MTHE 493 - Engineering Mathematics Project

Fall Term 2013 and Winter Term 2014

Coordinator: Tamas Linder, Jeffery Hall 401, linder@mast.queensu.ca

Office Hours: By appointment

Grading:

1. Signed Project Proposal (Week 4): 10%
2. Midterm Oral Presentation (Week 12): 15%
3. Final Oral Presentation: (Week 22): 15%
4. Thesis (Week 24: last day of classes): 40%
5. Group evaluation by supervisor: 10%
6. Individual evaluation by supervisor: 10%

Week 1:

- *Organizational Meeting:* Tuesday, September 10, 12:30 pm, Jeffery Hall, Room 102
- *Social Meeting:* Tuesday, September 10, 1:00 pm, 5th floor lounge

Course Overview

In this course students pursue supervised research on an engineering topic. Through this mechanism students gain exposure to various aspects of engineering practice and the carrying out of independent research. All students are expected to address all of the following aspects of engineering practice during the course of their research project.

1. *Problem analysis:* This has to do with modeling, analysis of results, appropriate use of systems, etc.
2. *Engineering design:* This has to do with solving an *open-ended* engineering problem, understanding the constraints involved, and using tools in the design process, i.e., arriving at a solution in a systematic, rather than ad hoc manner.
3. *Use of engineering tools:* You are expected to understand and apply the engineering tools appropriate to your project.
4. *Teamwork:* All projects will be done in teams. Students are expected to perform well as a group, and as individuals in their group. Supervisors will be assessing teamwork at the end of the course after all other assessment has been done.
5. *Communications:* There are two oral reports, a written proposal, and a final thesis. These are expected to be prepared and/or presented to the standards of professional practice.

6. *Professionalism:* Students are expected to show an understanding of the engineering profession, and conduct themselves in a manner befitting a member of the engineering community.
7. *The social, environmental, and economic impacts of engineering:* All three aspects, social, environmental, and economic, must be addressed in all projects. Students are expected to provide as thorough and thoughtful an analysis of these elements of the project as is reasonably possible.
8. *Ability to learn independently:* It is expected that all students will demonstrate that they are able to continue learning independently about their profession as their careers develop.

It is to be understood that not all projects will involve all of the above elements equally. Thus students will be assessed on whether, *given the nature of their research project*, they appropriately addressed the elements above. However, *all* elements must be present in each project. Prior to each oral presentation, there will be a meeting of the entire class to discuss the assessment criteria so that there will be no confusion as to expectations. The dates for these meetings will be announced as they draw near.

Research topics are selected from a list distributed early in the fall term, or by consultation with faculty members. Projects typically involve the design and implementation of some piece of equipment, or software; emphasis is placed on projects where engineering and mathematics fit together nicely. All projects are supervised (or co-supervised) by Mathematics and Engineering faculty members. The marks are assigned jointly by the supervisors, the course coordinator and by other Mathematics and Engineering faculty.

Course Road Map

1. **Choosing a Team and a Project - Week 1:** You are expected to form your research team *during the first week of classes*. The size of a team may be two or three members. It is paramount that the work load is uniformly distributed among all team members; this will be verified by the supervisors throughout the year. *Any student who has not declared a project on time will be assigned a project by the course coordinator.*

   The thesis topic you work on can be selected from the circulated list of projects. You may also consult with a particular faculty if you have a topic in mind (e.g., relating to a summer job). Your topic can also relate to a previous thesis that attracts your attention (theses from previous years are shelved in the Undergraduate Resource Room on the second floor of Jeffery Hall). All projects must be supervised by Mathematics and Engineering faculty. It is also possible to work with a faculty from another Department as long as a Mathematics and Engineering

faculty is serving as a co-supervisor. Project titles from previous years with names of students and supervisors are available at
`http://www.mast.queensu.ca/meng/undergrad/projects.php`.

2. **Project Proposal – Week 4:** A written thesis proposal signed by the project team members and the supervising faculty, must be submitted by the end of Week 4 (drop it at the front desk in Room 310). Even though faculty are thoroughly involved in the thesis projects, you should adopt a style appropriate for your Mathematics and Engineering class. This is the audience you should keep in mind for all the written work in the course, and for the oral presentations.

   The proposal should be no longer than 15 pages. Its contents should include the following sections: Introduction/Background, Problem Description, Proposed Solution/Design, Project Timeline (in *both* Tabular and Gant Chart formats), Team Members and Load Distribution/Assigned Tasks.

3. **Midterm Oral Presentation – Week 12:** A ten to fifteen minute progress report describing your thesis topic, your methodology, and progress to date, will be given during Week 12; a tentative date is *Wednesday, November 29, 2013*. The audience will be your Mathematics and Engineering class and faculty supervisors.

4. **Final Oral Presentation – Week 22:** Work on the thesis should be almost completed by the end of Week 18, and completely wrapped up by the end of Week 22. The Mathematics and Engineering Conference will take place at the end of Week 22 (usually it is held on Saturday to avoid time conflicts); a tentative date is *Saturday, March 22, 2014*. Depending on size, each team will have between 20 to 30 minutes for the oral presentation.

5. **Thesis – Week 24:** You should start writing the thesis during Week 18. In the final six weeks, you are also encouraged to show a draft of your thesis to your supervisors for comments. The final copy of the thesis is due at the end of Week 24, on the last day of classes. *You should submit a hardcopy to each faculty supervisor, and two hardcopies and one soft copy on a CDROM to Ms. Johana Ng* (who will file one hardcopy for the Department and one hardcopy for the Undergraduate Resource Room). In addition, you should email the pdf file of your thesis to math493thesis@mast.queensu.ca.