CIVL 180 - ENGINEERING SYNTHESIS  
SPRING 2004

Class Meetings:  M, W 3:30 - 5 p.m. 205 Khoury Hall

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Office Hrs:  M, W, F 10 - 11:30; Tu 1-2 p.m. or by appointment

Text:  None

Course web page:  http://www1.uop.edu/eng/courses/civil/civl180/  
Information about the course, announcements, etc. will be posted on the course web site.

Prerequisite:  Senior standing

COURSE OBJECTIVES

In this course you will work as part of a team with other graduating seniors to develop, propose, and successfully complete a civil engineering project of significant scope. You will use your knowledge of the principles of engineering to design a system or process to achieve specified objectives. You will consider both technical and non-technical aspects of your project and produce a final project report, complete with all necessary documentation.

Upon completion of this course you should be able to:

1. develop and propose a multifaceted project involving several areas of civil engineering.  
2. describe the design process common to typical civil engineering projects.  
3. employ team oriented strategies for achieving a successful project outcome.  
4. produce clear project timelines with major tasks identified and appropriate priorities assigned.  
5. give oral progress reports regarding your project.  
6. consider and accommodate aesthetic, economic, safety and other non-technical aspects of a project.  
7. appreciate more fully the business aspects of engineering  
8. produce a full set of drawings, specifications and standards appropriate to your project

Your mastery of the course objectives will be evaluated in several ways. You will be required to develop a project proposal and present it in both written and oral form. You will provide documentation of your project schedule, make progress reports and give a final summary presentation. Each of these activities will be evaluated by both the instructor and your mentor.
COURSE ADMINISTRATION

Design Teams

Virtually all real engineering projects are completed as a result of several people working together. Consequently, successful completion of CIVL 180 requires that each student work effectively as part of a team to complete the selected project.

Although the project is to be a team effort, it is essential that each member of the team be involved in the technical aspects of the design. It is important to realize that each group member has different skills and expertise (and limitations) and will make different contributions. It is the job of the project leader to properly utilize the assets of his/her team members to efficiently achieve the project objectives. Each team will have a project leader who will accept responsibility for ensuring that the team completes the project successfully. The project leader will receive additional compensation in the form of points toward his or her final course grade.

The project leader, together with the team members, will divide the project into three or four major processes, as appropriate. For example, if a water treatment system is to be designed, one team member might have primary responsibility site development, one for the design of the treatment processes, one for coordinating economic analyses, and scheduling, etc. Each team member will, in addition to their specific technical design responsibilities, take lead responsibility for coordinating one of the particular processes. This team member may call on other team members as well as members of other teams for advice and assistance, however, the team member must take full responsibility for successful completion of her/his section of the project. Team composition and allocation of responsibilities are subject to the approval of the instructor.

Project Leader Responsibilities

The project leader has primary responsibility for bringing the project to a successful conclusion. He or she must ensure that each member is working effectively as part of the team and that all members clearly understand their roles and focus on their tasks. The project leader must lead the development of a realistic project time line and must monitor the progress of each member to ensure that the project is progressing according to schedule. Specific responsibilities include:

1. holding regular group meetings and leading the meeting to ensure effective use of meeting time,
2. meeting weekly with the instructor to discuss project progress (other group members may be present as well),
3. maintaining an up-to-date log of group activities, progress, and problems,
4. appropriately delegating duties to ensure equitable distribution of workload,
5. scheduling and holding regular meetings with Project Mentors,
6. setting firm and realistic deadlines for completion of project tasks, and
7. assuming ultimate responsibility for success or failure of the project.

Project Member Responsibilities

Each member of the team is responsible for ensuring that his or her components are completed fully, correctly, and according to schedule. Accordingly, each team member must:

1. maintain an organized and complete log of all work,
2. attend all group meetings, coming to the meetings prepared (i.e., with work completed, all necessary information organized, list of tasks, questions, etc. assembled, and so on.)
3. be honest and professional; keep other team members informed of progress, problems, etc., work to resolve difficulties in a professional manner and as quickly as possible
Design Project Mentor

To assist in technical and general guidance, each group must select a mentor with whom the group leader and/or members will meet regularly. This person may be a faculty member or a practicing professional engineer; someone who knows the area of civil engineering that comprises the principal portion of the proposed project. The mentor will be one of the evaluators of the technical merit of the final design.

Design Logs

In engineering practice, it is imperative to keep organized and thorough documentation of work performed and time spent on a project. For this course, each student is required to maintain a bound project notebook, referred to as a 'design log', in which the student will maintain a detailed account of the effort spent on the project. Since this is a four unit course, each student is expected to spend about 150-175 hours, including class meeting time, on the work required. These logs will help with keeping on schedule and will provide the instructor with a realistic picture of each person's efforts. Each log entry should include:

a. the date,

b. the task undertaken,

c. the time spent in hours (to the nearest 15 min.),

d. any significant conclusions or accomplishments, and

e. a running total of time spent thus far.

The instructor will collect design logs at random and review each individual's and team's progress. Therefore the logs must be kept up to date and complete at all times.

In addition to the design log, a three-ring binder must be used to keep data sheets, design drawings, and any supporting documentation in logical order, e.g., by topic and/or in chronological order.

PROJECT EVALUATION AND COURSE GRADING

The project will be evaluated, and the course grade assigned, based on a possible 1000 points which are distributed as follows:

<table>
<thead>
<tr>
<th>Component</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary project proposal</td>
<td>50</td>
</tr>
<tr>
<td>Project proposal - Oral Presentation</td>
<td>150</td>
</tr>
<tr>
<td>Progress report</td>
<td>100</td>
</tr>
<tr>
<td>Final project report</td>
<td>400</td>
</tr>
<tr>
<td>Final oral presentation</td>
<td>150</td>
</tr>
<tr>
<td>Design log, other</td>
<td>150</td>
</tr>
<tr>
<td>Project Manager bonus</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1000</strong></td>
</tr>
</tbody>
</table>
PROJECT REQUIREMENTS

PROJECT CONTENT

This course is intended to give each student the opportunity to work as part of a team to propose a project, to plan and schedule the required effort, and to use analysis and design skills developed to complete the project, considering among other factors, ethical, economic, and environmental constraints. Each team will prepare oral and written reports to document progress and the final design.

The ABET accreditation guidelines for civil engineering state the following:

Students must be prepared for engineering practice through the curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating engineering standards and realistic constraints that include most of the following considerations: economic; environmental; sustainability; manufacturability; ethical; health and safety; social; and political.

To ensure that the requirements specified in the above statement are met, each project must include all of the following:

1. The design of a structure; water or wastewater treatment, water distribution, transportation, or other infrastructure system; recreational facility, or other project of similar scope.

2. A full site development plan including:
   • A statement regarding the need for such a project, with appropriate social and political ramifications,
   • an environmental assessment,
   • a review of the applicable regulations including building codes, etc.

3. An economic analysis of the project including consideration of all costs, including opportunity costs, constructions costs, maintenance costs, etc.

4. A clear statement about the sustainability of such a project, i.e.,
   • can we continue to build projects of this type indefinitely?
   • what will be required to maintain the project in working order?
   • can the project be easily adapted to another future use?

5. A discussion of the health and safety implications of the project.

6. A discussion of the ethical considerations inherent in the project.
PROJECT REPORTS

Four reports/proposals are required:

1. A written preliminary project proposal, due January 23, 2004, containing sufficient information to allow the instructor to determine the project feasibility. The proposal must contain at least the following:
   - A cover letter from the project leader, addressed to the instructor. This letter should identify the leader as the principal in a consulting firm (the team should select a name) and describe the firm's capabilities. Consider the instructor to be a prospective client.
   - A brief, but clear and concise, description (1-2 pages) of the proposed project and scope of work.
   - A preliminary (but detailed) list of tasks to be accomplished with a tentative schedule.
   - A preliminary list identifying the team member(s) responsible for completing each section.
   - The name(s), address(s) and telephone number(s) of your proposed mentor(s).

   Each team must meet with the instructor before Jan 28 to discuss the project, then revise the project and scope of work, as necessary.

2. An oral proposal presentation, lasting about 15 minutes, to the entire class on Monday, Feb. 2. A revised written project proposal must also be submitted at this time. Oral presentation requirements will be distributed at a later date.

3. An oral progress report, with written summary, describing the current state of your project. This will be given to the entire class on Monday, March 10.

4. A final oral presentation describing the entire project. This presentation will last about 20-25 minutes, and will be given on Apr 28. The final project report with drawings, design calculations, specifications and final project summary will be due by 3:30 p.m. on May 3.

Traditionally all projects are entered into the School of Engineering Project day competition which will likely be on May 14.