material would be identical for both graduate and undergraduate students, but the assigned reading for graduate students would be more extensive and cover a broader range of topics and applications in greater depth.