

ENGR 1C03 - Engineering Design & Graphics (Pre[†])Course Outline

Engineering 1, Faculty of Engineering, McMaster University

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[†]This outline is being provided prior to the course start to assist students in preparing for the course. The official version will be distributed once classes begin; however, no major changes are expected.

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1 Course Description

Graphics communication: sketching, 2D and 3D computer-aided design. Design skills workshops and group design project.

Prerequisite: Registration in any engineering programme.

Antirequisite: ENGINEER 1C04

2 Introduction

This course is about technical design and communication for engineers. Using solid modelling CAD, freehand sketching, and simulation the course will explore the design of common mechanisms, visualization, the reading and creation of engineering drawings, and technical standards. The course ties all of these elements together in a group dissect and design project.

The course assumes no prior background in the content, however, there are a few things that can help you prepare. At the start of term it is most important to obtain and organize your course materials (see section 7). Throughout the term you will have marked and unmarked assignments that will help prepare you for exams and the project. It is important to keep up with the work and to remember that each assignment will build upon the previous assignments.

3 Objective

The primary goal of Engineering Design and Graphics is for you to be able to model your designs and effectively communicate in the language of engineering graphics. You will learn new skills and gain experience in

1. visualization,
2. technical sketching,
3. reading engineering drawings,
4. creating engineering drawings,
5. solid modelling, and
6. system modelling.

By the end of the this course you will be able to:

1. mentally visualize three-dimensional objects from arbitrary points of view given orthographic projections, isometric projections, or physical objects;
2. hand sketch multiviews and isometric pictorials of engineering designs quickly and accurately;
3. read mechanical engineering drawings conforming to standard practices;

4. create mechanical engineering drawings conforming to standard practices using computer-aided design software;
5. draw detailed engineering designs in three dimensions using computer-aided design software; and
6. both solid and system model the mechanical system.

The secondary goal is engagement — to create interest and intellectual curiosity about the engineered world that surrounds us.

3.1 Teaching Methods and Philosophy

This course is designed to help you succeed in attaining the course objectives. The level of success will be evaluated using bi-weekly tests, a group project, and a final exam. To prepare for these evaluations, lectures, tutorials, labs, assigned problems and a reading schedule will help you learn the material. Familiarizing yourself with the grading schemes and listening to feedback on your progress will greatly assist your progression through this course. Grading schemes utilize defined rubrics and will be applied in a consistent manner to assignments, tests, and exams.

4 Course Management System (CMS)

The Course Management System will be Avenue to Learn (<http://avenue.mcmaster.ca>). The student is required to **check the system daily** for assignment release/submission, course related material, and posted announcements.

5 Email Policy

In an effort to process course related email more efficiently, the following policy has been adopted by the instructor, course coordinator (often abbreviated as CC), and instructional assistant interns (often abbreviated as IAI)

1. The instructor requires that you contact him via his McMaster email account at doylet@mcmaster.ca.
2. The course coordinator requires that you contact via the McMaster email account at engta@mcmaster.ca.
3. Your instructional assistant intern will provide you with their email address in your first lab or tutorial.
4. Emails must have a subject prefix of “ENGR1C03: ”. The subject of your specific message should follow this prefix.
5. Include the following information at the beginning of your email body: student number, lab section, and tutorial section. If you have a question about a specific assignment, please state which assignment. Failure to include this information will result in a returned email asking for the information - this delays resolution and often takes much more time.
6. Please Include all past correspondence. Deleting the email history makes it very difficult, if not impossible, to keep track of our discussion.
7. **CMS email will not be read.**
8. Do not send your email from the Avenue CMS because the Avenue email system does not accept replies from external email accounts, which means you will never receive a reply from an @mcmaster.ca account. Send your email from your McMaster email account.

9. Your email must be sent from your own McMaster University email account. Emails from non-McMaster email accounts will not receive a reply.

Method(s) of contacting teaching assistants (TA) will be clarified in tutorial and lab. However, in general, all TA contact is expected to be during lab and/or tutorial hours.

6 Expectations

You can expect:

- That no prior knowledge of sketching, drawing, drafting, solid modelling, or system modelling is assumed.
- Although helpful, you do not have to have your own computer.
- Grades will be posted periodically on the Course Management System (CMS - see section 4) .
- Graded assignments will be returned within 10 days. (Contact CC if not received)
- IAIs and TAs to be helpful and professional and to grade objectively according to the provided marking scheme.
- The instructor, coordinator, IAIs, and TAs will endeavour to respond to email within five days (sending your email to the right person helps reduce the response time).

Your instructor, instructional assistant interns, and coordinator expect from you:

- All email communication with the instructor, coordinator, and IAIs will be made through the McMaster University email system.
- You are expected to use e-mail properly. Follow the Email Policy 5, state the subject of your message clearly, and use the English language appropriately to write your e-mail. If you fail to do so, you may not receive a response.
- You are expected to check your email and CMS for announcements pertaining to this course daily.
- You are expected to be familiar with this document (the syllabus), the documents and websites referenced within the syllabus.
- It is assumed you have a basic computer literacy (i.e. word processing, web browsing, software installation, etc.).
- It is expected that you have a firm grasp of the English language in conversation, reading and writing.
- You are expected to be punctual for all lectures, tutorials, and labs.
- You are expected to work on all lab and tutorial assignments on your own.
- If you require help with tutorial or lab materials contact your IAI first.
- You are expected to be prepared for all labs and tutorials.
- Complete all assigned readings must be completed before lecture, lab, and tutorial.

7 Course Materials

7.1 Required

All course materials are available through the Titles bookstore or online:

1. textbook: “Engineering Design Graphics: Sketching, Modeling, and Visualization”, by Leake,
2. textbook: “Autodesk Inventor 2011 for Designers”, by Tickoo,
3. software: Maple15 and MapleSim5 software (see section 20),
4. software: AutoCad Professional Inventor Suite 2011 (see section 20),
5. hardware: i>clicker remote (this is used in many first year classes),

7.2 Optional, but Recommended

1. a 400 Series Strathmore sketchpad (9x12 inch, 100 sheets),
2. a Staedtler drafting pencil (e.g. model MARS-780)¹,
3. a Staedtler drafting pencil HB² lead refill, and
4. a Staedtler eraser.

8 Course Instruction

8.1 Professor

Dr. T. E. Doyle, P.Eng

Office: ETB 106, Department of Electrical and Computer Engineering

Office Hours: Tuesdays, 3:30 p.m. to 5:00 p.m. or by appointment.

Please note that *only* McMaster email will be returned.

8.2 Instructional Assistant Interns - “IAI”s

IAIs will lead tutorial and laboratory lessons. Some grading will be done by the IAIs.

Mr. J.J. Booth

Office: ETB 119

Office Hours: TBA

Email: boothjj@mcmaster.ca

Mr. D. Z. McCormack

Office: ETB 119

Office Hours: TBA

Email: zanykmd@mcmaster.ca

Mr. S.M. Syed

Office: ETB 119

Office Hours: TBA

Email: syedsm3@mcmaster.ca

¹Pencil is sold with 2H lead which is good for construction lines, but too light for object lines.

²HB lead is good for object lines.

8.3 Teaching Assistants - “TA”s

TAs will assist the IAs in lab and run the exercises/assignments. Most grading will be done by the TAs. Please record your TAs name(s) and contact information when you first attend lab and tutorial.

9 Course Administration

9.1 Course Coordinator

Ms. J. Norris

Office: ETB 110

Office Hours: 10:00 am to noon, and 2:00 pm to 3:30 pm every day (or by appointment)

Email: engta@mcmaster.ca

10 Course Components

10.1 Lecture Topic Overview

Note that for 1C03 “week-01” starts September 11, 2011 and each new week starts the following Sunday. Thus “week-02” starts September 18, etc.

1. Overview
2. Projections and Conventions
3. Types of Computer Aided Design
4. Solid Modelling, 2D Profiles, DOF & Constraints
5. Visualisation Methods (multiview to isometric)
6. Alternate View Types
7. Rigid Bodies in Free Space, 3D, DOF & Constraints
8. Simple Mechanisms
9. Mechanical Dissection
10. Common Gear Design

10.2 Lectures Described

Lectures are complemented by the lab and tutorial material. To take full advantage of the lecture time, the student must keep up with assigned readings and do the assigned problems. Lectures will be initially focussed on course theory and around mid-term move into engineering application through a directed dissection and examination of simple mechanisms. The lecture time will not be used to teach the software applications or hand sketching.

10.3 Labs Described

To start you will be learning the solid modelling software, for the purpose of creating detailed designs of parts and assemblies, and for creating engineering drawings. Later in the term you will have opportunity to use the system modelling software to verify your design(s).

All lab time is dedicated to learning the software. Experience has demonstrated that the software can only be learned by students working on their own to complete the available practice problems. Take the time to do the problems meticulously; just reading the problems and solutions is not an effective way to learn solid/system modelling.

During the term you will have “lesson” and ”testing” weeks. Attendance and completion of the lesson sessions are required and will count toward your preparedness evaluation.

10.4 Tutorials Described

In tutorial you will learn visualization skills through technical sketching and system modelling using the Maple/MapleSim software. Again, you must practice these skills to become proficient.

During the term you will have “lesson” and ”testing” weeks. Attendance and completion of the lesson sessions are required and will count toward your preparedness evaluation.

10.5 Group Project

A group project will require you to combine design, sketching, and solid modelling skills in the directed dissection of a simplified mechanism from a common consumer product. This design will then be modelled and tested as a system. The project will be introduced by mid-term of the course. The final submission is due in week 12 of the course during your assigned lab session.

10.6 Course Competition

The top projects from each term will be invited to a course competition at the end of the academic year. Participating groups are awarded bonus marks to their final grade.

10.7 i>clicker

The i>clicker is a system for real-time, in-class feedback. All students are required to use it in this course. Students are expected to do the following.

- Purchase an i>clicker. Students only need one i>clicker for all classes but each student must have their own. i>clickers may not be shared among students.
- Register the i>clicker at <http://www.iclicker.com/registration/> prior to the second lecture. Students must use their MacID where the Student ID is requested. Do not use your student number.
- Bring the i>clicker to all lectures.
- Maintain the i>clicker in working order throughout the course.
- Attach a label to your i>clicker with your name and its serial number so that you will not confuse your i>clicker with someone else’s and to record the serial number which tends to rub off with repeated use.
- Failure to follow policies related to i>clicker may result in confiscation of the device(s).

The i>clicker will be used by the instructor to assess understanding of course work and measure participation. Each missed lecture carries 0.5% penalty on the final grade with the following exceptions.

- A penalty will not be issued for the first lecture in the course.
- Each student will be allowed to miss two lectures per term without penalty beyond the first lecture.

MSAF forms will not be issued for lectures or missed i>clicker questions. Arriving late to lecture may result in missing the clicker questions. All lectures are mandatory. Using another students i>clicker or lending an i>clicker to someone to whom the i>clicker is not registered will be considered grounds for pursuing charges of academic dishonesty.

10.8 Assignment/Exam Submissions

It is the student's responsibility to ensure that assignments are correctly submitted to the correct location (e.g. drop box), on time, and in the specified format(s). For example, a student that submits a file as a Microsoft Word file, when required to submit as a PDF will have the work assigned a 0. As an additional example, a student submits only part of the files needed to grade their lab exam/assignment (e.g. submits part files, but omits the assembly file) will be assigned a 0 for the exam. If you are not sure, please ask before leaving the lab or before the submission date/time.

10.9 Reading Schedule

The weekly reading schedule will be posted on the CMS. For the first week please complete the following reading:

1. Leake chapters 1, 2 (p30-34), and 7 (p184-207), and
2. Tickoo chapters 1 and 2.

10.10 Rescheduled Lecture, Labs, and Tutorial

Information regarding rescheduled lectures, labs, and tutorials will be posted on the CMS.

11 Laboratories and Tutorials

Laboratory and Tutorial sessions begin in week-02 (September 18, 2011).

The student has chosen or been assigned specific laboratory and tutorial sections. The day and time of these sections are listed in the McMaster Undergraduate Master Timetable. Attendance of the laboratory and tutorial are compulsory.

When attending labs and tutorials, the student must attend the assigned room and section. Attendance will be taken. Labs are due at the end of the session.

Penalties for late submission, tardiness, or absence without a valid reason are typically a 0 on the assigned work.

A laboratory exercise deemed to be partially or fully copied will be considered an academic offence and be subject to the terms laid out under Academic Integrity in Section 16.

All work is required to be done individually and, unless explicitly stated, no collaborative work is permitted.

12 Assigned Problems

The student will be given a set of problems from both the text and the instructor. These problems complement the course material and are to be done by the given time-line. Some solutions may be provided by the instructor and/or teaching assistants; however, your tutorials are best suited to address these problems.

13 Evaluation

13.1 Grading

The final letter grade will be determined from the weighted sum shown in Table 1.

The final exam must be written else a final grade of F will be awarded with the notation DNW (Did Not Write).

Table 1: Final Grade Weighting

Final Grade Component	Weight
Lab Tests	25%
Tutorial Tests	25%
Final Exam	25%
Project	25%

In a case where the component weight cannot be fulfilled as a result of unforeseen and/or uncontrollable circumstance(s) in the course operation or execution, the grades assigned to that component may be pro-rated.

Final exam details are set by the Registrar. The instructor(s) reserves the right to choose the format (i.e. written or oral) of any deferred midterm or exam in this course.

Please note that announcements concerning any type of graded material may be in any format (e.g., announcements may be made only in class). Students are responsible for completing the graded material regardless of whether they received the announcement or not. This means that if you skip a class and an announcement for a quiz, lab, test etc. is made in that class, then you are still responsible for that material. If you miss it, then you get a zero.

13.2 Test and Examination Aids

Unless otherwise stated, the use of calculators, laptops, personal digital assistants, cell phones, and/or any programmable device is not permitted during any test or examination in this course. Unless otherwise stated, tests and examinations are closed-book. Failure to comply will result in severe penalty and will be treated as an offence under the Academic Integrity Policy outlined in Section 16.

14 Missed Work - MSAF

Should any work be missed with valid reason, a student may apply for special consideration using the Missed Work Form Self Reporting Tool (<http://www.mcmaster.ca/msaf>) (MSAF). For policies that govern the MSAF system, please refer to the MSAF website. If the MSAF Form is issued then the student must obtain an approval and a course of action from either the instructor or course coordinator.

You must use the following email address for 1C03 MSAF: engta@mcmaster.ca

Any MSAFs that are not sent to engta@mcmaster.ca will be ignored.

Please note that missed course components are not added to the final exam. Missed lab/tutorial tests are assigned the average of the remaining lab/tutorial tests.

14.1 Religious Obligations and Known Absences

In accordance with University regulation, special examination arrangements may be made for conflict with religious obligations. Application may be made to the Office of the Associate Dean of Engineering.

It is rare that special examination arrangements are granted for alternate reasons, however, cases are reviewed individually. Application may be made to the Office of the Associate Dean of Engineering.

If a known future absence will conflict with any scheduled portion of the course (e.g. tutorials, labs, exams, etc.), excluding examinations, an application for special consideration may be made to the course instructor.

All applications must be made at least 10 working days before the scheduled date of the course component and acceptable documentation must be supplied. Failure to meet the stated deadline may result in the denial of special arrangements.

15 Appeals

If an appeal becomes necessary, it will be initiated by the student. The successive levels for an assignment or laboratory appeals are:

1. Instructional Assistant Intern,
2. Course Coordinator,
3. Instructor,
4. Associate Dean, and
5. Senate Review Board Academic.

For an appeal of an exam grade, the appeal process begins with the instructor.

All levels of appeal shall be by the submission of written request that is signed and dated by the student (an email is not suitable). The appeal procedure should be commenced as soon as possible, but not later than ten calendar days from the date of the action or decision giving rise to the appeal.

Students who are repeating the course for any reason shall repeat it in its entirety, unless an exception is granted. Application for exception is to be submitted in writing to the course instructor within the first week of lecture.

16 Academic Integrity Policy

Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences, e.g. the grade of zero on an assignment, loss of credit with 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 [?], specifically Appendix 3.

The following illustrates only three forms of academic dishonesty:

1. Plagiarism, e.g. the submission of full or partial 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.

All work is required to be done individually and, unless explicitly stated, no collaborative work is permitted.

Students may be required to submit their work electronically and in hard copy so that it can be checked for academic integrity.

Students should note that this course uses software to verify academic integrity.

17 Discrimination

The Faculty of Engineering is concerned with ensuring an environment that is free from all adverse discrimination. If there is a problem that cannot be resolved by discussion among the persons concerned, then individuals are reminded that they should contact a Department Chair, the Sexual Harassment Office, or the Human Rights Consultant, as soon as possible.

18 Health and Safety

The Faculty of Engineering is committed to McMaster's University Workplace and Environmental Health and Safety Policy which states: "Students are required by University policy to comply with all University health, safety and environmental programs".

It is your responsibility to understand McMaster University Workplace and Environmental Health and Safety programs and policies. For information on these programs and policies please refer to McMaster University Environmental and Health Support Services Occupational Safety Risk Management Manual at: <http://www.workingatmcmaster.ca/link.php?link=Job+Matters%3APolicy-Manual>

It is also your responsibility to follow any specific Standard Operating Procedures (SOPs) provided for some of the experiments and the laboratory equipment.

19 Notice

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes.

20 Notes on Obtaining Maple/MapleSIM

Steps for Purchasing MapleSim 5.0 and Maple 15.0

MapleSim, which is a multi-domain, simulation and modelling tool, is **required** software for ENGINEER 1C03. The preferred method for purchasing MapleSim is via the Maplesoft webstore, although several copies will be available at the campus bookstore (Titles). The steps to purchase MapleSim, at the very special price negotiated for McMaster students, are as follows (but please remember that ENGR 1C03 is using MapleSim 5.0 and Maple 15.0 - do not upgrade your versions):

1. Activate your MAC ID. You should have already done this to register on SOLAR, but if you have not, the instructions can be found at:

http://www.mcmaster.ca/uts/email_accounts/macid/student/activation_guide.html

2. Enable your MAC ID services, which includes enabling your McMaster e-mail. **YOU WILL REQUIRE A VALID MCMASTER E-MAIL ADDRESS TO PURCHASE MAPLESIM.** Other email domains will not be accepted. To enable your MAC ID services log on to MUGSI and select "Enable Your MAC ID Services." You must have your MAC ID to enable other MAC ID services like e-mail. Further instructions can be found at:

http://www.mcmaster.ca/uts/email_accounts/macid/student/enable_services.html

3. Point your web browser at the Maplesoft webstore:

<https://webstore.maplesoft.com/index.aspx>

4. Under "Choose a Category" select Student.
5. Under "Promotion Code" type TS-MCU011-O8C
6. Click on "Start Shopping." You will now be able to purchase MapleSim (and the associated program Maple) using a credit card or PayPal.

If you have trouble with the above steps, they will be reviewed when the academic term starts in the Fall.

21 Notes on Obtaining Inventor

Steps for Obtaining AutoCAD Inventor Professional Suite 2011

AutoCAD Inventor Professional Suite 2011 is a suite of industry standard software available to students at McMaster University. As a student you are permitted free access to the academic versions of this suite of software through

<http://students.autodesk.com>

by registering with your McMaster University email address (see above for activation of your MAC ID).

Once registered at students.autodesk.com you will have access to download all Autodesk academic software. Please note that you only require **AutoCAD Inventor Professional Suite 2011**. Be aware that the download and install will take some time and disk space. Ensure you select the appropriate installation for your computer (i.e. 32-bit vs. 64-bit). Please follow the installation and activation instructions presented to you as you install Inventor and when you are asked to install Mechanical 2D ensure you select yes (this will make your software the same as the laboratory computers). Note that software activation may be required after installation.

After downloading and installing Inventor 2011, review the “Quick Start Tutorial for Autodesk Inventor” under the section titled “Learn”.

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