Course Syllabus for

MECH 6303 – Computer-Aided Design

Summer 2015; Class meets on MW from 12:30pm-2:45pm
Note: One week of class time during summer roughly equals 1.5 weeks during semester

Professor Contact Information

Dr. Oziel Rios
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Teaching Assistant Contact Information

Name: TBD
Office:
Office Hours:
Email:

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisite: MECH 3305 Computer Aided Design (or equivalent)
Co-requisite: None
Other Restrictions: None

Course 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.

The course is taught by lectures and in-class tutorials. Students are responsible for the use the CAD lab for homework which is assigned on a regular basis. Students are required to propose project topics and present part/assembly design and analysis during the last week of the class.

Course Objectives and Topics

The learning objectives/outcomes for this course are as follows:

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 CREO Parametric).
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 in CAD software to construct parts, make assembly models and carry out all phase of design and analysis.

The topics covered in this course are as follows:

- Introduction to CAD
  - CAD Software, modeling philosophies, coordinate systems, sketching, model views
- 3D Geometric Modeling
  - Sketched-based modeling, Constructive Solid Geometry (CSG)
  - Geometric modeling of standard machine elements (gears, shafts, springs, etc.)
  - Part and assembly modeling, engineering drawings, dimensioning
- Curve and Surface Design
  - Parametric and non-parametric representations of curves and surfaces
  - Synthetic representation of curves and surfaces (Bezier)
  - Tangent and curvature continuity of curves and surfaces with examples in CREO Parametric
- Programming
  - Examples in SolidWorks and/or CREO Parametric of: parametric constraint relationships, global and local design variables, curve design
  - Writing scripts (programs) using MATLAB for: generating curves and surfaces, performing coordinate transformations and projections (and optimization if time permits)
- Design Analysis and Simulation
  - Examples in CREO Parametic include: kinematic motion simulation and analysis of assemblies, design optimization, Finite Element Analysis (FEA), tolerance analysis
  - Use of SolidWorks Simulation

Reference Textbooks and Course Material

Notes, tutorials and other resources will be posted on eLearning (UTD ID and password required). Lecture slides are not intended to replace your notes.

No book is required for this course but the following books will be used as references:

- Mastering CAD/CAM, by Ibrahim Zeid, ISBN: 0072868457
- Mastering SolidWorks, by Ibrahim Zeid, ISBN: 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, by Roger Toogood and Jack Zecher, ISBN: 9781585038152

Work on the following tutorials for help with SolidWorks and CREO Parametric. You should also search online for videos and tutorials for specific help on a topic.

- SolidWorks: http://www.solidworks.com/sw/resources/solidworks-tutorials.htm
- CREO Parametric: http://www.ptc.com/product/demos-and-tips

Other resources:

- SolidWorks and CREO Parametric are available in the CAD Lab (CN 1.304). Check with the Mechanical Engineering front desk for availability during summer.
- A CREO Parametric student version can be downloaded for free from the following link: http://support.ptc.com/appserver/wcms/forms/index.jsp?&im_dbkey=86840&icg_dbkey=482. Make sure to register using your UTD email address.
- A SolidWorks trial version and other free CAD tools are available from: http://www.solidworks.com/sw/products/free-cad-software-downloads.htm.

Course Schedule

The following is a ***tentative*** schedule of class topics. These dates are subject to change. It is your responsibility to keep up with any changes.

Week	Day	Topic(s)
1		
	5-27	Overview of Course
2	6-1	Sketching and Solid Modeling (Examples in SolidWorks and CREO Parametric)
	6-3	Sketching and Solid Modeling
3	6-8	Sketching and Solid Modeling
	6-10	Parametric Curve and Surface Design (Curve Interpolation, Bezier Curves; Planar, Tabulated, Revolved, Ruled, Lofted, Seep and Bezier surfaces)
4	6-15	Parametric Curve and Surface Design
	6-17	Parametric Curve and Surface Design
5	6-22	Parametric Curve and Surface Design
	6-24	Parametric Curve and Surface Design
6	6-29	**Midterm Exam** (Covers Sketching, Solid Modeling, Curves, Surfaces)
	7-1	Assembly Modeling and Design (Static and Kinematic Constraints, Motion Analysis)
7	7-6	Assembly Modeling and Design
	7-8	Assembly Modeling and Design
8	7-13	Engineering Drawings (Part and Assembly)
	7-15	Geometric Transformations and Projections
9	7-20	Geometric Transformations and Projections
	7-22	Geometric Transformations and Projections
10	7-27	Design Analysis (Optimization, FEA, Tolerance Analysis)
	7-29	Design Analysis
11	8-3	Work on Projects
	8-5	Project Presentations
12	TBD	**Final Exam** (Comprehensive)

Important Dates

Memorial Day (no classes):	May 25
First day of classes:	May 27
Census day:	June 5
Last day to withdraw without "W":	June 5
Independence Day (no classes):	July 4
Last day to withdraw with "W":	July 13
Last day of classes:	August 6
Final Exams:	August 7-8

Grading Policy

[**40%**] **Exams**: There will be two exams each worth 20%. Make-up exams will only be allowed for the cases of illness, attendance of a university-sponsored event (such as a conference or other activity) or under unusual circumstances. For each case, you are required to provide proper documentation (such as doctor's note or note from academic advisor).

[**30%**] **Homework Assignments**: Unless otherwise stated, homework assignments will be submitted in eLearning. Late homework assignments will **NOT** be accepted under any circumstances.

[**30%**] **Project**: You will work as a team (2-4 members allowed per team) to design and perform analysis on a mechanical engineering system. Constraints will be provided but the choice of system will be your own. For this project, you will: submit a report detailing the design and analysis performed the system of your choice; submit part and assembly models as well as engineering drawings; and, present your project to the class during the last day of regularly scheduled classes.

You have five business days to appeal any grade or absence (contact the instructor or TA during office hours). The five days will be counted starting from the day the assignment or exam is returned or the grade is posted in eLearning (whichever comes first).

Your final grade will be rounded to the nearest whole number and the final letter grade will be assigned based on the following ranges:

	Plus (+)		**Minus (-)**
A	100 - 97	96 - 93	92 - 90
B	89 - 87	86 - 83	82 - 80
C	79 - 77	76 - 73	72 - 70
D	69 - 67	66 - 63	62 - 60
F		59 and below	

Course & Instructor Policies

Email must be sent from your UTD email account to the UTD email address of the instructor or TAs. Emails related to homework submissions should be addressed to both the instructor and TA. Please allow 24-36 hours for a response during the week. Please format your emails professionally before sending: (i) address the recipient appropriately (e.g., "Prof. Rios" or "Dear Dr. Rios"), (ii) use correct grammar, capitalization, and sentence structure, and (iii) add a closing (e.g., "Best regards", or "Best wishes").

Throughout the semester, the instructor may have intermittent, unavoidable professional travel commitments. On these days, the instructor will provide advance notice and class will be canceled or taught by a TA.

You are **NOT** allowed to surf the internet, use social media, text, etc. during class time. Only the software and internet sites specified by the instructor will be allowed. Students violating this rule will be asked to leave the lab to avoid distracting your fellow students.

Academic dishonesty will not be tolerated. All suspected cases of academic dishonesty will be sent to the Office of Judicial Affairs (see http://www.utdallas.edu/deanofstudents/managing/). If it is determined that academic dishonesty occurred you will receive a grade of **F** in this course.

For a full list of university policies, please visit http://go.utdallas.edu/syllabus-policies

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THE INFORMATION IN THIS DOCUMENT IS SUBJECT TO CHANGE AT THE DISCRETION OF THE INSTRUCTOR.
