Engr 696 Course Syllabus

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Course Outline for ENGR 696 Engineering Design Project I (CE)

Bulletin Description:
ENGR 696 Engineering Design Project I (1)
Prerequisites: Completion of at least 21 upper division units in engineering and passing score on JEPET or concurrent enrollment in ENG 414
Selection of design project, methods of research, time management, engineering professional practice, and ethics.

Expanded Description:
Engineering 696 is intended to prepare students to deal with real engineering problems. Problems in professional engineering practice tend to be far more complex and ill-defined than problems encountered in typical engineering courses. To this end, students in ENGR 696 will develop proficiency in defining, organizing, performing, and reporting the solution to a real world engineering problem. Related matters such as professionalism, ethics, and critical thinking are included.

Textbooks:
None

Coordinator:
Norman Owen, Professor of Civil Engineering

Prerequisites by Topic:
1. Basic design methodology (Projects in ENGR 300, 302, 309, design electives)
2. Analytical methods (ENGR 309, 323, and one or more of 429, 430, and 434)
3. Component design and analysis (Concurrent enrollment in engineering design electives)
4. Engineering report writing (ENGR 200, 300, 302)

Course Objectives 1:
1. Development of methodological approach to design. [A.2, B.1]
2. Enhancement of library search and other technical information acquisition techniques. [B.3]
3. Clarification of relationships between professionalism ethics, engineering practice, and society. [C.1, C.3]
4. Selection, definition, and early work on a senior design project. [A.2, B.1, C.2]
5. Instill the practice of life-long learning. [B.4]
6. Learn skills necessary for effective teamwork. [A.4]
7. Development of techniques for effective engineering communication. [A.5]
8. Instill professional behavior. [C.3]

Topics:
1. Design process and methodology
2. Scheduling and time management
3. Literature, resource, and component information gathering
4. Oral and written communication

1 Indexes in brackets refer to “Objectives and Outcomes” for the School of Engineering.
5. Career development
6. Ethics
7. Professionalism

Professional Component

<table>
<thead>
<tr>
<th>Engineering Sciences</th>
<th>0%</th>
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</thead>
<tbody>
<tr>
<td>Engineering Design</td>
<td>100%</td>
</tr>
</tbody>
</table>

Evaluation
1. Class attendance and participation
2. Attendance at seminars and professional meetings
3. Homework assignments
4. Final written project report
5. Final oral project presentation

Performance Criteria²:

Objective 1
1.1 Student utilizes a systematic approach to the different stages of the design process. [3,4]
1.2 Student demonstrates the use of decision analysis in the selection of an appropriate senior project. [3]

Objective 2
2.1 Student uses library (conventional) and electronic means to access technical and component information related to the design project. [3,4]

Objective 3
3.1 Student is aware of professional engineering societies. [2]
3.2 Student is aware of engineering codes of ethics and has applied them to a complex engineering/societal dilemma. [1,3]

Objective 4
4.1 Student forms a team with other students, prepares a preliminary proposal and secures a faculty advisor for the senior project. [1,3]
4.2 Student team develops a thorough project description including a time-task schedule, which is detailed in the final proposal. [3,4]
4.3 Student team describes early project work using oral and written progress reports. [3,4]

Objective 5
5.1 Student attends 3 professional seminars and 2 society meetings. [2]

Objective 6
6.1 Student fully participates with the team in making decisions, allocating responsibilities and sharing project work. [1,4]

Objective 7
7.1 Student submits all homework in the form of engineering technical memos. [3]
7.2 Student prepares and presents effective oral and written presentations describing the project. [4]

Objective 8
8.1 Student recognizes importance of punctuality, participation, communication skills and teamwork in the professional setting. [1,4]

² Numbers in brackets refer to evaluation method used to assess student performance.
### ENGR 696 Engineering Design Project I (CE)

**Fall Semester 2004**

**Instructors:** Tim D’Orazio  
**Office:** SCI 168B  
**Phone:** (415) 338-7740

**Schedule:**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Lab Activity</th>
<th>Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/31</td>
<td>Organization</td>
<td>List of ideas</td>
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<tr>
<td></td>
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<td>Green and GE Worksheets</td>
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<tr>
<td>2</td>
<td>9/7</td>
<td>Choosing a project</td>
<td>Decision analysis on idea list</td>
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<td></td>
<td></td>
<td>Advising for next semester and grad application</td>
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<td></td>
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<td>Discussion groups by interest</td>
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<td>3</td>
<td>9/14</td>
<td>Review project groupings</td>
<td>Brief proposal (due 9/21)</td>
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<td>4</td>
<td>9/21</td>
<td>Finalize groups and proposals</td>
<td>Start detailed proposal (due 10/12)</td>
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<tr>
<td>5</td>
<td>9/28</td>
<td>Project tasking and schedule</td>
<td>Define tasks, prepare schedule</td>
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<td>6</td>
<td>10/5</td>
<td>Open</td>
<td>Project work</td>
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<td>7</td>
<td>10/12</td>
<td>SUBMIT Proposal &amp; Schedule Library</td>
<td>References for proposal</td>
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<tr>
<td>8</td>
<td>10/19</td>
<td>How to make a presentation</td>
<td>Prepare group presentation</td>
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<td>9</td>
<td>10/26</td>
<td>BRIEF PRESENTATION</td>
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<td>10</td>
<td>11/2</td>
<td>Ethics (ATTENDANCE REQUIRED)</td>
<td>Ethics questions</td>
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<td>11</td>
<td>11/9</td>
<td>Career and resumes</td>
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<td>12</td>
<td>11/16</td>
<td>Open *</td>
<td></td>
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<tr>
<td>13</td>
<td>11/23</td>
<td>Guidelines for final report and final presentation</td>
<td>Report and presentation</td>
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<td>14</td>
<td>11/30</td>
<td>Open *</td>
<td>“     ”</td>
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<tr>
<td>15</td>
<td>12/7</td>
<td>Final presentation</td>
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<td>“     ”</td>
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*“Open” means that nothing is scheduled now, but class may still meet. If class does not meet, your team should meet to work on your project.*
PREREQUISITES

Advising Prerequisite:
A copy of your advisor signed green sheet must be on file in the Engineering office.

JEPET Prerequisite:
Provide proof of passing JEPET or English 414 (or equivalent for non-native speakers).
Also will consider concurrent enrollment in English 414.
If you have not taken JEPET, I might let you take it this semester, if you have a good excuse.

<table>
<thead>
<tr>
<th>Test Dates</th>
<th>Registration Deadline</th>
<th>Approx. Report Date</th>
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</thead>
</table>

21-Unit Prerequisite:
This prerequisite is to ensure that you are ready for this course and that you will graduate next spring (or fall) semester.
If you will not be graduating until June two years from this past June, take Engr 696 next fall.

FUNDAMENTALS OF ENGINEERING EXAM
(EIT Exam)
You are encouraged to take this exam during your last semester.

<table>
<thead>
<tr>
<th>Exam date</th>
<th>Filing date</th>
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<tr>
<td>Oct .., 2004</td>
<td>Sept .., 2004</td>
</tr>
<tr>
<td>April .., 2005</td>
<td>Feb .., 2005</td>
</tr>
</tbody>
</table>

For more information:  www.dca.ca.gov/pels      Board of Registration for PE
For review books:     www.ppi2pass.com
EVALUATION

Course Evaluation:

1. Class attendance and participation 10%
2. 
   a. Lifelong learning (attend 3 seminars) 15%
   b. Professional activities (2 society meetings) 10%
3. 
   a. Ethics discussion and assignment 10%
   b. Other homework assignments 20%
4. Final written project proposal 25%
5. Final oral project proposal presentation 10%

Lifelong Learning Requirement:

You must attend 3 professional seminars during the semester. Here are potential sources:

   School of Engineering seminars (sign-in list by T. D’Orazio)
   ASCE Student Chapter meeting with a speaker (sign-in list by chapter)
   Other engineering student chapter meetings with a speaker (you get xerox of list)
   ASCE local section dinner meeting with a speaker (you get documentation=ticket)
   An engineering seminar at your work setting (you get documentation)

Professional Activities Requirement:

You must attend 2 business meetings. Here are potential sources:

   ASCE Student Chapter business meeting (sign-in list by chapter)
   Other engineering student chapter business meeting (you get xerox of list)
   ASCE local section meeting with or without speaker (you get documentation)

Ethics Requirement:

You must attend class to get credit for this component (worth 10% of the final grade).
ENGR 696 Engineering Design Project I (CE)

Check on Prerequisites

Name ________________________________

JEPET Status

I have taken JEPET  Yes  No
I passed JEPET  Yes  No
Since I did not pass JEPET, I have taken English 414 (or equivalent)?  Yes  No
I have signed up to take the JEPET this semester  Yes  No
I have signed up to take English 414 this semester  Yes  No

21 Units of U.D. Engineering Classes

List below all engineering classes which you have taken and passed.
Only 300-level and above.
Only those you have already completed.
Course #units

____________________________________
____________________________________
____________________________________
____________________________________
____________________________________
____________________________________
____________________________________
____________________________________
____________________________________

Total units =

List below the engineering classes which you are taking this semester.

____________________________________
____________________________________
____________________________________
____________________________________
Minimum Requirements
For
Acceptable Engineering Design Project
In
Civil Engineering

To have an acceptable Engineering Design Project (Engr. 696/697), you must satisfy these minimum requirements:

1. Form a team with 2 to 4 other students.
2. Obtain approval from a faculty who is willing to serve as you advisor (or “client”).
3. Prepare a written description of the project with a clear focus and scope of work.
4. Identify engineering standards to be used (guidelines, pre-standards, codes, etc.).
5. Identify which of the constraints below you will address in your final report.

Project Constraints

Real engineering projects are subject to a number of constraints that limit the potential solutions. Realistic constraints often include the following considerations:

- Economic
- Environmental
- Sustainability
- Manufacturability
- Ethical
- Health and safety
- Social
- Political

In your engineering senior project you probably will not be able to realistically constrain your project in many of those areas. However, you are required to consider the potential interaction between your project and at least five (5) of the above issues in your final report for Engr. 696. To assist you in this discussion, the following questions are offered to guide your discussion:

- Economic. What economic factors encourage or discourage undertaking such a project? What might be the limits on available funds? Who would provide the funds?
- Environmental. What are the environmental impacts and benefits of the project?
- Sustainability. Will the project be sustainable in the long run?
- Manufacturability. Can this project be constructed? What aspects or parts of the project might be difficult (or impossible) to construct?
- Ethical. What ethical issues might arise during project development, construction, or use?
- Health and safety issues. What health and safety issues do you see for workers during construction or the general public when project is in use?
- Social. Does the project present social issues?
- Political. Does the project present political issues?
To: Students in ENGR 696 CE

From: T. D’Orazio
Date: September 3, 2004
Subject: Homework assignment #1

Due Date: September 10, 2004

There are FIVE (5) ASSIGNMENTS. Each is to be submitted SEPARATELY.

WARNING: If any one of items 1 through 4 is not submitted next week or is incomplete, you WILL LOSE 5 points from your final grade. Potentially, you could lose 20% of your final grade if you do not pay attention to this assignment.

1. List of ten (10) ideas.
   - The purpose is to generate MANY ideas. Quality does not count.
   - Do not judge ideas. Do not ask yourself, “Can I do this?”
   - Be expansive and creative. Pick things in different areas: structures, geotech, environmental, and so on.
   - Do not focus on just your current idea, should you have one.

2. School Graduation Application (green).
   - This is a worksheet to check on your status and plan.
   - Pencil okay. Typing not required.
   - List ALL COURSES – SFSU & transfer.
   - List courses still to be completed!

   TRANSFER STUDENTS: Xerox and attach your transfer credit form for LD pre-engineering and engineering courses. If any UD transfers, attach that as well. These forms should be signed by CE Program Head (N. Owen prior to Sept. 2000, T. D’Orazio after Sept. 2000.)

3. GE worksheet.
   - If an Engineering GE Advisor (Krishnan or Owen) has already reviewed and written comments on your worksheet, then submit xerox copy. Note changes and fill in blanks in red ink.

   If you do not have a reviewed worksheet, complete one now. Pencil okay. DO NOT TRY TO GET APPROVED NOW.

4. JEPET
   - Xerox copy of JEPET pass/failed letter, or DAR showing JEPET (highlight).

   If you did not pass JEPET, then copy your current touchtone enrollment sheet showing ENG 414 (or equivalent).
5. Plan for Lifelong Learning and Professional Activities.

Write a memo to me (format like this one) indicating how you plan to fulfill each one of these requirements.

If you are not using School seminars or ASCE student chapter meetings, then state how you will obtain documentation.
To: Students in Engr. 696 CE  
From: T. D’Orazio  
Date: September 17, 2004  
Subject: Brief Proposals  

Deadline: Submit September, 24 2004  

Prepare a brief proposal as a technical memo. That is, you are to use the memo format illustrated here with To: etc. as shown above. Address to T. D’Orazio.  

The names of the students joining in the proposal MUST be listed opposite “From:” and all MUST SIGN.  

The proposal must contain the following headings only and in this order:  

<table>
<thead>
<tr>
<th>Working Title</th>
<th>Description</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This is a partial sentence or phrase.</td>
<td></td>
</tr>
<tr>
<td>Description:</td>
<td>Describe WHAT you will design or build. Canoe, building, steel bridge, wastewater plant, etc. State some of the criteria for the facility. What parameters must be satisfied or why would it be built?</td>
<td></td>
</tr>
<tr>
<td>Approach:</td>
<td>How are you going to go about doing the project? What are the major tasks that you see at this time?</td>
<td></td>
</tr>
</tbody>
</table>
San Francisco State University
School of Engineering

To: Students, Engr. 696 CE, Fall 2004
From: T. D’Orazio
Date: September, 24 2004
Subject: Detailed project proposal and Hmwk Assignment #4

Proposal Due date: October 15, 2004

Proposal Format:

Use memo format as shown on the attached example. It is easier to read the proposals if you all adhere to the same format, so….

Please do not create your own format.
Use headings as shown and in the given order as the attached example.

Homework Assignment #4 (use memo format)

Due October 1, 2001

Group Meeting
1. Hold a group meeting before Tuesday, Oct. 1.
2. Take minutes: when held, where held, who present. What discussed. Decisions.
3. Prepare tentative list of tasks and subtasks.
4. Decide who will

Write each section of the proposal
Prepare time-task schedule (Gantt Chart)
5. Discuss and decide tentatively who will be responsible for each task.

Submit on October 1:
- Minutes of meeting
- List of tasks (and subtasks)
To: T. D’Orazio

From: Name

Date: October 15, 2004

Subject: Detailed Proposal for 696/697 Project

Each student must sign.

We are pleased to submit the following information and description of our proposed project for Engr 696/697.

Title: Design of the Replacement for the Bay Bridge

Advisor(s): (Talk to the advisor!! Be sure he/she is willing to do this and understands your project. Get advisor’s signature on your proposal.)

Description: ………… (At least one paragraph describing the project. Describe what you are going to analyze or investigate or design. Not how you are going to do it.) (Include a sketch.)

Methodology: ………… (Describe how you will approach this problem. What type of analyses? What tests, if any? What tools or software?)

Work Products:
1. Calculation files
2. Drawings
3. Intermediate and final reports
4. Results of lab tests (?)
5. Video (?)
6. Physical model (?)

Anything else?

Tasks: (List tasks with brief description of each).

(Attach Gantt chart at end.)

Individual Responsibilities: (List each team member and indicate responsibilities.)

Constraints to be Considered: (List at least 5 of the 8 project constraints, which you will discuss in your final report for Engr. 696.) (Project constraints: see “Minimum Requirements For Acceptable Engineering Design Project In Civil Engineering.”)

References: (List 10 references related to your project.)
To: Students in ENGR 696 CE

From: T. D’Orazio
Date: December 3, 2004
Subject: Instructions for Final Presentation

Presentation Date: December 10, 2004 9:35 – 12:25

Purpose of Presentation
- To explain your project to instructors and classmates
- To develop your skills in making clear and informative presentations

Practice!! Practice as individuals and as a group.

Outline: Use this order.
1. Describe Project
   - Assume no one is familiar with your project.
   - Make it interesting! Use illustrations.
   - Describe location -- real or imaginary
     - Concrete canoe: describe competition race course
     - Steel bridge: describe competition construction site
     - Timber bridge: describe imaginary location
   - Describe the “facility” (structure, canoe, waste-treatment facility, etc.). BE BRIEF in this part. Save details to section below.
   - Design criteria – What loads, what requirements on facility. Bridge and canoe competition should summarize contest rules and constraints.

2. Describe accomplishments to date
   - Information gathered.
   - Selection of layout (site plan or structural configuration). Illustrate with structural framing plans, canoe shape, process or component layouts (what ever applies).
   - What analysis and design (component selection) has been accomplished?

3. What is left
   - Show time-task schedule. Bring it up to date!
   - Indicate what tasks are left.
   - Briefly review the tasks for Jan – May portion.

4. Identify problems you anticipate
   - What problems?
   - What can you do about them?

5. Discuss the 5 constraints
   - Identify the constraints
   - Very briefly state concerns for each constraint for your type of project.
To: Students in ENGR 696 CE  
From: T. D’Orazio  
Date: December 3, 2004  
Subject: Instructions for Final Report

Due Date: Wednesday, December 18, 2004, 12:01PM.  
(unless special permission for later date)

Purpose of Report
- To explain your project to others
- To set the stage for next semester

Outline:

Use this order.

6. Title page
- Title
- Date
- Class (Engr 696)
- Name of students -- each must sign
- Name of advisor (at this time)

7. Project Description
- Purpose: to introduce reader to your project
- State objectives for doing project
- Detailed description of what you are doing/going to do. (NOT HOW)
- Describe project requirements, restrictions, and criteria.

8. Methodology
- This is the “how.”
- Describe methodology you are/will use to analyze and design the facility.
- Describe “tools” (computer programs, lab tests, etc) you are/will be using.

9. Schedule
- Schedule is to go through May 2003.
- Write a paragraph or more about your schedule.
- State whether or not you are on schedule.
- Identify problems you are having staying on schedule.
- How will you overcome these problems?
- Attach revised time-task schedule in appendix.

10. Individual Responsibilities
• List each team member followed by responsibilities in each task.
• Do you have a “management team?” If so list them.

11. Constraints
• Discuss each of the 5 constraints you chose for your project.
• Discussion should include a brief analysis of that constraint.

12. References
• List at least 10 references.

Appendices follow references.
• Calculations
• Sketches used in developing your design configuration.

Margins
• Use 1-inch margins top, bottom, left and right.
• Justify only on left side. Do not justify on right side.

Font
• 12 pt, Times Roman

Line Spacing
• 1 and a half.
### Lifelong learning and Professional activities summary sheet

Name _____________________________________________

#### Professional seminars

<table>
<thead>
<tr>
<th>Date and location</th>
<th>Type of activity (eg. School of Engineering seminar or ASCE student meeting with speaker)</th>
<th>Speaker’s name</th>
<th>Topic spoken about</th>
<th>Approximate number of attendees</th>
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</table>

#### Business meetings

<table>
<thead>
<tr>
<th>Date and location</th>
<th>Type of activity (eg. ASCE student business meeting)</th>
<th>Topic discussed</th>
<th>Approximate number of attendees</th>
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<tbody>
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Attach documentation for all activities outside the School of Engineering
Ethics Assignment

Gilbane Gold character evaluation

This film presents a number of ethical issues faced by characters involved in the Gilbane community. In class, you will be assigned three characters. For each character:

1. Describe the position taken by the character in the film.
2. State whether you feel this position is ethical with respect to the ASCE code of ethics.
3. Describe a position directly opposite to the one taken by the character.
4. Show how it could be ethical for the character to take this opposite position.

Overall Summary

Describe how you believe the conflict can be resolved in a manner that is acceptable to all parties.
Group management

Project manager

The project manager is responsible for the quality and timeliness of all aspects of the work involved. He or she assigns tasks to the other group members and sets time deadlines for the work. All work must get to the project manager early enough for the project manager to check the quality. This includes checking calculations and proof reading all text. Since all calculations will be done by two group members, the project manager participates in the process of getting the two calculations to arrive at the same result if they disagree. The project manager summarizes all work with figures and text. This material goes into the summary portion of the report. The project manager has sole responsibility for preparing the project summary. The project manager should be capable of speaking knowledgeably on all aspects of the project. The project manager must manage all group members respectfully.

Group members

Group members must follow the instructions of the project manager. Calculations must be performed accurately and on time. All calculations will be carried out by two group members! They must arrive at the same final result. If they do not initially arrive at the same result, they must meet independently and resolve their differences. If they cannot resolve their differences, they should involve the project manager to get the differences resolved and develop a final acceptable design.

Task sheet

<table>
<thead>
<tr>
<th>Task</th>
<th>Group member name</th>
<th>Date due</th>
<th>Date submitted</th>
<th>Date verified with other calculation</th>
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