Course Objectives
Almost all professional engineers find themselves involved in some sort of team work for many aspects of their professional activities. Novel engineering research and design is performed by individuals in the context of projects or goals which require, or will require, the involvement of many other individuals. As such, it is important that engineering students learn to carry out research and design tasks as members of groups of individuals. To achieve this purpose the ECE 4600 Group Design Project course is mandatory in the Electrical and Computer Engineering curricula. The CEAB Accreditation Criteria and Procedures succinctly states the main goal of this course with regard to design content and team work:

- **Engineering design** integrates mathematics, basic sciences, engineering sciences and complementary studies in developing elements, systems and processes to meet specific needs. It is a creative, iterative and often open-ended process subject to constraints which may be governed by standards or legislation to varying degrees depending upon the discipline. These constraints may relate to economic, health, safety, environmental, social or other pertinent interdisciplinary factors.

- The engineering curriculum must culminate in a significant design experience which is based on the knowledge and skills acquired in earlier course work and which preferably gives students an exposure to the concepts of team work and project management. A research project may be interpreted as engineering design provided it can be clearly shown that the elements of design, as noted in the definition [above], are fulfilled in the completion of the project.

Prerequisites
Electrical Eng. students: ENG 2010, ECE 3670, ECE 3780, ECE 3580, ECE 3720, ECE 3610
Computer Eng. students: ENG 2010, ECE 3670, ECE 3780, ECE 3700, ECE 3760, ECE 3740

Course Content
As well as the technical content of each group project, students will learn/exercise the following skills:

- Working in groups to achieve a substantial engineering design project
- Writing a detailed project proposal with realistic specifications
- Effective procedures for the division of labour amongst group members
- Creating and maintaining a schedule with milestones
- Maintaining an up-to-date Engineering Logbook
- Giving written and oral progress reports
- Writing a final engineering group report
- Making an oral group presentation of the project results
- The course will also cover Engineering Law, where students will learn the meaning of law, contracts, expert witness, legal responsibility, and liability

Accreditation Units
Mathematics: 0%
Natural Science: 0%
Complementary Studies: 0%
Engineering Science: 0%
Engineering Design: 100%

Web Page
http://ece.eng.umanitoba.ca/undergraduate/ECE4600/
Textbook
Guidelines and slides are provided on the course web page.

Other References

Evaluation Details
The final course grade is determined by the student’s performance on the design project both individually (Individual Mark), and with their group members (Group Mark). Students must pass each component making up the final mark in order to obtain a passing grade in the course. Course instructors may make adjustments to the Group Mark, in order to take into account variations in the degree of technical difficulty between different projects.

<table>
<thead>
<tr>
<th>Component</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Mark Proposal</td>
<td>5</td>
</tr>
<tr>
<td>Group Mark Progress Report (written)</td>
<td>10</td>
</tr>
<tr>
<td>Group Mark Final Report</td>
<td>15</td>
</tr>
<tr>
<td>Group Mark Presentation Day Poster</td>
<td>5</td>
</tr>
<tr>
<td>Group Mark Achievements, success, and completion level of project*</td>
<td>35</td>
</tr>
<tr>
<td>Group Mark Adjustment*</td>
<td>± 10</td>
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<tr>
<td>Individual Mark Logbook</td>
<td>10</td>
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<tr>
<td>Individual Mark Progress Report (oral)</td>
<td>5</td>
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<tr>
<td>Individual Mark Oral Presentation</td>
<td>15</td>
</tr>
<tr>
<td>Individual Mark Individual group member evaluations by supervisor (zero-sum amongst group members, $n$ is the number of students in the group)*</td>
<td>± 5n</td>
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</tbody>
</table>

*Determined by course coordinator in consultation with the project supervisor(s)*

Instructors
Coordinator
Prof. Behzad Kordi, Ph.D., P.Eng.
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Telephone: (204) 474-7851
Email: Behzad.Kordi@UManitoba.CA

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Email: Daniel.Card@UManitoba.CA
Technical Communication Specialist
  Aidan Topping, M.A.
  Office: E3-470
  Telephone: (204) 474-8329
  E-mail: Aidan.Topping@UManitoba.CA

Office Hours
By appointment.

Teaching Assistants
N/A

Voluntary Withdrawal Date
A student must make the decision to voluntarily withdraw (VW) from this course by Monday, January 12, 2015 (in consultation with the other members of the group and the project supervisor). This date is prior to the university’s official winter term VW date because of the impact a student’s withdrawal would have on the rest of the group.

Requirements/Regulations
  • Attendance at lectures and laboratories is essential for successful completion of this course. Students must satisfy each evaluation component in the course to receive a final grade.
  • It is the responsibility of each student to contact the instructor in a timely manner if he or she is uncertain about his or her standing in the course and about his or her potential for receiving a failing grade. Students should also familiarize themselves with Sections 4 and 6 of the Regulations dealing with incomplete term work, deferred examinations, attendance and withdrawal.
  • No programmable devices or systems (such as calculators, PDAs, iPods, iPads, cell phones, wireless communication or data storage devices) are allowed in examinations unless approved by the course instructor.

Academic Integrity
Students are expected to conduct themselves in accordance with the highest ethical standards of the Profession of Engineering and evince academic integrity in all their pursuits and activities at the university. As such, in accordance with the General Academic Regulations and Requirements of the University of Manitoba, Section 7.1, students are reminded that plagiarism or any other form of cheating in examinations, assignments, laboratory reports or term tests is subject to serious academic penalty (e.g. suspension or expulsion from the faculty or university). A student found guilty of contributing to cheating in examinations or term assignments is also subject to serious academic penalty.
Learning Outcomes

1. Undertake a multi-person engineering project. Aspects include specifications, construction, and implementing - from concept, to design, to final implementation.
2. Planning and documenting an engineering project, including prediction/application of division of labour, scheduling, budgeting, progress report, and logbook.
3. Communicating engineering ideas and work to engineers and society at large, in written reports, oral presentations, and including comparison and evaluation of other group efforts.
4. Understanding of law, as pertaining to the practice of engineering, accountability, and the role and identification of intellectual property and show logged documentation of self/group work.

Expected Competency Level **

<table>
<thead>
<tr>
<th>Learning Outcome</th>
<th>A1</th>
<th>A2</th>
<th>A3</th>
<th>A4</th>
<th>A5</th>
<th>A6</th>
<th>A7</th>
<th>A8</th>
<th>A9</th>
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</table>

*Attributes:
A1 A knowledge base for engineering
A2 Problem analysis
A3 Investigation
A4 Design
A5 Use of engineering tools
A6 Individual and team work
A7 Communication skills
A8 Professionalism
A9 Impact of engineering on society/environment
A10 Ethics and equity
A11 Economics and project management
A12 Life-long learning

**Competency Levels:
1 - Knowledge (Able to recall information)
2 - Comprehension (Able to rephrase information)
3 - Application (Able to apply knowledge in a new situation)
4 - Analysis (Able to break problem into its components and establish relationships)
5 - Synthesis (Able to combine separate elements into whole)
6 - Evaluation (Able to judge of the worth of something)

Student Contact Time (Hrs)

Lectures: 12 hrs
Student presentations: 18 hrs (tutorial)
Presentation day: 5 hrs (tutorial)

Evaluation

<table>
<thead>
<tr>
<th>Component</th>
<th>Value (%)</th>
<th>Methods of Feedback</th>
<th>Learning Outcomes Evaluated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logbook</td>
<td>15</td>
<td>F</td>
<td>1, 2, 3, 4</td>
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<tr>
<td>Proposal</td>
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<td>F, S</td>
<td>1, 2, 3</td>
</tr>
<tr>
<td>Written Progress Report</td>
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<td>F, S</td>
<td>1, 2, 3, 4</td>
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<td>Oral Progress Report</td>
<td>10</td>
<td>F, S</td>
<td>1, 2, 3, 4</td>
</tr>
<tr>
<td>Presentation Day Poster</td>
<td>5</td>
<td>S</td>
<td>2, 3</td>
</tr>
<tr>
<td>Final Report</td>
<td>25</td>
<td>S</td>
<td>1, 2, 4</td>
</tr>
<tr>
<td>Final Oral Presentation</td>
<td>25</td>
<td>S</td>
<td>1, 2, 3, 4</td>
</tr>
</tbody>
</table>

* Methods of Feedback: F - *formative* (written comments and/or oral discussion), S - *summative* (number grades)