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# Engineering 4M06 Multidisciplinary Projects

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Information Session

February 10, 2011

G.A. Irons

Instructor

# Calendar Description

- ENGINEER 4M06 MULTIDISCIPLINARY PROJECTS Capstone Course in which students work in multidisciplinary teams to develop an integrated design or solve a problem for an organization (company or not-for-profit organization). Two Labs (3 hours each); both terms
- Prerequisites: Registration in final year of an Engineering program, a CA of at least 8.0, and permission of Department and Instructor.
- Antirequisites: CHEM ENG 4W04, CIV ENG 4C04, 4R04, 4X06, ELEC ENG 4I06, 4BI6, ENG MGT 5B03, ENG PHYS 4A06, MATLS 4Z06, MECHATRON 4TB6, MECH ENG 4M06, SFWR ENG 4G06, 4GP6. Not open to students in any Engineering Physics programs.

# Learning Outcomes

The objective of this course is to give students experience in open-ended projects that are industrially-based and multi-disciplinary. The projects will be selected to apply design solutions for complex, open-ended engineering problems and to design systems, prototypes, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, economic, environmental, cultural and societal considerations.

# Specific Learning Outcomes

- The ability to assemble a multidisciplinary team and market the team to potential clients.
- The ability to develop a formal proposal and secure an engineering project. The project should:
  - Be selected from a number of possible projects on the basis of team skills and the potential for a value-adding outcome,
  - Include relevant engineering, business and sustainability aspects,
  - Be of a degree of difficulty to challenge the team at the final year level.
- The ability to work productively as a consulting team to deliver a project outcome that adds value to the client.

# Specific Learning Outcomes (cont'd)

- The ability to work with an open-ended project that may be in an unfamiliar field.
- The ability to cope effectively with changing circumstances, issues and difficulties that may arise before, during and after the project.
- Demonstration of professional skills in all aspects of the course. In addition to writing skills, speaking and presentation skills, the team should demonstrate initiative, time management, and analytical ability.

# Team Formation & Registration (February to early July)

- Potential teams of 5 students will make a team skills statement and request provisional registration from the instructor. The team skills statement outlines the collective skills of the team and the general types of projects that they will solicit.
- Submit the request to [eng4M06@mcmaster.ca](mailto:eng4M06@mcmaster.ca) as a Word document with:
  - Team Skills Statement (see slide 13)
  - Team Members in a Table with these headings:
    - Last Name, First Name, McMaster Email, Student Number, Department/Program

# Provisional Registration

The Instructor will evaluate the request based on:

1. Multi-Disciplinary composition of group (at least 2 Engineering departments)
2. At least 1 Engineering and Management student
3. CA of at least 8.0 for all members
4. Marketability of the team skills and likelihood of finding suitable client organizations.
4. Ensure a reasonable balance between the teams across the Faculty (no more than 10 teams).

# Project Approval Process by the end of June)

1. Solicit potential client organizations (companies or not-for-profit organizations, such as hospitals) for 2 or 3 potentially suitable projects.
2. Solicit a faculty member from one of the departments of the students with knowledge of the technical area of the potential projects to act as Advisor.
3. The Advisor, in collaboration with the Instructor and Engineering and Management Coordinator, will assist the group to modify as required and select the best project from the potential ones.
4. Prepare a brief Project Statement that outlines the background to the work, objectives and methodology so that the Instructional Team can evaluate its suitability for a project. Submit this to [eng4m06@mcmaster.ca](mailto:eng4m06@mcmaster.ca) by the end of June. Failure to do so will result in loss of registration.

# Final Approval & Formal Course Registration (early July)

1. The Instructional Team for the course (Instructor, Engineering and Management Coordinator, and advisors from all departments with students in the groups) will determine if the project is suitable for the course based on the Project Statement.
2. Departments have the right to refuse registration in the course if the project is not deemed suitable for a final year capstone experience in the discipline.
3. Students will be notified if their project is accepted; if so, they will be permitted to register in this course on SOLAR. If not, they will take their department capstone course (and ENG MGT 5B03).

# Course Deliverables

<b>Deliverable</b>	<b>E-submit</b>	<b>Paper copy</b>
Team skills statement (Shortly after February briefing session)	Y	N
Project Statements (Due June 30)	Y	N
Progress review notes (Every 7 to 10 days, starting in September)	Y	N
Oral Proposal (to be scheduled evenings of week of September 26)	Y	N
Written Project Proposal (September 30)	Y	Y
Oral Progress Report (to be scheduled evenings of the week of January 16)	Y	N
Written Progress Report (due January 20)	Y	Y
Final Oral Report (to be scheduled in the evenings of the last week of classes in April)	Y	N
Final Written Report (due last day of classes in April)	Y	Y spiral bound

# Course Evaluation

Team Proposal Presentation	10%
Written Proposal	10%
Team Progress Presentation	10%
Written Progress Report	10%
Progress Review Notes	10%
Final Team Presentation	20%
Written Final Report	<u>30%</u>
TOTAL	100%

# Team Formation

- Team Size: 5 students
- Multidisciplinary, a minimum of 2 departments & at least one Eng. & Mgmt.
- Build a marketable team
  - Talk with potential team members about theme areas for projects
  - Test team member responsiveness
  - Teams must self-select (your responsibility)

# Team Skills Statement

- Prepare your team skills statement as a marketing tool
  - Consider types of projects that interest the team
  - Is there a market for these skills?
  - Align skill set to the ability to deliver a project in the area of interest
  - Remember your broad engineering skills as well as the specifics of your discipline

# Marketing Your Team & Developing a Project

- Explore your possible contacts
  - People who you already know
  - Co-op and internship contacts
  - Companies you have an interest in
  - Referrals (people who would know other people)
- Do your homework before making contact
- Listen carefully to feedback and follow up promptly

# Project Leads

- Keep several leads active and review suitability
- Search the knowledge base for some background
  - Company or institution website
    - Presentations for financial analysts
    - Technical resources
    - Competitor web sites
- Set up a meeting by email or phone

# Use Draft Project Statements to Develop Projects

- Prepare a draft project statement
  - Company, website, location, contact name, position, email,
  - Status of discussion
  - Summary of Issues/Opportunities Identified by the Client
  - Potential Project
    - Any issues? What are next steps?
    - Any questions/ requests for help to advisor?
- Keep several leads active. Avoid locking into one project prematurely.

# Possible Projects

- Design projects
- Problem Solving in Existing Process or Product
- Major capital projects
- Building construction projects
- Maintenance projects
- Modification projects
- Quality Improvement projects
- Asset Life Extension projects
- New Product Development projects
- Software Development Projects
- New Process development
- Problem Solving in Existing Process or Product
- Simulation Projects
- Technology Assessment Projects
- Technology Demonstration Projects
- Business Analysis
- New Project Evaluation
- Feasibility Studies
- Consulting Projects
- Life Cycle Analysis
- Environmental Impact Assessments

# Relationship Management with Instructors and Advisors

- With your instructor/advisor
  - Nominate your team contact person
  - Work as a self directed team
  - Seek advice and make good use of it
  - Keep in touch, bcc significant emails
  - Alert any issues or concerns early – due diligence

# Relationship Management with Your Client

- With your client
  - ❑ Nominate your team contact person
  - ❑ Get to know your client and their expectations
  - ❑ Listen, record, analyze and follow leads from client
  - ❑ Make sure you understand your client's world
  - ❑ Be prepared for meetings
  - ❑ Be sensitive to client workload

# Criteria for Comparing Projects

- Type of Project
- Degree of Difficulty
- Fit with Team Skills
- Resources Available
- Definable Scope
- Time Frame/Deliverables
- Due Diligence & Confidentiality
- Client
- Location
- Business/Management Engineering balance
- Focus question: How can we add value for this client in 26 weeks?

# Prepare Project Statement (end of June)

- Select the most appropriate project from your leads based on criteria from last slide in consultation with:
  - Faculty Advisor
  - Engineering & Management Coordinator
  - Course Instructor
- Prepare a brief Project Statement that outlines the background to the work, objectives and methodology so that the Instructional Team can evaluate its suitability for a project.

# Project Proposal (due September 30)

- If the Project Statement and course registration is approved, a more formal project proposal will be required
- An Information Session in September will provide more details about proposal preparation

# Due Diligence

- Is information and project likely to be confidential?
- What is intellectual property assignment?
- How do we handle confidential projects?
  - Communicate directly in writing (email)
  - Do not sign anything without permission of instructor
  - Handle in close consultation with your instructor
  - Confidentiality restrictions
    - Information given to you
    - Reports and Presentations made by you

# Ontario Centres of Excellence (OCE) Connections Program

- There may be cost to design and laboratory work
- Each team will prepare a Project Budget
- Client may provide some cash and in-kind support
- OCE Connections Program is designed to support students working with clients
- The Instructor will apply, based on the Project Budget, (up to \$3000)

# Have Fun While You Learn!

- Dr. Gordon A. Irons
- [eng4m06@mcmaster.ca](mailto:eng4m06@mcmaster.ca)
- Questions & comments?

