

Course Syllabus
MECH 6303, Computer Aided Design

Course Information:

MECH 6303.502.15F, Class Number: 82651, 3 semester hours
Monday and Wednesday: 7 pm – 8:15 pm
Starts: August 24, 2015

Fall 2015
Lecture Room: CN 1.304
Ends: December 9, 2015

Professor Contact Information:

Dani Fadda, Ph.D., P.E.

Cell Phone: 214-616-7896

Office Hours: by appointment

TA: TBD

Office Hours: Monday and Wednesday: 6 pm – 7 pm (by appointment)

Office: ECSN 3.214

Email: fadda@utdallas.edu

TBD@utdallas.edu

Office: ECSN 2.124

Description:

This course provides an introduction to design principles and methodologies for geometrical modeling, curve and surface fitting in an automated environment, CAD/CAM simulation of manufacturing, and computer-aided solid modeling including theoretical framework and applications using commercial CAD packages/programming languages. Projects involve CAD concepts to solve advanced engineering problems.

The course is taught by lectures, tutorials, and presentations. Students are responsible to use the CAD lab for homework which is assigned on a regular basis. Students are required to propose project topics and present part/assembly and analysis during the last week of the class. These projects are discussed in class with sample project and posted in eLearning.

Course Pre-requisites co-requisites and/or restrictions:

Prerequisite: MECH 3305 Computer Aided Design or equivalent (3 undergraduate semester hours)

Course Learning Outcome (CLO):

- 1) Fundamental understanding of CAD/CAM system including the principles and practice of computer aided solid modeling and its applications to manufacturing.
- 2) Be able to effectively use commercial CAD software (mainly SolidWorks and ProE/Creo).
- 3) Be able to describe various standards pertaining to CAD/CAM software.
- 4) Explain the mathematical formulations and properties of parametric modeling of curves and surfaces.
- 5) Be able to use basic and advanced features of CAD software to construct parts, make assembly models and carry out all phase of design and analysis.

Topics:

- 1) Introduction to computer-aided design
 - Motivation, general design philosophies, CAD software, coordinate systems, sketches, orthographic and isometric views, exploded view, rendering
- 2) Principles of 3D geometrical modeling
 - Basic features of solid modeling, part drawing, standard dimensioning and tolerance, constraint relationships in solid modeling
 - Basic modeling tools in CAD (layers, colors, selection, transformation, offset, array, etc.)
 - Standard engineering drawing, standard machine elements (gear, shaft, springs, bearings)
- 3) Curve and surface fitting in an automated environment
 - Parametric and non-parametric representation of curves with example using ProE/Creo and SolidWorks.
 - Synthetic, analytic, implicit and explicit methods of curves.
 - Surface representation in CAD, synthetic (splines and Bezier), and analytic (plane, ruled, revolution, tabulated), orthogonality, tangency.
 - Solid modeling, regularization, Boolean operation, half space operations, boundary representation (B-rep), constructive solid geometry (CSG)
 - Writing scripts (programs) using MATLAB for curves, surfaces and solids.
- 4) Programming
 - Relation database, objects, class, inheritance, parametric modeling in: AutoCAD, ProE, and SolidWorks.
 - Macro and Application Programming Interface (API).

5) CAD/CAM simulation of manufacturing

- Animation: basics, implementation in CAD software
- Standard parts, fittings, bolts nuts, creating assembly and subassembly drawings
- Product data exchange, file types (IEGS, STEP, ACIS, DXF, PARASOLID, STL, etc.)

6) Computer-aided solid model analysis and rapid prototyping

- Simulation program for solving problems such as SolidWorks Simulation
- Basics of computational techniques, Finite Element Analysis (FEM) using CAD software (pre-processing, meshing , apply boundary condition, solve, post processing)
- Geometric Tolerance: perpendicularity, parallelism, eccentricity, surface finish, angularity, flatness, position tolerance, clearance and interferences, using these features in CAD software
- Basics of rapid prototyping, hardware and software, molding, design for manufacturing, reverse engineering and data capture techniques

Grading Policy:

40%	Homework
20%	Midterm Exam
10%	Project Proposal
10%	Project In-class presentation
20%	Project

References and Materials:

- Lecture notes and online tutorial (UTD login ID and password required)
- <https://elearning.utdallas.edu/webapps/portal/frameset.jsp>
- You can access from off campus via VPN (see <http://www.utdallas.edu/ir/howto/utd-vpn/>)

Reference Textbooks:

- Mastering CAD/CAM, by Ibrahim Zeid, ISBN: 0072868457
- Mastering SolidWorks, by Ibrahim Zeid, ISBN-10: 0135046092
- Geometric modeling, by Michael E. Mortenson, ISBN 0831132981, 9780831132989
- Computer Graphics and Geometric Modeling for Engineers, by Vera B. Anand, ISBN: 0471157317, 9780471157311
- CREO Parametric 2.0 Tutorial and Multimedia CD: Roger Toogood and Jack Zecher, ISBN-13: 978-1585038152

Online Tutorials:

- SolidWorks <http://www.solidworks.com/sw/resources/solidworks-tutorials.htm>
- ProE/Creo <http://www.ptc.com/product/demos-and-tips>

Software:

- SolidWorks and CREO are available in the CAD Lab (CN 1.304)
- CREO downloads from the following link:
http://support.ptc.com/appserver/wcms/forms/index.jsp?&im_dbkey=86840&icg_dbkey=482
- SolidWorks downloads from the following link:
<http://www.solidworks.com/sw/products/free-cad-software-downloads.htm>
- DraftSight can be downloaded from the following link:
<http://www.3ds.com/products-services/draftsight/download-draftsight/>

Policies and Procedures for Students:

The University of Texas at Dallas provides a number of policies and procedures designed to provide students with a safe and supportive learning environment. Brief summaries of the policies and procedures are provided for you at <http://provost.utdallas.edu/home/index.php/syllabuspolicies-and-procedures-text> and include information about technical support, field trip policies, off-campus activities, student conduct and discipline, academic integrity, copyright infringement, email use, withdrawal from class, student grievance procedures, incomplete grades, access to Disability Services, and religious holy days.

QR Codes



eLearning



VPN



SolidWorks



PTC



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SolidWorks



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