



Faculty of Engineering
Department of Mechanical Engineering
COURSE OUTLINE

MECH 410/520 – Computer Aided Design (CAD)
Term – Spring 2017 (201701)

Instructor	Office Hours
Dr. Ramtin Rakhsha	Days: TBA
Phone: 2504725096	Time: TBA
E-mail: rrahksha@uvic.ca	Location: ELW A238

List all prerequisites and co-requisites:

LECTURE DATE(S)

Section: A01 MECH 410 – CRN 22178 MECH 520 – CRN 22199	Days: Monday/Thursday	Time: 4:00-5:20PM	Location: BWC A104
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LAB SECTIONS

Section: B01	Days:	Time:	Location:
MECH 410/520	Thursday	5:30-8:20PM	ELW B228

Lab times and locations are also available from the [timetable](#) through Sign in to UVic, My Page.

TA Name	E-mail	Office
Vahid Ahsani	ahsaniv@uvic.ca	TBA
Haoqiang Ji	haoqiang@uvic.ca	TBA
Qi (Vicky) Zhou	qzhou@uvic.ca	TBA
Haijia Zhu	hjzhu@uvic.ca	TBA

Required Text	Optional Text
Title: N/A	<ul style="list-style-type: none"> Chang, K. <i>e-Design Computer-Aided Engineering Design</i>
Author:	
Publisher/Year:	
Reference Materials:	
<ul style="list-style-type: none"> Lee, K. <i>Principles of CAD/CAM/CAE Systems</i> Lombard, M. <i>Solidworks Surfacing and Complex Shape Modeling Bible</i> 	

COURSE OBJECTIVES: Fundamentals of computer graphics; basic elements of geometric modeling of solids and curved surfaces; advanced topics in engineering drawings; use of integrated CAD/CAE/CAM system for modelling, simulation, engineering analysis, automated production, and parameter optimization of mechanical designs; input and output techniques, data management, and customization of CAD/CAE/CAM systems.

LEARNING OUTCOMES: At the end of this course, students will be able to:

Basic elements of CAD and relevance to current industrial practice. Representation of curves and curved surfaces. Training in free-form surfacing, assembly and mechanical drawings. Application of finite element model. Numerical optimization and its application to parameter design. Computer aided manufacturing. Post processing models and G-code.

Weight & Date(s) of Assessments:	Weight	Date
Labs	% 15	Date: Jan 26 th , Feb 20 th , Mar 9 th & 23 rd , Apr 4 th
Quizzes	% 25	Date: Feb 9 th - Apr 3 rd
Project	% 60	Date: TBA

LABORATORIES (Description & Method of Delivery)

IMPORTANT: The project is in Solidworks and labs are in Unigraphics NX – Why?

- Small-medium industries are likely to have SW, while high end work (automobile, aircraft etc.) uses more advanced tools such as NX. The course intends to give an exposure to both reaching a different level of expertise (intermediate for SW and beginner for NX)
- Graduate students (MECH520) are allowed to choose the software for their projects if that helps them in integrating the project in their research.

Laboratory attendance is NOT mandatory, as a matter of fact they are open labs. However, the TA will be in the lab assisting during the scheduled lab time and will give presentations/tutorials about how to operate the software (NX). Vicky is responsible for such assistance. Announcement of active laboratory sessions will be provided in lecture periods. The laboratories will include instructional work that is expected to help students develop proficiency with NX software.

Lab reports are to be completed in groups for undergrads and individually for grads. Laboratory e-copy submissions are to be made through the course space (TBA).

Lab #	Modules	Start	Due (5 pm)
1	Design Modeling - User Interface; 2D Sketching; 3D Modeling and Engineering Drawing Generation	01.12	01.26
2	Mechanical Assembly – Modeling of Assembly and Mechanism; and Motion Animation	02.02	02.20
3	Static Structural Analysis	02.16	03.09
4	Sensitivity Analysis and Design Optimization	03.09	03.23
5	Automated CNC Tool Path Generation & Machining	03.23	03.31

PROJECTS: (Description & Method of Delivery)

Project descriptions, method of submission and formatting will be uploaded to the course-space accordingly

CAD Laboratory		MECH410 (Group)	MECH520 (Individual)
Laboratory 1	Design Modeling - User Interface; 2D Sketching; 3D Modeling and Engineering Drawing Generation	3 %	3 %
Laboratory 2	Mechanical Assembly – Modeling of Assembly and Mechanism; and Motion Animation	3 %	3 %
Laboratory 3	Static Structural Analysis	3 %	3 %
Laboratory 4	Sensitivity Analysis and Design Optimization	3 %	3 %
Laboratory 5	Automated CNC Tool Path Generation & Machining	3 %	3 %
Project		60%	60 %
Project concept	General concept of the project topic part 1	mandatory	mandatory
Project Proposal P1	Detailed description of the objectives and strategies	5 %	5 %
CAD report I	3D models/assembly/Drawings	20%	25%
Project Proposal P2	Detailed description of the objectives and strategies	5 %	5 %
CAE/CAM Report II	Design analysis and G-Code	20%	25%
Project Presentation	CAD/CAE/CAM project presentation	10%	-
Quizzes (2)	Lecture material	25%	25%

NOTE: Failure to complete all laboratory requirements and projects will result in a grade of N being awarded for the course.

The final grade obtained from the above marking scheme for the purpose of GPA calculation will be based on the percentage-to-grade point conversion table as listed in the current Undergraduate Calendar.

COURSE LECTURE NOTES

Unless otherwise noted, all course materials supplied to students in this course have been prepared by the instructor and are intended for use in this course only. These materials are NOT to be re-circulated digitally, whether by email or by uploading or copying to websites, or to others not enrolled in this course. Violation of this policy may in some cases constitute a breach of academic integrity as defined in the UVic Calendar.

There will be no supplemental examination for this course.



Faculty of Engineering

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COURSE OUTLINE

GENERAL INFORMATION

Note to Students:

Students who have issues with the conduct of the course should discuss them with the instructor first. If these discussions do not resolve the issue, then students should feel free to contact the Chair of the Department by email or the Chair's Secretary to set up an appointment.

Attendance

Students are expected to attend all classes in which they are enrolled. An academic unit may require a student to withdraw from a course if the student is registered in another course that occurs at the same time....

An instructor may refuse a student admission to a lecture, laboratory, online course discussion or learning activity, tutorial or other learning activity set out in the course outline because of lateness, misconduct, inattention or failure to meet the responsibilities of the course set out in the course outline. Students who neglect their academic work may be assigned a final grade of N or debarred from final examinations.

Students who do not attend classes must not assume that they have been dropped from a course by an academic unit or an instructor. Courses that are not formally dropped will be given a failing grade, students may be required to withdraw and will be required to pay the tuition fee for the course." UVic Calendar, (2017) <http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/attendance.html#>

Faculty of Engineering, University of Victoria Standards for Professional Behaviour

"It is the responsibility of all members of the Faculty of Engineering, students, staff and faculty, to adhere to and promote standards of professional behaviour that support an effective learning environment that prepares graduates for careers as professionals...."

You are advised to read the Faculty of Engineering document Standards for Professional Behaviour which contains important information regarding conduct in courses, labs, and in the general use of facilities.

<http://www.uvic.ca/engineering/assets/docs/professional-behaviour.pdf>

Cheating, plagiarism and other forms of academic fraud are taken very seriously by both the University and the Department. You should consult the Undergraduate Calendar for the UVic policy on academic integrity.

Policy on Academic Integrity

<http://web.uvic.ca/calendar2017-01/undergrad/info/regulations/academic-integrity.html#>

Equality

This course aims to provide equal opportunities and access for all students to enjoy the benefits and privileges of the class and its curriculum and to meet the syllabus requirements.

Reasonable and appropriate accommodation will be made available to students with documented disabilities (physical, mental, learning) in order to give them the opportunity to successfully meet the essential requirements of the course. The accommodation will not alter academic standards or learning outcomes, although the student may be allowed to demonstrate knowledge and skills in a different way. It is not necessary for you to reveal your disability and/or confidential medical information to the course instructor. If you believe that you may require accommodation, the course instructor can provide you with information about confidential resources on campus that can assist you in arranging for appropriate accommodation. Alternatively, you may want to contact the Resource Centre for Students with a Disability located in the Campus Services Building.

The University of Victoria is committed to promoting, providing, and protecting a positive, and supportive and safe learning and working environment for all its members.

Resource Centre for Students with Disabilities

<http://www.uvic.ca/services/rcsd/>

Accommodation of Religious Observance (AC1210)

<http://web.uvic.ca/calendar2017-01/general/policies.html>

Discrimination and Harassment Policy (GV0205)

<http://web.uvic.ca/calendar2017-01/general/policies.html>

Week	Mondays	Thursdays	Lab	Deadline
Week 1	-	Course info		
Week 2	Generate groups	SW modeling basics	Lab 1 Modeling	
Week 3	Advanced Features 3D scanner	Coordinate Systems and Transformations		Project Concept
Week 4	Curves & Surfaces	Project Discussion (Mech410 only)		Project Proposal P1
Week 5	Mesh and geometric modeling systems	Sheet Metal Forming	Lab 2 Assembly	Lab 1
Week 6	Review	Quiz		
Week 7	No Class (reading Break)		Lab 3 Analysis	Lab 2
Week 8	Fatigue analysis SolidWorks	Intro to FEA		Design CAD Report
Week 9	Intro to FEA	Intro to FEA SolidWork Analysis	Lab 4 Optimization	Lab 3
Week 10	Intro to Optimization	SolidWork Optimization & Comsol sensitivity		Project Proposal P2
Week 11	Rapid prototyping G-Code Product data exchange.	Dr. Armando Tura - invited lecture: CAM		
Week 12	Project Discussion (Mech410 only)	Presentations	Lab 5 CAM	Lab 4
Week 13	Presentations	Presentations		
Week 14	Quiz	-		Design CAE/CAM Report Lab 5

Note: Green colored classes include quiz related materials.
THIS TABLE MIGHT BE UPDATED DURING THE SEMESTER