ENGG*3120 Computer Aided Design and Manufacturing
Winter 2017

UNIVERSITY of GUELPH

School of Engineering

(Revision 1: January 1, 2017)

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1 INSTRUCTIONAL SUPPORT

1.1 Instructor

Instructor: Ammar Alzaydi, PhD.
Office: THRN 2361, ext. 53385
Email: aalzaydi@uoguelph.ca
Office hours: TBA on Courselink or by appointment

1.2 Teaching Assistants

Hayson Ko
Email: cko@mail.uoguelph.ca
Office hours: TBA on Courselink or by appointment

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2 LEARNING RESOURCES

2.1 Course Website

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

2.2 Required Resources

SolidWorks 2014 for Designers by Prof. Sham Tickoo, CADCIM Technologies, USA.

2.3 Recommended Resources

Mastering CAD/CAM by Ibrahim Zeid, ISBN 978-0-07-286845-6, McGraw-Hill

2.4 Additional Resources

Additional resource will be posted on CourseLink.

2.5 Communication & Email Policy:

Major announcements will be posted to the course website. It is your responsibility to check the course website regularly. As per university regulations, all students are required to check their <uoguelph.ca> e-mail account regularly: e-mail is the official route of communication between the University and its student.

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3 ASSESSMENT

3.1 Dates and Distribution

Practical Exams: 30 %

Exam No. 1, February 27, 2017, (2 hours practical exam, Time: TBA, Location: THRN - 1319)
Exam No. 2, March 27, 2017, (2 hours practical exam, Time: TBA, Location: THRN - 1319)

Projects: 45 %

Project 1- Large Assembly – Group Project: Due March 18, 2017 (30%)

Project 2- Design Project – Individual Project: Due April 04, 2017 (15 %)

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

Assignment: 10%.

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 % 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.

3.2 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.

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4 AIMS, OBJECTIVES & GRADUATE ATTRIBUTES

4.1 Calendar Description

The course presents the elements of solid modeling, 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.

Prerequisite(s): ENGG*2100, ENGG*3280

4.2 Course Aims

The course aims at exploring and understanding the area that is commonly referred to as CAD/CAM. The general objectives of the course are outlined in the following section.

4.3 Learning Objectives

At the successful completion of this course, the student will have demonstrated the ability to:

1. Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D 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 full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

4.4 Graduate Attributes

Successfully completing this course will contribute to the following CEAB Graduate Attributes:

Graduate Attribute	Learning Objectives	Assessment
1. Knowledge Base for Engineering	2	Assignment , Project, Exams
2. Problem Analysis	5	Assignment , Project, Exams
3. Investigation	5	Assignment , Project, Exams
4. Design	3,4, 5	Assignment , Project, Exams
5. Use of Engineering Tools	1, 3, 4,7, 8, 9	Assignment , Project, Exams
6. Communication	1	Assignment , Project, Exams
7. Individual and Teamwork		
8. Professionalism		
9. Impact of Engineering on Society and the Environment		
10. Ethics and Equity		
11. Environment, Society, Business, & Project Management		
12. Life-Long Learning		

4.5 Instructor's Role and Responsibility to Students

The instructor's role is to develop and deliver course material in ways that facilitate the learning of the students.

4.6 Students' Learning Responsibilities

Students are expected to take advantage of the learning opportunities provided during lectures and labs. The best leaning experience will be achieved if you ***attend lecture and lab regularly***. Scientific studies have proven that a student success rate is strongly related to his/her class attendance. Those who attend classes, tutorials and labs have higher success rates than those who do not.

4.7 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.

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5 TEACHING AND LEARNING ACTIVITIES

5.1 Timetable

Lectures:			
Monday		5:30 PM– 6:20 PM	THRN, Room 1319
Wednesday		5:30 PM– 6:20 PM	THRN, Room 1319
Lab:			
Section 1	Wednesday	9:30 AM – 11:20 AM	THRN 1313
Section 2	Friday	9:30 PM – 11:20 AM	THRN 1313

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 tolerances.
- 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 Lab Schedule

Topic	**Date**
Part/ Assembly Modeling	Week 2
Part/ Assembly Modeling	Week 3
Part/ Assembly Modeling	Week 4
Stress/thermal/flow Analysis	Week 5
Stress/thermal/flow Analysis	Week 6
Stress/thermal/flow Analysis	Week 7
Motion Analysis	Week 8
Sheet Metal/Weldment/Surface modeling	Week 9
Sheet Metal/Weldment/Surface modeling	Week 10
MasterCAM	Week 11
MasterCAM	Week 12
Laboratory attendance and activities will be graded at the end each lab section.	

5.4 Other Important Dates

Please refer to the undergraduate calendar 2016-2017 for scheduled dates at:

http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c03/c03-wintersem.shtml

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6 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.

7 ACADEMIC MISCONDUCT

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 discourages misconduct. 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.

7.1 Resources

The Academic Misconduct Policy is detailed in the Undergraduate Calendar:
http://www.uoguelph.ca/registrar/calendars/undergraduate/current/c08/c08-amisconduct.shtml

A tutorial on Academic Misconduct produced by the Learning Commons can be found at:
http://www.academicintegrity.uoguelph.ca/

Please also review the section on Academic Misconduct in your Engineering Program Guide.

The School of Engineering has adopted a Code of Ethics that can be found at:
http://www.uoguelph.ca/engineering/undergrad-counselling-ethics

8 ACCESSIBILITY:

The University of Guelph is committed to creating a barrier-free environment. Providing services for students is a shared responsibility among students, faculty and administrators. This relationship is based on respect of individual rights, the dignity of the individual and the University community's shared commitment to an open and supportive learning environment. Students requiring service or accommodation, whether due to an identified, ongoing disability for a short-term disability should contact the Centre for Students with Disabilities as soon as possible