

Mechanical Engineering 4M06: Senior Project

Coordinator: Dr. M. K. Jain Course Web Site: (<http://avenue.mcmaster.ca>)

Lectures: See the last page on Lectures from the Department faculty and external visitors for details. First introductory class by Dr. Jain will be held on Wednesday, September 5th at 5:30 PM in the lecture theater ABB/102. The lectures will end in Term I. There will be no lectures in Term II.

Days	Time period	Term	Location
Mondays, Wednesdays and Thursdays	05:30 PM - 06:20 PM	1	ABB/102

Important Dates:

Dates	Events
Wednesday, September 5	Introductory session; Project List is posted on the course web site.
Thursday, September 6	Introduction to some of the projects by interested faculty.
Monday, September 10	Machine shop safety course, Part 1 in room ABB/102, to be attended by all students ¹ . <u>Project selection forms</u> to be dropped off in <u>Dr. Jain's</u> mail box in JHE310.
Wednesday, September 12	Machine shop safety course, Part 2 in room ABB/102, to be attended by all students ¹ . <u>Project selection forms</u> to be dropped off in <u>Dr. Jain's</u> mail slot in room JHE310 (last day of project selection sheet submission).
Thursday, September 13	Machine Shop Safety Course, Part 3, to be attended by all students ¹ .
Monday, September 17	List of project teams and their project allocation to be posted on the course web site as well as names of 2 faculty evaluators of the project
Monday, September 17	Start of 4M06 Lectures (all lectures in ABB/102) (see list at the end of this document)
Monday, October 29	Written test based on 4M06 Lectures (in ABB/102)
Thursday, November 1	Submission of Scope of Work (SW) document by the teams to assigned evaluator and Dr. Jain ²
Wednesday, November 7	Term 1 <u>presentation abstracts</u> to be submitted in two sealed envelopes addressed to <u>your</u> two presentation evaluation faculty members by placing in their mail boxes in the Department Office (JHE310).
Nov. 12 – Nov. 23	Term 1 oral presentations (time and place to be set by the <u>project supervisors</u> in consultation with their project teams and faculty presentation evaluators). Design journals are to be presented to the evaluators during the presentation.

¹ Attendance will be taken at the start of the Machine Shop Safety lectures (all 3 parts). No credit will be given for late arrivals.

² Place material in the mail slot of your SW evaluator in the Department office (JHE310) by 4:00 PM, and submit an e-copy of SW document in Word to Dr. Jain (e-mail: jainmk@mcmaster.ca).

Friday, November 30	<u>Last date for submission of project funding application</u>
Monday, February 4	<u>Due date for submission of progress report to your project supervisor¹</u>
Monday, March 11	<u>Project presentation abstract, SW document, and a copy of the progress report of February 4th to be submitted in two sealed envelopes addressed to the 2 faculty presentation evaluators in their mail slots in the Department Office (JHE310).</u>
March 18 – March 29	<u>Term 2 oral presentations (time and place to be set up by the project supervisors in consultation with their project group members and faculty presentation evaluators). Design journals are to be presented to the evaluators during the presentation.</u>
Friday, April 5	<u>Final report and design journals to be handed to your project Supervisor¹.</u>

Evaluation:

- Evaluation is based on the following scheme:

Term	Component	Group mark (max)	Individual mark (max)	Evaluation by
I	Written test (based on in-class lectures)	Not applicable	5%	Dr. Jain
I	Technical writing	Not applicable	1% (bonus)	Dr. Wohl
I	Scope of Work document	25%	Group mark* IE factor ²	2 Designated (team-specific) Project Evaluators
	Group presentation I	10%	Group mark* IE factor ²	2 Designated (team-specific) Project Evaluators
II	Progress report ²	15%	Group mark* IE factor ²	Project Supervisor ²
	Group presentation II	20%	Group mark* IE factor ²	2 Designated (team-specific) Project Evaluators
	Final report ²	25%	Group mark* IE factor ²	Project Supervisor ²

Note: Rubrics will be provided to the students on the course web site (Avenue) ahead of time for all requested documents, reports and presentations, and to ensure consistency in grading.

¹Place material in supervisor's mail slot in the Department office (JHE310) by 4:00 PM.

² Group mark will be multiplied by initiative & effort, IE factor, for each student in the group, taking values between 0.0 for no initiative and effort and 1.0 for full initiative and effort. The IE factor for individual contribution to the group effort will be determined by peer review and /or by the supervisor.

- **Machine Shop Safety Lectures.** All students must attend all 3 parts of the safety course (except as noted below). Note that attendance will be taken during the 3 safety related lectures. The first two safety lectures are not required for those students who already have the Mechanical Engineering Project Laboratories Card.
- **Department Workshop Training**

The Project Workshop training will be held immediately after the 3 safety related lectures at the beginning of the course. This training is mandatory for those who wish to use the shop later in the project work. A separate Pass/Fail test will be held after the training. The students must secure at least 85% mark to pass the training test. All students are advised to take the training even if you do not anticipate using the workshop. This training will be provided first and last time in September. Access to the Mechanical Engineering workshop will be denied if your plan has changed to incorporate fabrication work in your project, and you have not received the training in September.

- **Written test** (October 29th, 5:30 PM, room ABB/102)

There will be a 50-minute long written multiple-choice test (for lectures from Sept. 17 – Oct. 24, with the exception of Dr. Jain's lecture on October 4th) based on the lecture material covered by participating faculty and invited speakers. The test will be worth 5% of the course grade. All lecture slides will be posted on course web site in advance of the test.

- **Scope of Work document** (due November 1st)

A comprehensive Scope of Work (SW) document with well-defined and quantifiable deliverables is to be prepared by the team in consultation with the Project Supervisor as per the template to be provided on the course web site. SW should include, (i) project-specific background research, (ii) available and applicable lab infrastructure for use in the project (including specific project laboratory equipment and facilities), (iii) specific objectives and deliverables of work in clear and quantitative terms (suitable for engineering action) by reassessment of the project's original objectives, new challenges based on new research and knowledge, and reconsideration of all original design and fabrication constraints noted in the Supervisor's project description, (iv) supporting documents such as concept sketches of various designs, concept selection (criterion and methodology), (v) detailed timelines for specific stages of work, and (vi) a detailed estimated budget (based on components, materials, external labor etc.). This document will be integral to the presentation and final report rubrics for project evaluation purposes. SW should include names of all team members including the Project Supervisor, McMaster e-mail addresses, and signatures of all team members and Project Supervisor. Lastly, a Job Hazard Analysis (JHA) for the project should also be included in the SW document after visiting all work areas involved in the project. SW will constitute 25% of the final course grade.

SW evaluation will be carried out by an assigned 4M06 faculty member other than the Supervisor of the project based on a rubric. A copy of the rubric for SW will be made available on the course web-site ahead of time to help student groups prepare their SW document. SWs will be first assessed for a 'pass' or 'fail'. For SWs that pass, a mark will be assigned by the

committee. For the SWs that fail, the teams will be asked to revise and resubmit the revised SW to the committee for re-evaluation until the SW qualifies as a pass. SW must be submitted directly to the assigned 4M06 evaluator by placing the SW document in the mail slot of the evaluator in the Department office (JHE310). Also, an e-copy of SW document in Word should be sent to Dr. Jain.

- The **Term I Presentation** (period: Nov. 12 – Nov. 23) will be a 20-minute presentation (plus 10 minutes for questions and discussion). The presentation should include your project-specific background research, specific objectives and deliverables, various initial design concepts, concept selection criterion and a final concept, timeline and estimated budget. This could be largely based on the earlier SW document. The presentation will be evaluated by 2 participating faculty members (and not by your project supervisor). A list of presentation evaluators for the different 4M06 projects will be made available on the course web site towards the end of September. This will likely remain unchanged for Term I and Term II presentations unless special circumstances arise.

A rubric for Term I presentation would be made available to the students on the course web site by the end of October providing details of content for presentation assessment and the marks distribution for the different components.

A one-page presentation **abstract** must be provided by each student team by November 7th (a copy to each of the two faculty evaluators, to be placed in their mail slots in JHE310). If the project requires the involvement of the project shop and/or supplies, a third copy of the abstract with the timeline and description of the project shop work and supplies needed must be submitted in an envelope addressed to the Course Coordinator – Dr. Jain. Design journals of all team members are to be made available for viewing by the evaluators during the presentation (more on this later).

For projects that require funding, Department will be requesting **project funding** applications for the build portion of some of the projects on a competitive basis. A project funding application form with instruction to complete the form and to prepare supporting documents will be available to the students on the course web site by October 1st. The last dates for the submission of the application is Friday, November 30th.

- **Progress Report** (due Feb. 4, 2019) should provide an update of the project status with reference to the initial timeline. The expected project completion status should be at least 70% of the entire project work. The report should contain a description of the project progress with respect to all of the specific objectives and deliverables as stated in SW document as well as details of the tasks completed with itemized man-hours committed by individual group members, and an updated timeline and budget for the final stage of the project completion. The report should be placed in your supervisor's mail slot in the Department office (JHE310). The body of the report should be typed using 12pt font size and be contained within 15 double spaced pages, not counting figures and end of the report appendices. A rubric for the progress report will be made available in advance.
- The **Term II Presentation** (March 18 – March 29, 2019) should be a 20 minute oral presentation (plus 10 minutes of questions and discussion) of the completed project. A one-page presentation abstract, SW document from Term I, and a copy of the progress report of

February 4th, must be submitted to each of the two evaluating faculty members by March 11th. These should be placed in the evaluator's mail slots in the Department office (JHE310). Design journals of individual team members for viewing by the evaluators are to be made available during the presentation. A rubric for Term II presentation will be made available to the students on the course web site by the end of February providing details of contents for presentation assessment by the two evaluators and the marks distribution for the different components.

- The **Final Report** (due April 5, 2019) should be a formal engineering report that is to be done to a professional standard. The appendix to the final report should include the actual timeline for the project with an itemized man-hour contribution for individual group members and a brief comparison between the actual timeline and the intended timelines as presented in SW document in Term I. The body of the report should be typed using 12pt font size and be contained within 25 double spaced pages, not counting figures and end of the report appendices. The report should be placed in your supervisor's mail slot in the Department office (JHE310). In addition, all individual design journals should be submitted to the Project Supervisor. A rubric for the final report would be made available to the students on the course web site by the end of February providing details of contents for report assessment and the marks distribution for the different components.

Submission of reports:

The Scope of Work document is to be submitted to the assigned 4M06 evaluator by placing the document in the mail box of the evaluator in the Departmental office (JHE310). Also, an e-copy of SW document in Word should be sent to Dr. Jain. The progress and final reports must be submitted directly to your project supervisor by the due date. The report should be placed in the mail box of your project supervisor in the Departmental office (JHE310). For Term II presentations, a 1-page presentation abstract, SW document of Term I, and Progress Report of February 4th are to be submitted to each of the two faculty presentation evaluators by the due date of March 11th by placing all documents in an envelope in their respective mail slots in JHE310 by 4:00 PM.

Design Journals:

- A design journal is to be kept by each student.
- It must be a hard-bound lab note book with sewn-in pages.
- Entries are to be done in ink, and each entry is to be dated.
- Use it to record any information you collect, brainstorming ideas, sketches, calculations, meeting minutes, summaries of unsolved problems, etc. Be complete. Don't worry about spelling, grammar or excessive neatness.
- Journals are to be shown to your supervisor at each weekly meeting. They are also to be presented to the presentation evaluators during Term I and Term II (final) presentations.
- Design journals are to be handed in to your project supervisor at the end of the project along with the final report.

Additional Information:

- Average project effort per person must be 6 hrs/week in Term 1 & 12 hrs/week in Term 2.
- **Scope of Work** document must be completed using the standardized form while adhering to the maximum space requirements for each of the boxes.

- **Reports** are to be formal engineering reports, and need to be done to a professional standard. The page limit mentioned earlier must be adhered to for each of the reports. A logical, concise and well-organized report is far better than a voluminous, rambling, one. The project supervisors are expected to timely read and provide feedback to the students, and report marks to Dr. Jain for uploading on Avenue.
- **Presentations** will be professional presentations done by each group. You are responsible for presentation aids (e.g., overhead slides, a laptop and projector for presentations, if one is not available in the presentation room). An abstract of the presentation in a sealed envelope must be submitted to your project evaluators, for the 1st term presentation, by Wednesday, Nov. 7th and by Monday, March 11th, for the second term. Also, in the second term, a copy of the SW document and progress report of February 4th should be provided to the faculty presentation evaluators in addition to the presentation abstract (all in a sealed envelope to be deposited in their mail slots in JHE310). The project evaluators are expected to timely mark the presentation as per the rubric and provide marks to Dr. Jain for uploading on Avenue. The students should directly approach the Presentation Evaluators for any feedback soon after the marks have been posted on the course web site.
- Good **Communication** with your supervisor is critical for the success of the project. Schedule regular meetings, at least once a week, and all group members must attend them. Your supervisor may assign you demerit marks for poor project meeting attendance.
- When the Project List becomes available on September 5th, it is advisable that you speak to supervisors of projects you are interested in, to make sure you have a good and shared understanding of what the project entails. Some supervisors will require this before you can select their projects.
- If your project leads to the creation of new **Intellectual Property** (IP), you have certain rights regarding the ownership of that IP. See McMaster's policies on IP located at the following address:

<http://www.mcmaster.ca/mufa/handbook/ippolicyJoint.html>

McMaster Policy on Academic Dishonesty:

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. a mark of zero on a report, loss of credit with a notation on the transcript (notation reads: "Grade of F assigned for academic dishonesty"), and/or suspension or expulsion from the university. It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, located at

<http://www.mcmaster.ca/policy/Students-AcademicStudies/AcademicIntegrity.pdf>

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g., the submission of work that is not one's own or for which other credit has been obtained.
2. Improper collaboration in group work.
3. Copying or using unauthorized aids in tests and examinations.

ME4M06 Project Selection Sheet

Individual selection (top table) is to be completed individually by all students

Name: _____ ID No.: _____

List (in your preferred order) five different supervisors and the project codes on which you would like to work. It is mandatory to list all 5 choices. Each choice must be with a different project supervisor. Return your completed form to Dr. Jain by placing it in his Department mail box in room JHE310 by September 14th.

Supervisor ¹	Project codes	Met with the supervisor (yes/no)?	Comments
1.			
2.			
3.			
4.			
5.			

Group Project (completion of this section is optional)

If you would like to be in a group with other people, who have already agreed to work with you, submit the names of the group members and the project codes from the Projects List. Your group size must be consistent with the group size required for each of the chosen projects in the Project List.

Names of group members (print)	Signatures (<u>required</u>)	1 st choice project code ¹	2 nd choice project code ¹	3 rd choice project code ¹	4 th choice project code ¹	5 th choice project code ¹

¹ Each of the five project choices must be with a different supervisor

ME 4M06 Lectures in 2018

(Location: ABB/102, Mondays, Wednesdays and Thursdays at 5:30 PM)

Attendance is compulsory for the 3 Machine Shop Safety lectures and will be taken at the beginning of the class. The attendance is expected for all other lectures. A written test based on the lectures noted below (worth 5% of the mark towards the course grade) will be conducted on October 29th in room ABB/102. Lecture dates, names of speakers and lecture topics are given in the table below.

Date	Speaker	Topic
Sept. 17	Andrew Colgoni	Library Instruction
Sept. 19	Dr. Jim Cotton	Sustainability
Sept. 20	Dr. Greg Wohl	Technical Writing I
Sept. 24	Dr. Greg Wohl	Technical Writing II
Sept. 26	Dr. Kobus Kirstein	ASME BPVC not a recipe
Sept. 27	Kathryn Leistner	Never apply to a job posting again
Oct. 1	Dr. Phil Koshy	Design for Manufacturing
Oct. 3	Dr. Mohamed Hamed	Effective presentations
Oct. 4	Dr. Mukesh Jain	Scope of Work document preparation (material <u>not</u> included on the written test)
Oct 15	Dr. John MacKinnon	Success in the workplace, time management and professionalism
Oct 17	Sonia Hawrylyshyn	Soft Skills
Oct. 18	Jessica Phyland	Human factor and career development
Oct. 22	Tracey Caruana/Adeilton Reberio (PEO)	Professionalism
Oct. 24	Dr. Wajih Hamouda	Engineers in the real world
Oct. 25	Dr. Don Metzger	Design consulting in the Canadian nuclear industry
Oct. 29	N/A	<u>Written test</u> in room ABB/102 based on lectures (Sept. 17 – Oct. 24) with the <u>exception</u> of the lecture by Dr. Jain on October 4th
Nov. 1	John Colenbrander	Project funding - budget development and approval process

Note: The order of lectures may change depending upon any changes in schedules of some of the speakers. Please check regularly the course web site for any changes/updates. There will be no lectures in Term II.