

Course Outline (F2012 and W2013)

IND70A&B: Industrial Systems Design

Instructor	Cory Searcy, Ph.D., P.Eng. Associate Professor Office: EPH-303 Phone: (416) 979-5000 ext. 2095 Email: cory.searcy@ryerson.ca Office hours: To be posted on office door
Prerequisites	MTL 200, (IND 302 or ECN 801), (MEC 323 or MEC 324), PSY 209, CMN 432, IND 300, IND 405, MEC 325, MEC 516, MTH 309, IND 400, IND 600, IND 604, IND 605
Compulsory Text	<i>None</i>
Reference Texts	<ol style="list-style-type: none"> 1. Product Design and Development, 3rd Edition, Karl T. Ulrich and Steven D. Eppinger, McGraw-Hill, New York, 2004, ISBN: 0072471468 2. Engineering Design: A Materials and Processing Approach, 3rd Edition, George E. Dieter, McGraw-Hill, New York, 2000. 3. Engineering Design: A Project-Based Introduction, Clive L. Dym and Patrick Little, Wiley, New York, 2000. 4. The Engineering Design Process, Second Edition, Atila Eatas and Jesse C. Jones, Wiley, New York, 1996. 5. Engineering Design Principles, Ken Hurst, Wiley, New York, 1999. 6. Engineering Design: Products, Processes, and Systems, Andrew Kusiak, Academic Press, San Diego, California, 1999. 7. Case Studies in Engineering Design, Clifford Matthews, Wiley, New York, 1998. 8. Total Design: Integrated Methods for Successful Product Engineering, Stuart Pugh, Addison-Wesley, Wokingham, England, 1991. 9. Simultaneous Engineering for New Product Development: Manufacturing Applications, Jack A. Ribbens, Wiley, New York, 2000. 10. Successful Product Development, Milton D. Rosenau, Jr., Wiley, New York, 2000. 11. Design for Success: A Human-Centered Approach to Designing Successful Products and Systems, William B. Rouse, Wiley, New York, 1991. 12. The Mechanical Design Process, 2nd Edition, David G. Ullman, McGraw-Hill, New York, 1997. 13. Engineering by Design, Gerard Voland, Addison-Wesley, Reading, Massachusetts, 1999. 14. Handbook of Industrial Engineering, Second Edition, Edited by Gavriel Salvendy, W.J. Wiley, Published in cooperation with: IIE ISBN 0-471-50276-6 15. Systems Analysis and Design Methods, 7e, Active, In-Print, Jeffrey L. Whitten, Lonnie D. Bentley, ISBN: 0073052337, McGraw Hill, 2007

Calendar Description

This course, conducted in the graduating year, brings together the knowledge gained in many previous courses. The engineering design process and the impact of design on society and the environment are presented. Working in small teams, students will complete major team projects in which they will be expected to integrate the knowledge and skills acquired on various aspects of industrial engineering. Each student will complete a series of individual design projects as well. Students will be required to submit final reports and conduct oral presentations.

Learning Objectives

At the end of this course, the successful student will be able to:

1. Generate solutions for more complex design engineering problems/systems. (4d)
2. Objectively determine relative value of feasible alternatives or proposed solutions. (4f)
3. Apply selection/decision-making techniques to more complex design engineering problems/systems. (4g)
4. Demonstrate iterative process in complex design engineering projects. (4h)
5. Construct effective arguments and draw conclusions using evidence, write and revise documents using appropriate discipline specific conventions, adapt format, content, organization, and tone for various audiences, demonstrate accurate use of technical vocabulary. (7a)
6. Elicit and use information and viewpoints from others; present instructions and information clearly and concisely; demonstrate confidence in formal and informal oral communications; explain and interpret results for various audiences and purposes. (7b)
7. Demonstrate fluency in using current software for communications appropriate to the discipline. (7c)
8. Use graphics to explain, interpret, and assess information. (7d)
9. Contribute to teamwork in an equitable and timely manner. (8a)
10. Incorporate the public interest in the decision-making process. (8b)
11. Integrate standards and codes of practice relevant to the discipline into decision-making processes; know regulations governing professional practice (e.g. Professional Engineers Act); adhere to guidelines dictating use of intellectual property and contractual Issues. (8c)
12. Consider economic, social, and environmental factors in decisions; manage relevant legal requirements that govern engineering activities. (9a)
13. Integrate relevant legal requirements that govern engineering activities. (9b)
14. Evaluate situations and actions in terms of adopted professional code of ethics; evaluate competing values in decision making; use a professional code of ethics in decision-making; analyze components of a decision in terms of ethical guidelines.(10a)
15. Evaluate and apply equity principles in case studies. (10b)

Note: Numbers in parentheses refer to the graduate attributes required by the Canadian Engineering Accreditation Board. For more information, see: http://www.feas.ryerson.ca/quality_assurance/accreditation.pdf

Course Organization

1 hour of lecture and 3 hours of lab per week for two semesters.

Course Information:

This is a final year course that includes a Capstone Design Project undertaken at cooperating companies and other design projects over two semesters. The industry-based projects are real world problems faced by the collaborating corporations. The schedule of different projects is shown below:

<i>Fall</i>	<i>Winter</i>	<i>Supervised by:</i>
One-semester team project	Individual projects	Course Coordinator
Year-long design project, team of 2 students (Capstone Design Project involving real world problems at cooperating companies)		Faculty Supervisor

A brief summary of the required projects is provided below. Additional details, including deadlines, will be provided in class.

One-semester team project – Fall semester:

Teams of 4 - 6 students will be formed during the first week. A common design project will be assigned to all teams by the *course coordinator*. A final project report shall be submitted at the end of the Fall semester followed by a team presentation.

Individual design projects – Winter semester:

The *course coordinator* will assign small design projects to students. Students shall complete each project individually, and shall submit a report and deliver a presentation.

Year-long design project (Capstone Design Project) – Fall & Winter:

The year-long design project is an industry-based project that may be completed by up to two students. Each team will be supervised by a *faculty supervisor*. Students are responsible to contact faculty members to sign up for their design projects.

Special Note:

Invited Speakers from various industries will be sharing their project and design experiences during the Winter semester. Student attendance for these invited speaker sessions is mandatory and class attendance will be taken. Marks will be awarded for attendance to the invited speaker sessions.

Course Evaluation	Team Project (Fall)	20%
	Individual Projects (Winter)	15%
	<u>Year-long Project</u>	<u>65%</u>
	Total	100%

Course Content This is a capstone course that is a combination of lectures and project-related work. A lecture schedule for the Fall term will be provided in class. As noted above, lectures in the Winter term will consist of presentations from invited speakers. Attendance at the invited speaker sessions is mandatory. Further details on the invited speaker sessions will be provided in January.

Labs are primarily intended for work on the course projects. There are no formal lab requirements in the course. The lab periods may be used in the Winter term if needed for the invited speaker presentations. Work space has been set aside in both KHE 119 and KHE 137 for project-related work. It is anticipated that students will also use this time to spend time at the companies for their year-long design projects.

Important Notes

1. All of the required course-specific written reports will be assessed not only on their technical/academic merit, but also on the communication skills exhibited through these reports.
2. All assignment, project and lab/tutorial reports must have the standard cover page which can be completed and printed from the Department website at <http://www.ryerson.ca/mie/undergraduate/importantinfo/> . The

cover page must be signed by the student(s) prior to submission of the work. Submissions without the cover pages **will not** be accepted.

3. Should a student miss a mid-term test or equivalent (e.g. studio or presentation), with appropriate documentation, normally a make-up will be scheduled as soon as possible in the same semester, and, where possible, before the last date to drop the course. Where a missed mid-term, assignment or other assessment is one of only two assessments in a course (e.g. there is one mid-term and a final), or when the assessment is worth more than 30% of the final course grade, the provision of a make-up is required. Where a missed mid-term, assignment or other assessment is part of a number of assessments given throughout the term, and when it can be shown that the objective of the missed work is assessed in some other way, then the instructor and student may agree, in writing, to distribute the weight of the missed work to the final exam, or other assessment or group of assessments. The redistribution of the weight of missed work may not cause the final exam or any single assessment to be worth more than 70% of the student's final grade. Where there is no agreement, the student may consult the Chair or Director for assistance. Where it is not possible to schedule the missed work or mid-term because, for example, it was presented in a group, it requires that a lab studio or other set-up be recreated; the weight may be distributed to the final exam or other assessment or group of assessments. In this case, the redistribution of the weight of missed work should normally not cause the final exam or any single assessment to be worth more than 70% of the student's final grade. If it will, an alternate assignment should be considered on a case by case basis.
4. Make-up of final exams: Students who miss a final exam for a verifiable reason and who cannot be given a make-up exam prior to the submission of final course grades, must be given a grade of INC (as outlined in the Grading Promotion and Academic Standing Policy) and a make-up exam (normally within 2 weeks of the beginning of the next semester) that carries the same weight and measures the same knowledge, must be scheduled.
5. Provision of a second make-up: On a case by case basis, a second make-up may be scheduled at the discretion of the instructor. The student may be required to provide a detailed rationale supported by appropriate documentation for consideration. If a student misses a scheduled make-up of a mid-term, assignment or other assessment for verifiable reasons, the grade may be distributed over other course assessments even if that makes the grade on the final exam worth more than 70% of the final grade in the course. If a student misses a scheduled mid-term make-up test or assignment, without a verifiable reason, a grade of "0" may be assigned. Final Exam: Except where there are verifiable reasons, and the student and instructor have agreed to a rescheduled make-up exam, students who miss a scheduled make-up of a final exam will receive a "0" for that exam.
6. Medical or Compassionate documents for the missing of an exam must be submitted within 3 working days of the exam. Students are responsible for notifying the instructor that they will be missing an exam as soon as possible. Documentation must clearly and unequivocally demonstrate that the student was unable to meet his/her academic obligations.
7. Requests for accommodation of specific religious or spiritual observance must be presented to the instructor no later than two weeks prior to the conflict in question (in the case of final examinations within two weeks of the release of the examination schedule). In extenuating circumstances this deadline may be extended. If the dates are not known well in advance because they are linked to other conditions, requests should be submitted as soon as possible in advance of the required observance. Given that timely requests will prevent difficulties with arranging constructive accommodations, students are strongly encouraged to notify the instructor of an observance accommodation issue within the first two weeks of classes.
8. The results of the first regularly scheduled test or mid-term exam will be returned to students before the deadline to drop an undergraduate course in good Academic Standing.
9. Students are required to adhere to all relevant University policies including:
 - Undergrad. Grading, Promotion and Acad. Standing, <http://www.ryerson.ca/senate/policies/pol46.pdf>
 - Student Code of Academic Conduct, <http://www.ryerson.ca/senate/policies/pol60.pdf>
 - Student Code of Non-Academic Conduct, <http://www.ryerson.ca/senate/policies/pol61.pdf>
 - Academic Integrity Office for additional policy information, <http://www.ryerson.ca/academicintegrity/>
 - Undergraduate Academic Consideration and Appeals, <http://www.ryerson.ca/senate/policies/pol134.pdf>
 - Examination Policy, <http://www.ryerson.ca/senate/policies/pol135.pdf>
 - Accom. of Student Relig., Abor. and Spir. Observance, <http://www.ryerson.ca/senate/policies/pol150.pdf>

Est. of Stud. Email Accts for Official Univ. Commun., <http://www.ryerson.ca/senate/policies/pol157.pdf>
Academic Accom. of Students with Disabilities, <http://www.ryerson.ca/senate/policies/pol159.pdf>

10. Students are required to obtain and maintain a Ryerson Matrix e-mail account for timely communications between the instructor and the students.
11. Any changes in the course outline, test dates, marking or evaluation will be discussed in class prior to being implemented.
12. Students in this course may be required to submit electronic file versions of their work to an electronic plagiarism detection service at <https://www.turnitin.com> . Students who do not want their work submitted to this plagiarism detection service must, by the end of the second week of class, consult with the instructor to make alternate arrangements. **Please note:** Even when an instructor has not indicated that a plagiarism detection service will be used, or when a student has opted out of the plagiarism detection service, if instructor has reason to suspect that an individual piece of work has been plagiarized, the instructor is permitted to submit that work in a non-identifying way to any plagiarism detection service.
13. Attendance at scheduled Laboratory sessions is compulsory.
14. Posting of grades for projects, labs, tests, and exam is normally done using *Blackboard Gradebook*. However, your final grade (numerical or letter) will not be posted. In some cases grades may be posted by *hardcopy* in a non-identifying way. Students who wish not to have their grades posted in *hardcopy* format must inform the instructor in writing.

Prepared By: _____
Dr. C. Searcy

Date: _____

Approved by: _____
Dr. J. Friedman

Date: _____