



Calendar description: This course introduces the fundamental concepts of Computer-Aided Design and Manufacturing (CAD/CAM) using Fusion 360 and computer numerical controlled (CNC) machines. The students will use their acquired CAD/CAM knowledge to complete a simple design/manufacturing project throughout the course.

The program and the 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 modifications become necessary, reasonable notice and communication with the students will be given. Students will be provided with an explanation and an opportunity to comment.

Prerequisites: MAAE 2101 and 4th year standing.

Communication: Students are expected to be able to communicate in spoken and written English. "Developing and practicing communication skills is an essential experience requirement." – Components of Acceptable Engineering Work Experience (Section 4.1), Guideline for Assessment of Engineering Work Experience, Engineers Canada (Updated May 2009)..

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Schedule: Lectures
Wednesday: 2:35 – 3:55 PM
CB 2202

Laboratories
Fridays: 2:35 – 3:55 PM
ME 2256 or Machine Shop (ME 2159)

Audio or video recording of lectures, tutorials or labs is not permitted. Photos also may not be taken with the exception of lab setups.

Attendance: Regular and punctual attendance at all academic exercises is expected from all students. After a lecture has begun, students may not be admitted to a classroom without the instructor's permission. The instructor must be notified of all extenuating circumstances that result in a student's absence. Absences in the excess of 20% of course time may jeopardize receipt of credit for the course.

Website: Assignments, solutions, general course information, and announcements for the course will be posted on Brightspace/D2L (Desire 2 Learn). Students are responsible for keeping up-to-date with course information on D2L.

Additional information about the course and important calendar dates may be found on the Carleton University undergraduate calendar for this academic year.



Textbook: RECOMMENDED TEXTBOOK

Principles of CAD/CAM/CAE systems, Lee, K., Pearson Addison-Wesley Reading 1999. ISBN: 0-201-38036-6.

CAD/CAM Computer-Aided Design and Manufacturing, Groover, M.P., Zimmers, E.W. Jr., Prentice-Hall Inc., 1984. ISBN: 0-13-110130-7.

A Hands-On Introduction to Topology Optimization, Mirzendehtel, A.M., Suresh, K., CreateSpace Independent Publishing Platform, 2017. ISBN: 978-1976480604.

Metal Additive Manufacturing, Toyserkani, E., et al., 2021. ISBN: 978-1-119-21078-8.

Other versions of the textbook are acceptable alternatives. Appropriate tables and charts will be provided to students for use during exams.

Office Hours: For office hours, an “open-door” policy is maintained. Students are welcome to drop by the office at any time for help with the course material. When doing so, students are required to come prepared with specific questions. Alternatively, students can contact the instructor by email to schedule a meeting time.

Assessment: The methods of assessment and their respective weightings are given below:

Fusion 360 Exam	30%
CAD/CAM Theory Exam	30%
Project	40%

If a marking error exists, please come to see the course instructor. Negotiating for higher grades is NOT acceptable.

Final Grades: The final grades will be consistent with the University Grading System.

For information regarding appeals of final grades or other academic matters, please consult the university's intranet site.

Course Content:

Part A: CAD/CAM Theory

- Introduction to CAD/CAM
- Review of Milling and Turning
- Numerical Control
- Computer-Aided Drafting Systems
- Geometric Modelling Systems
- Representation and Manipulation of Curves and Surfaces
- Topology Optimisation
- Metal Additive Manufacturing



Part B: Fusion 360 (some topics instructed by Alex Proctor)

- Introduction to Fusion 360, Interface, Customisation, Design Philosophies
- Machine Setup
- CNC Milling
- CNC Lathe
- Advanced Modelling
- Assembly and Motion Study
- Topology Optimisation

Exams: Exams will be based on the homework and lesson material within the classes. A final exam will be scheduled in the Final Exams period, date TBD.

Important Dates:	January 11	First Class
	February 20-24	Reading Week (no classes)
	April 12	Last Class / Fusion 360 Exam (2:30 – 5:30 PM)
	April 14	Project Files Due
	April 25	Theory Final Exam

Course Delivery:

1. The course is delivered in the form of lectures that present the relevant material.
2. Course topics will be presented in an abbreviated format during lectures. It is thus highly recommended to complete the assigned readings and homework in order to fully comprehend the material and be well prepared for exams.
3. The slides used for the lectures are made available in the form of PPT handouts prior to class (these can be accessed through D2L).
4. Attendance implies participation within the lecture and tutorials.
5. Demonstrations of key concepts as well as examples are introduced in class on the blackboard/whiteboard. These are numbered and cross-referenced in the handouts.
6. All pertinent documentation related to the course is available for download throughout the term using the D2L system. (Pending blackout timing, e.g., lecture notes.)

Student Conduct: Ethical behaviour is an important part of engineering practice. Each professional engineering association has a Code of Ethics, which its members are expected to follow. Since students are in the process of becoming Professional Engineers, it is expected that students will conduct themselves in an ethical manner.

The PEO (Professional Engineers Ontario) Code of Ethics states that engineers shall “conduct themselves with fairness, courtesy and good faith towards clients, colleagues, employees and others; give credit where it is due and accept, as well as give, honest and fair professional criticism.” (Section 77, Regulation 941, General R.R.O. 1990, Professional Engineers Act).

The first part of this statement discusses an engineer’s relationships with his or her colleagues. One of the ways in which engineering students can demonstrate courtesy to their colleagues is by helping to maintain an atmosphere that is conducive to learning, and minimizing disruptions in class. This includes arriving on time for lectures, turning cell phones and other electronic devices off during lectures, not leaving or entering the class at



inopportune times, and refraining from talking to others while the instructor is talking. However, if you have questions at any time during lectures, please feel free to ask (chances are very good that someone else may have the same question as you do).

For more information, please consult the University Guidelines for Academic Conduct.

Academic Honesty:

The latter part of the above statement from the PEO Code of Ethics discusses giving credit where it is due. At the University, this is addressed by university policies on academic integrity and academic misconduct. In this course, students are expected to submit their own individual work for academic credit, properly cite the work of others, and to follow the rules for examinations. Academic misconduct, plagiarism, and cheating will not be tolerated. Copying of assignments is considered academic misconduct.

Students should be aware of their obligations with regards to academic integrity. Please review the information about academic integrity at: <https://carleton.ca/registrar/academic-integrity/>. This site also contains a link to the complete Academic Integrity Policy that was approved by the University's Senate.

Safety:

The PEO (Professional Engineers Ontario) Code of Ethics also states that Professional Engineers shall “hold paramount the safety, health and welfare of the public and the protection of the environment and promote health and safety within the workplace” (Section 77, Regulation 941, General R.R.O. 1990, Professional Engineers Act).

The Faculty of Engineering and Design takes safety very seriously. Students are expected to work in a safe manner, follow all safety instructions, and use any personal protective equipment provided. Students failing to observe the safety rules in any laboratory will be asked to leave.

**Academic
Accommodation:**

You may need special arrangements to meet your academic obligations during the term. You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at <http://www.carleton.ca/equity/>. For an accommodation request, the processes are as follows:

Pregnancy or Religious obligation: Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details see <https://carleton.ca/equity/wp-content/uploads/Student-Guide-to-AcademicAccommodation.pdf>

Academic Accommodations for Students with Disabilities: The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your Letter of Accommodation at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (if applicable).



Requests made within two weeks will be reviewed on a case-by-case basis. After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website (www.carleton.ca/pmc) for the deadline to request accommodations for the formally scheduled exam (if applicable).

Survivors of Sexual Violence: As a community, Carleton University is committed to maintaining a positive learning, working and living environment where sexual violence will not be tolerated, and where survivors are supported through academic accommodations as per Carleton's Sexual Violence Policy. For more information about the services available at the university and to obtain information about sexual violence and/or support, visit: <https://carleton.ca/sexual-violence-support/>.

Accommodation for Student Activities: Carleton University recognizes the substantial benefits, both to the individual student and for the university, that result from a student participating in activities beyond the classroom experience. Reasonable accommodation must be provided to students who compete or perform at the national or international level. Please contact your instructor with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details, see <https://carleton.ca/senate/wpcontent/uploads/Accommodation-for-Student-Activities-1.pdf>