

School of Engineering, University of Guelph  
ENGG\*3120 - Computer Aided Design and Manufacturing  
(Course Outline - Winter 2013)

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Telephone:	(519) 824-4120 Ext. 56512
Lecture:	Mon, Wed, Fri; 01:30PM - 02:20PM; THRN 1313
Lab	Sec1 Wed 8:30 to 10:20; Sec2, Fri 3:30 to 5:20; THRN 1009
Office Hours:	(During Lab hours and by appointment)

### **Brief Course 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.

### **Course Objectives:**

The course examines the area that is commonly referred to as CAD/CAM. The general objectives of the course are to enable the students to:

- Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings,
- Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program,
- Improve visualization ability of machine components and assemblies before their actual fabrication through modeling, animation, shading, rendering, lighting and coloring,
- Model complex shapes including freeform curves and surfaces,
- Understand the possible applications of the CAD/CAM systems in motion analysis, structure analysis, optimization, rapid prototyping, reverse engineering and virtual engineering,
- Implement CNC programs for milling and turning machining operations,
- Create a computer aided manufacturing (CAM) model and generate the machining codes automatically using the CAM system,
- Integrate the CAD system and the CAM system by using the CAD system for modeling design information and converting the CAD model into a CAM model for modeling the manufacturing information,
- Use full-scale CAD/CAM software systems designed for geometric modeling of machine components and automatic generation of manufacturing information.

### **Topics:**

- Introduction to geometric modeling (parametric curves, surfaces and solids)
- Coordinate transformations (translation, rotation, scaling, reflection)

- 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
- 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

## References:

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1. Mastering CAD/CAM by Ibrahim Zeid, ISBN 978-0-07-286845-6, McGraw-Hill
2. SolidWorks 2012 for Designers by Prof. Sham Tickoo, CAD/CIM Technologies, USA.

## Grading Scheme:

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In class practical exercises*	10%	Part Modeling using SolidWorks
Marked Lab exercise*	15%	Part and Assembly Modeling, Animation and Motion Analysis, Stress and Thermal Analysis, Flow Analysis, Vibration and Modal Analysis
Assignments (4 to 6 assignments)	5%	
Geometric Modeling Assignments	5%	Covers the mathematical foundations of curves, surfaces and solid
Geometric Modeling Test	30%	
Project 1 (Due Feb 20)	15%	Part and Assembly modeling of mechanical devices and machines of reasonable complexity.
Project 2	20%	
Time taken to accomplish the exercises will also be taken into account in grading.		

## Student Responsibilities

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- Attend lectures and labs in order to obtain all the course material that you are responsible for.
- Check announcements at CourseLink and emails on a regular basis.
- Submit assignments on time.
- Regularly, check your marks on the CourseLink and make sure they are up to date.
- Submission of assignments for re-marking must be done within a week of being returned.

## Important Notes

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- Labs starts the second week of class (week of **January 14, 2013**).

- Communications regarding this course will frequently involve CourseLink web page (<https://courselink.uoguelph.ca>) and email.
- Students are responsible for checking CourseLink and the university email account for all instructions and announcements. This must be done at least twice every week.

## **Late Assignment/Missed Quiz Policy**

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Generally, when you find yourself unable to meet a course requirement such as an assignment, lab exercise, or in class practical quizzes as a result of compassionate, illness or physiological reasons, a formal explanation must be made in writing to the instructor and (where possible) proper documentation must be provided. This should be done prior to an exam, lab or assignment (if possible) or as soon as possible but definitely within a week after the exam, lab or assignment due date.

If no explanations are provided, quizzes will receive a grade of zero and assignments/lab reports are subject to the following deductions:

- 25% will be deducted if the assignment is up to 24 hours late,
- 50% will be deducted if the assignment is 24 to 48 hours late,
- No assignments or lab report will be accepted after that.

## **University Policy on Academic Misconduct**

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Academic misconduct, such as plagiarism, is a serious offence at the University of Guelph. Please consult the Undergraduate Calendar 2011-2012 and School of Engineering programs guide, for offences, penalties and procedures relating to academic misconduct. Please refer to <http://www.uoguelph.ca/registrar/calendars/undergraduate/current/>

## **Disclaimer**

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The instructor reserves the right to change any or all of the above in the event of appropriate circumstances, subject to the University of Guelph Academic Regulations.