UNIVERSITY OF SOUTH FLORIDA
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

CES 4740, CAPSTONE STRUCTURAL AND GEOTECHNICAL DESIGN
Spring, 1999 Extended Syllabus

INSTRUCTORS:	Gray Mullins, Ph.D., P.E. Assistant Professor	Steven L. Stroh, P.E. Adjunct Professor
OFFICE:	ENG 044	Off Campus
PHONE:	813-974-5845	813-286-1711
FAX:	813-974-2957	
EMAIL:	gmullins@eng.usf.edu	

OFFICE HOURS:	Monday 5-6 P.M. or by appointment
CLASS MEETS:	Monday 6-9 P.M. and Friday 8-10 A.M. LIF 261
TEXTBOOK:	American Association of State Highway and Transportation Officials (AASHTO) LRFD Bridge Design Specifications 1994, with Interim Specification through 1997.
REFERENCES:	AISC *Manual of Steel Construction-Load and Resistance Factor Design* FHWA Participants Workbook: Load and Resistance Factor Design (LRFD) for Highway Bridge Substructures
CREDIT HOURS:	4 hours of Engineering Design

COURSE OBJECTIVES:

This course provides a "capstone" design experience requiring the synthesis of several fields of civil engineering. The course is the culmination of structural and geotechnical design concepts and is a natural extension of CES 4605, CES 4011, and CES 4012 (Concepts of Steel Design, Soil Mechanics I, and Geotechnical Engineering II, respectively). The specific objective are as follows:

-To provide the students the ability to undertake advanced designs in the areas of Structural and Geotechnical Engineering.
-To familiarize the students with the AASHTO Highway design through code interpretation of load and design requirements.
-To emphasize the importance of interdisciplinary planning, coordination, and communication.
-To promote team work through group assignments in both superstructure and substructure design as well as combined teams of each discipline.

COURSE DESCRIPTION:

The students will be divided into design teams and will first develop a concept, and then a preliminary design for the super and substructure of a highway bridge based on a realistic set of site constraints. The design teams will be comprised of both structural and geotechnical constituents, who will consider additionally the effects of hydrology, transportation planning, and aesthetics in their design. By analyzing and interpreting the subsurface site data, the students will identify problematic soils and determine a proposed alignment with span lengths that optimize material utilization and overall cost effectiveness.

Individual assignments will test the students use on contemporary engineering techniques, skills and software tools. A supplemental series of lectures will emphasize the importance of continued engineering education by illustrating state-of-the-art designs and construction practices.

The students will demonstrate their ability to communicate effectively though oral presentations of the

concept and preliminary submissions. An accompanying report including the problem statement, design approach, calculations, descriptive text, and sketches, shall be thoroughly indexed to clearly depict the design merits.

ATTENDANCE POLICY:

Because there are no scheduled, in-class, written examinations, attendance is mandatory to ensure the effective transfer of information. It is the student's responsibility to submit all homework assignments on time and to answer homework questions on topics covered or discussed in class which are not covered in, or in contradiction with the design references.

RELIGIOUS OBSERVANCE POLICY:

No student will be compelled to attend class or sit for an exam in conflict with his/her religious belief. In such situations, the student must provide prior notification to the instructor in writing. The student will be given a reasonable opportunity to make up such work. This will be done on a case-by-case basis only for those religious days listed in the University Calendar of Religious Holy Days. This policy will in no way contradict that of the university-wide policy for religious observance.

MAKE-UP, MISSED WORK POLICY:

All homework on a given topic must be submitted during class, one week after the completion of that lecture topic. In the event of an exceptional circumstance, a student may submit late work on a case-by-case basis at the discretion of the instructor.

LATE WORK SUBMISSION:

Work that is submitted late will be penalized for each day of delay. The penalty is subject to the discretion of the specific instructor.

PERFORMANCE EXPECTATIONS:

All work, both homework and project submissions, must be clear and orderly. Each problem must be accompanied by a scaled sketch of the design which is clearly lettered. Pertinent code references should be included where possible. Although most assignments can be completed through the use of a computer, all hand-written submissions must be clean; unclear work may be penalized. All work should stand alone and be self explanatory as if it were a final copy of design calculations for archival.

- **!** Emphasis in the course will be on the correct formulation, physical understanding, and clear presentation of the design.
- **!** There is not one single correct solution to a design assignment; but rather, there exists a range of reasonable solutions within the given constraints. Proper presentation of a design must include consideration of safety, reliability, economics, and construct-ability.

Cumulative grades will be determined using the following distribution:

Homework Assignments (individual)	20%
Mid-Term Concept Submittal (group)	20%
Preliminary Design Submittal (group)	30%
Oral Presentations (group/individual)	30%

All assignments must be submitted for successful completion of the course. Additionally, due to the importance of group involvement, student self evaluation of team member performance may be employed.

Final course grades will be based on the following distribution:

90 - 100	A
80 - 89	B
70 - 79	C
60 - 69	D
0 - 59	F

DISPOSITION OF WORK:

Work that have not been collected by the students and exams will be discarded three months after the end of the semester. Students may obtain copies of their work, but not the original.

ACADEMIC DISHONESTY POLICY:

Academic dishonesty is not tolerated under any circumstances. Any evidence of plagiarism, theft, or unethical conduct will be dealt with severely. Appropriate action will be taken on a case-by-case basis at the discretion of the instructor within the broad policy of the University.

S-U GRADE POLICY:

This course is not offered on an S-U grading basis for students in the CEE department. Students from other departments may request an S-U grade in writing within the first three weeks of the semester.

INCOMPLETE GRADE POLICY:

If a student feels that he/she will not be able to complete the minimum required work prior to the end of the semester, then the student may request in writing the assignment of an "I" grade (incomplete). An "I" grade will be granted only under extenuating circumstances provided the student has a "C" grade or better at the mid-term. This will be done on a case-by-case basis at the discretion of the instructor.

SUMMARY OF ABET OUTCOMES AND OBJECTIVES

OUTCOME/OBJECTIVE	METHOD OF ADDRESSING	METHOD OF ASSESSING	LEVEL OF STUDENT EFFORT
Ability to apply math, science, and engineering	Lecture-based instruction; Problems solving	Assignments and Projects	Large
Ability to design and conduct experiments, analyze, and interpret data	Lecture-based instruction; Supplemental Presentations	Assignments, Projects, and Class discussion	Medium
Ability to design a system component or process to meet desired needs	Lecture-based instruction; Problems solving Open-ended design problems	Assignments and Projects	Large
Ability to function in teams	Group Assignments and Projects	Group Assignments and Presentations	Large
Ability to identify, formulate, and solve engineering problems	Lecture-based instruction; Problems solving Projects	Assignments and Projects	Large
Understanding of professional and ethical responsibility	Lecture-based instruction, Class discussion, and Supplemental Presentations	In class discussion, Presentations, and Projects	Large
Ability to communicate effectively	Lecture-based instruction, Group Assignments, Group Presentations	Power-point presentations, class discussion, group discussions, projects	Large
Understanding of the impact of engineering solutions in a global and societal context	Classroom discussion on global, societal and economic issues, supplemental presentations	Class discussions, Group discussions, projects	Large
Recognition and ability to engage in life-long learning	Information on Professional Organizations and Graduate Programs, Supplemental Presentations	Discussion of research sites and topics, Discussion of building techniques outside the scope of the course	Large
Knowledge of contemporary issues	Classroom discussion	Project	Medium
Ability to use techniques, skills, and engineering tools necessary for engineering practice.	Lecture-based instruction, problems solving, cost analysis, projects, Supplemental presentations	Assignments, Projects, Class discussion	Large