MECH410/520 Computer Aided Design (CAD)

Spring 2012

Course Information

Instructors: Armando Tura
Office: ELW B126; Phone: 721-7295; E-mail: atura@uvic.ca
Dr. Zuomin Dong
Office: EOW 548/551; Phone: 721-8900; E-mail: zdong@uvic.ca
Course Homepage: http://www.me.uvic.ca/~mech410/
TA: Jason Zhang
Office: EOW 239; Phone 721-6510; E-mail: xingz@uvic.ca

Lecture Schedule: Mondays, and Thurdays 10:00 am -11:20 pm
Lecture Place: DSB C118
Office Hours: Tuesday: 1:30-3:30 p.m. ELW B126 (or by appointment)
Lab. Schedule: Computational Design Lab. ELW B228 (Open 7x24, first lab: Jan 10)
Lab. Consultant: Tuesdays 1:30 - 4:30 p.m. (Mr. Minh Ly, Lab: ELW B228 and Office: ELW A214)
TA: Tuesdays 2:30 - 3:30 p.m. (Jason Zhang, during Lab: ELW B228)

References:
- Lee, K. Principles *of CAD/CAM/CAE Systems,* Addison Wesley, 1999.
- MECH410/520 Web Page at http://www.me.uvic.ca/~mech410/

Pro/ENGINEER Laboratory		**MECH410** (Group of 2)	**MECH520** (Individual)
Laboratory 1 (Start on Jan 10)	Design Modeling - User Interface; 2D Sketching; 3D Modeling and Engineering Drawing Generation (2 wks: Jan 10-24)	7 %	7 %
Laboratory 2	Mechanical Assembly – Modeling of Assembly and Mechanism; and Motion Animation (2 wks: Jan 24- Feb 7)	7 %	7 %
Laboratory 3	Static Structural (and Thermal) Analysis (2 wks: Feb 7- 21)	5 %	5 %
Laboratory 4	Sensitivity Analysis and Design Optimization (2 wks: Feb 21- March 6)	5 %	5 %
Laboratory 5	Automated CNC Tool Path Generation & Machining (1wk: March 6-13)	6 %	6 %
Final Project	Project topic, proposal, presentation and report	40 %	45 %
Quiz 1	Feb 23	15 %	12.5 %
Quiz 2	March 29	15 %	12.5 %

LABORATORIES ARE MANDATORY

Course Outline

1. Introduction to CAD/CAE/CAM and Technology Review
2. Computer Hardware and Software for a CAD System
3. Graphical Coordinate Systems
   Model (or World, Database) Coordinate System (MCS); Working Coordinate System (WCS); Viewing Coordinate System (VCS)
4. Reviews on Geometric Transformations and Projections
   a) 2D and 3D Transformations
   b) Parallel Projections
   c) Perspective Projections
5. An Introduction to the Pro/ENGINEER, CREO and Solidworks
   a) Parts and Features
   b) Assemblies
   c) Drawings
   d) Advanced Features
6. Computer Modeling Techniques
   a) Wireframe Model
   b) Solid Model: Boundary Representation; Sweeping; Construction Solid Geometry
   c) Feature-based Modeling and Parametric Modeling
7. An Introduction to Design Optimization
   a) Formulation of a Design Optimization Problem
   b) Search Schemes of Commonly Used Optimization Methods
   c) Important Issues in Design Optimization
8. An Overview of Unigraphics NX CAD/CAM/CAE System
9. FEA Using Cosmos, Comsol, and PRO/Mechanica
10. Representation of Curves
    a) Parametric Curve Representation
    b) Cubic spline, Bezier curves, B-spline curves and NURB
11. Representation of Surfaces
    a) Plane; Bilinear, Ruled, Bezier and NURB Surfaces
    b) Visualizing Surfaces; Surface Mesh and Surface Machining
    c) Surface Modeling in Pro/ENGINEER
12. Interactive Computer Graphical Programming
    a) Introduction and Background Review
    b) Programming in CAD Systems (Menu, Macro and High-level Programming – AutoCAD & Pro/E)
13. Data Organization in CAD
    a) Data Structure and Database
    b) Graphical Standard and CAD/CAM Data Exchange
14. Introduction to CAM