ENGR 481/482 Senior Design
Dept. of Mathematics, Computer Science and Engineering
George Fox University
Course Information and Syllabus, Fall 2008/Spring 2009

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COURSE DESCRIPTION:
1 hour. In the senior design sequence, students apply their knowledge and design skills gained through course work to an industry-based project. In the first semester, interdisciplinary teams are formed to begin projects in conjunction with participating industrial sponsors. Necessary background research and feasibility studies are completed. Students must also consider the ethical, moral, environmental, and social impact of their designs. Collaboration with other departments of the university is encouraged. Additional course fee is required. Prerequisite: senior standing in the engineering major.

COURSE OBJECTIVE:
The objective of the ENGR 481/482 course sequence is to provide a realistic experience in the practice of engineering design for senior engineering students at George Fox University.

COURSE SUMMARY:
Students will work together in a single team as project consultants for industry or other external agency. The team will research and develop a solution to a problem with guidance from representatives of the client and two George Fox faculty advisors. At the conclusion of the course the student team will formally report the results to the client and turn over any deliverables.

Each student is expected to deliver about 10-12 hours per week on the senior project. For a team of eight or nine senior engineering majors, this represents approximately 2700 hours of engineering work for the team and includes faculty guidance. The students are required to participate in a sequence of reporting activities, both written and oral. Two of the oral presentations will be performed at the client's site. The client should also expect to receive all of the proposed deliverables. Default on the list of deliverables will result in a grade of incomplete for the course. The grade of incomplete will remain until all of the deliverables have been transferred.

This is a capstone senior design project. It is an opportunity for students to participate in a realistic design process with authentic design challenges. The structure and conditions under which students will work are modeled after those to which students will likely be exposed after graduation as practicing engineers in industry. Students will be expected to exhibit responsible and ethical behavior. As professionals, it will be the students responsibility to complete the assigned work prior to deadlines and to the best of their ability. This is one of the most important activities in which you will participate as you work towards an engineering degree at George Fox University.
METHODOLOGY:
Students will assess the proposed project and create an organization to perform the required duties. This organization typically will need some sort of administrative and technical leadership. The organization might, if appropriate, be subdivided into smaller spheres of responsibility that may or may not have an organizational structure. The team and sub-teams will be responsible for creating specifications, objectives, and milestones for the design and construction of the project. The teams will also be responsible for complete documentation including, but not limited to: Operational Manual(s), Maintenance Manual(s), and a Project Report.

ASSESSMENT:
Individual performance will be assessed by the student’s peers as well as by faculty. Each student will develop an expectation of performance and will be periodically reviewed based on this expectation. Reviews will occur during both semesters as well as a final review in April. If a student continually fails to perform up to expectations, that student will be dismissed from the project at the final review and will not receive a passing grade in the course. Following the industry model, this would be akin to being fired.

The project will be assessed using the following rubric:

1. Development of Functional Specification (includes appropriate engineering codes, standards and specifications; economic, environmental, sustainability, manufacturability, ethical, health & safety, social, and political constraints).
2. Development of Concept Design (involves knowledge and skills from general education, basic math and science, and engineering science education).
3. Generation of Design Alternatives (involves knowledge and skills from general education basic math and science, and engineering science education).
4. Selection and Model of Best Alternatives (involves knowledge and skills from general education basic math and science, and engineering science education).
5. Test and Verification of the Design (meets design specifications).

The documentation will be assessed using the following rubric:

1. Format (quality, organization, presentation of material, fonts, page layout).
2. Writing Quality (word choice, style, grammar, spelling, paragraph structure, punctuation, readability, clarity).
3. Design Process Documentation (functional specification, concept development, alternative designs, selection, verification, description of final design).
4. Graphical Communication (schematics, graphs, charts, drawings, sketches, tables, photos, etc.)
5. Engineering Analysis (test plans, experimentation, instrumentation, test results, models, virtual testing, analysis, conclusions).
6. Information Sources (Site all resources for information and data collected, patents, state of the art, other designs, etc.).
The final oral presentation will be assessed based on:

1. Delivery
2. Language
3. Preparations & Visuals
4. Organization
5. Content/Substance

Course Web Page:
http://engr.georgefox.edu/Courses/ENGR482

Course E-mail list:
http://engr.georgefox.edu/mailman/listinfo/engr482

Engineering Your Soul:
The third mission objective of the George Fox University Engineering program states: “GFU Engineers will understand responsible service from a Christian worldview that emphasizes integrity in every aspect of this service, motivates individuals to a life of responsible service to humankind, and recognizes the need for a life of continued learning.”

As one step towards the fulfillment of this objective, the engineering faculty is excited to present another Engineering Your Soul reading for the semester. Each semester, we will collectively identify influential Christian writing(s) to be read and reflected upon by all engineering faculty and students throughout the term. This will be treated as an official component of every engineering course and will be uniquely integrated and assessed at the discretion of each course instructor.

It is our hope that students will not view this as one more task to complete, but as a catalyst for continued discussion ultimately leading to a deeper experience of Jesus Christ.

Disability Services Information
If you have specific physical, psychiatric, or learning disabilities and require accommodations, please contact the Disability Services Office as early as possible so that your learning needs may be appropriately met. You will need to provide current documentation of your disability to Disability Services. For more information, contact Rick Muthiah, Director of Disability Services (ext. 2314 or rmuthiah@georgefox.edu), or go to ds.georgefox.edu for more information.

Academic Resource Center
The Academic Resource Center (ARC) provides all students with free writing consultation, general tutoring, academic coaching, and learning strategies (e.g., techniques to improve reading, note-taking, study, time management). The ARC hours of operation are from 1:00-10:00 p.m., Monday through Thursday, and 12:00-4:00 p.m. on Friday. Call ext. 2327 or email the_arc@georgefox.edu to schedule an appointment. Visit arc.georgefox.edu for information about ARC Consultants’ areas of study,
instructions for scheduling an appointment, and helpful learning tools. Call Rick Muthiah, Director of the Academic Resource Center, at ext. 2314 if you have questions.