



ENGG*3120 Computer Aided Design and Manufacturing

Winter 2019

Section(s): C01

School of Engineering

Credit Weight: 0.75

Version 2.00 - February 20, 2019

1 Course Details

1.1 Calendar Description

The course presents the elements of solid modelling, creation of parts of increasing complexity and the assembly of parts to form a final design, along with mechanism simulation. The operation and programming of CNC machines is covered.

Pre-Requisite(s): ENGG*2100, ENGG*3280

1.2 Timetable

Lectures

Wednesday
5:30 PM – 8:20 PM THRN 1319

Labs

Section 1 Tuesday 10:30 AM – 12:20 PM THRN 1313

Section 2 Friday 12:30 PM – 02:20 PM THRN 1313

1.3 Final Exam

No Final Exam.

2 Instructional Support

2.1 Instructional Support Team

Instructor:	Fantahun Defersha Ph.D., P.Eng.
Email:	fdefersh@uoguelph.ca
Telephone:	519-824-4120 x56512
Office:	THRN 2403
Office Hours:	Immediately after class (8:20 pm) or by appointment
Office Hours:	
Office Hours:	Immediately after class (8:20 pm) or by appointment
Office Hours:	

2.2 Teaching Assistants

1. Scott Simmons: ssimmons@uoguelph.ca
2. Naveen Joshy: njoshy@uoguelph.ca

3 Learning Resources

3.1 Required Resource(s)

Course Website (Website)

<https://courselink.uoguelph.ca/>

Course material, news, announcements, and grades will be regularly posted to the ENGG*3120 Courselink site. You are responsible for checking the site regularly.

SolidWorks 2018 for Designers (Textbook)

Prof. Sham Tickoo, CAD/CIM Technologies, USA. This book is primarily used as a command reference throughout the semester. Moreover, some class exercises and assignments will be based on the problems in this book. However, a large portion of the materials covered in this course is from other sources. Nevertheless, it is a required textbook and students are highly recommended to have a copy of this book.

Additional Resources (Other)

Additional resource will be posted on CourseLink.

4 Learning Outcomes

4.1 Course Learning Outcomes

By the end of this course, you should be able to:

1. Model the 3D geometric information of machine components including assemblies, and automatically generate 2D production drawings.
2. Understand the basic analytical fundamentals that are used to create and manipulate

- geometric models in a computer program.
3. Visualize machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring.
 4. Model complex shapes including freeform curves and surfaces.
 5. Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering.
 6. Implement CNC programs for milling and turning machining operations.
 7. Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system.
 8. Integrate CAD and CAM systems by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information.
 9. Use fullscale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

4.2 Engineers Canada - Graduate Attributes (2018)

Successfully completing this course will contribute to the following:

#	Outcome	Learning Outcome(s)
1	Knowledge Base	2, 4
1.1	Recall, describe and apply fundamental mathematical principles and concepts	2, 4
1.2	Recall, describe and apply fundamental principles and concepts in natural science	2
4	Design	1, 3, 4
4.3	Create a variety of engineering design solutions	1, 4
4.4	Evaluate alternative design solutions based on problem definition	1, 3, 4
4.5	Develop and refine an engineering design solution, through techniques such as iteration, simulation and/or prototyping	1, 3, 4
5	Use of Engineering Tools	1, 3, 4, 5, 6, 7, 8, 9
5.2	Demonstrate proficiency in the application of selected engineering tools	1, 3, 4, 5, 6, 7, 8, 9
5.3	Recognize limitations of selected engineering tools	5

5 Teaching and Learning Activities

5.1 Lab

Topic(s):	Part/ Assembly Modeling
Topic(s):	Sheet Metal/Weldment/Surface modeling
Topic(s):	Stress/thermal/flow Analysis
Topic(s):	Motion Analysis
Topic(s):	MasterCAM

5.2 Lecture Schedule

This course is mainly delivered using practical exercises during the lecture and the lab in a computer room. As such the lecture and the lab are continuum and very integrated. The exercises will cover:

- Drawing, editing and modifying sketches
- Adding Relations and dimensions to sketches
- Creating reference geometries
- Creating, editing and modifying features
- Advanced part modeling (with complex geometries)
- Assembly modeling
- Working with drawings, views, dimensions and
- Sheet metal design
- Mold Design
- Introduction to geometric modeling (parametric curves, surfaces and solids)
- Coordinate transformations (translation, rotation, scaling, reflection)
- Surface Modeling
- Simulation using Finite Element Method (stress and deformation analysis)
- Motion and mechanism simulation
- Introduction to numerical control machines and part programming
- Creation of tool path and automatic generation of part programming using CAM system
- Several advanced CAD/CAM applications will be covered as time permits

5.3 Other Important Dates

Monday, January 7: Classes commence

Monday, February 18 – Friday, February 22: WINTER BREAK

Friday, March 8: 40th Class Day. Last day to drop winter semester courses.

Friday, April 5: Last day of classes.

Please refer to the undergraduate calendar 2018-2019 for scheduled dates at:
<https://www.uoguelph.ca/registrar/calendars/undergraduate/2018-2019/>

6 Assessments

6.1 Marking Schemes & Distributions

Name	Scheme A (%)
Practical Exams	50
Projects	25
Assignment	10
Marked in-Class and Lab Exercises	15
Total	100

6.2 Assessment Details

Practical Exams (50%)

Learning Outcome(s): 1,2,3,4,5,7,8,9

Exam No. 1 (25 %) February 28, 2019, (Practical exam, Time: 6:00 - 8:30 pm, Location: THRN - 1319)

Exam No. 2 (25 %) March 28, 2019, (Practical exam, Time: 6:00 - 8:30 pm, Location: THRN - 1319)

Projects (25%)

Learning Outcome(s): 1,2,3,4,5,7,8,9

Project - Hydraulic lift table design: Due April 3, 2019 (25%)

Submission: Each student will be given a personal and private folder on the Soe-Public (P:) drive for file submissions.

Assignment (10%)**Learning Outcome(s):** 1,2,3,4,5,7,8,9

This includes 4 to 6 assignments on part and assembly modeling, sheet metal modeling, mold design, weldments and structures, surface modeling, stress, thermal and flow analysis.

Submission: Each student will be given a personal and private folder on the Soe-Public (P:) drive for file submissions.

Marked in-Class and Lab Exercises (15%)**Learning Outcome(s):** 1,2,3,4,5,7,8,9

Class and Lab Exercises will be marked.

Submission: Each student will be given a personal and private folder on the Soe-Public (P:) drive for file submissions.

Laboratory attendance and activities will be graded at the end each lab section.

7 Course Statements

7.1 Course Grading Policies

Missed Assessments: If you are unable to meet an in-course requirement due to medical, psychological, or compassionate reasons, please email the course instructor. See the undergraduate calendar for information on regulations and procedures for Academic Consideration:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Accommodation of Religious Obligations: If you are unable to meet an in-course requirement due to religious obligations, please email the course instructor within two weeks of the start of the semester to make alternate arrangements. See the undergraduate calendar for information on regulations and procedures for Academic Accommodation of Religious Obligations:

<http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-accomrelig.shtml>

Passing grade: Students must obtain a grade of 50% in order to pass this course.

Missed quiz and midterm tests: If you miss a test due to grounds for granting academic consideration or religious accommodation, there will be makeup quiz or midterm tests.

Lab Work: You must attend and complete all laboratories. If you miss a laboratory due to grounds for granting academic consideration or religious accommodation, arrangements must be made with the teaching assistant to complete a makeup lab.

Late Lab Reports: Late submissions of lab reports will not be accepted.

7.2 Relationships with other Courses & Labs

Previous Courses:

ENGG*2100, ENGG*3280. The fundamental introduction of CAD in ENGG*2100 and the knowledge about the design of machine elements are assets in this course

Follow-on Courses:

This course is not a direct pre-requisite for any other course.

8 School of Engineering Statements

8.1 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate learning for a variety of students. Selected lecture notes will be made available to students on Courselink but these are not intended to be stand-alone course notes. Some written lecture notes will be presented only in class. During lectures, the instructor will expand and explain the content of notes and provide example problems that supplement posted notes. Scheduled classes will be the principal venue to provide information and feedback for tests and labs.

8.2 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and lab sessions. Students, especially those having difficulty with the course content, should also make use of other resources recommended by the instructor. Students who do (or may) fall behind due to illness, work, or extra-curricular activities are advised to keep the instructor informed. This will allow the instructor to recommend extra resources in a timely manner and/or provide consideration if appropriate.

8.3 Lab Safety

Safety is critically important to the School and is the responsibility of all members of the School: faculty, staff and students. As a student in a lab course you are responsible for taking all reasonable safety precautions and following the lab safety rules specific to the lab you are working in. In addition, you are responsible for reporting all safety issues to the laboratory supervisor, GTA or faculty responsible.

9 University Statements

9.1 Email Communication

As per university regulations, all students are required to check their e-mail account regularly: e-mail is the official route of communication between the University and its students.

9.2 When You Cannot Meet a Course Requirement

When you find yourself unable to meet an in-course requirement because of illness or compassionate reasons please advise the course instructor (or designated person, such as a teaching assistant) in writing, with your name, id#, and e-mail contact. The grounds for Academic Consideration are detailed in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Academic Consideration and Appeals

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-ac.shtml>

Graduate Calendar - Grounds for Academic Consideration

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.3 Drop Date

Courses that are one semester long must be dropped by the end of the fortieth class day; two-semester courses must be dropped by the last day of the add period in the second semester. The regulations and procedures for course registration are available in the Undergraduate and Graduate Calendars.

Undergraduate Calendar - Dropping Courses

<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-drop.shtml>

Graduate Calendar - Registration Changes

<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/genreg-reg-regchg.shtml>

9.4 Copies of Out-of-class Assignments

Keep paper and/or other reliable back-up copies of all out-of-class assignments: you may be asked to resubmit work at any time.

9.5 Accessibility

The University promotes the full participation of students who experience disabilities in their academic programs. To that end, the provision of academic accommodation is a shared responsibility between the University and the student.

When accommodations are needed, the student is required to first register with Student Accessibility Services (SAS). Documentation to substantiate the existence of a disability is required; however, interim accommodations may be possible while that process is underway.

Accommodations are available for both permanent and temporary disabilities. It should be noted that common illnesses such as a cold or the flu do not constitute a disability.

Use of the SAS Exam Centre requires students to book their exams at least 7 days in advance and not later than the 40th Class Day.

More information can be found on the SAS website
<https://www.uoguelph.ca/sas>

9.6 Academic Integrity

The University of Guelph is committed to upholding the highest standards of academic integrity, and it is the responsibility of all members of the University community-faculty, staff, and students-to be aware of what constitutes academic misconduct and to do as much as possible to prevent academic offences from occurring. University of Guelph students have the responsibility of abiding by the University's policy on academic misconduct regardless of their location of study; faculty, staff, and students have the responsibility of supporting an environment that encourages academic integrity. Students need to remain aware that instructors have access to and the right to use electronic and other means of detection.

Please note: Whether or not a student intended to commit academic misconduct is not relevant for a finding of guilt. Hurried or careless submission of assignments does not excuse students from responsibility for verifying the academic integrity of their work before submitting it. Students who are in any doubt as to whether an action on their part could be construed as an academic offence should consult with a faculty member or faculty advisor.

Undergraduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml>

Graduate Calendar - Academic Misconduct
<https://www.uoguelph.ca/registrar/calendars/graduate/current/genreg/index.shtml>

9.7 Recording of Materials

Presentations that are made in relation to course work - including lectures - cannot be recorded or copied without the permission of the presenter, whether the instructor, a student, or guest lecturer. Material recorded with permission is restricted to use for that course unless further permission is granted.

9.8 Resources

The Academic Calendars are the source of information about the University of Guelph's procedures, policies, and regulations that apply to undergraduate, graduate, and diploma programs.

Academic Calendars
<https://www.uoguelph.ca/academics/calendars>