DEPARTMENT OF MECHANICAL ENGINEERING AND MECHANICS
COLLEGE OF ENGINEERING
Drexel University

COURSE NUMBER: **MEM201-001: FUNDAMENTALS OF COMPUTER-AIDED DESIGN**
INSTRUCTOR: Dr. Wei Sun
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COURSE DESCRIPTION:
The objective of the course is to provide students with basic understanding of technical graphics communication and computer-aided design for engineering applications. By using computer-aided design/drafting software AUTOCAD 2006, students will learn basic principles of geometric modeling and descriptive geometry to assist in problem visualization and solution. The course consists of 1) lectures; 2) laboratories, and 3) term project.

Textbook and CAD Software:
"Engineering Graphics with AutoCAD 2006," James D. Bethune, Prentice-Hall, Inc., 2006
AutoCAD 2006 software – AutoDesk, Inc.

Class and Lab Information:

Lectures:	All sessions:	Mondays	11:00 - 11:50 a.m.,	Room: **Randel 327**
Labs:	MEM201-061:	Tuesdays	3:00 - 5:50 p.m.,	Room: 2-238A, MEM CAD Lab
	MEM201-062:	Tuesdays	12:00 - 2:50 p.m.,	Room: 2-238A, MEM CAD Lab
	MEM201-064:	Thursdays	12:00 - 2:50 p.m.,	Room: 2-238A, MEM CAD Lab

Grading Policy:
Homework, Assignments and Quiz: 50%; Final Project 25%; Final Exam: 25%
A+>95%; A>90%; A->85%; B+>80%; B>75%B-> 70%; C> 60%; D> 50%; F< 50%

Lab Administrator:
George Ciarrocchi: MEM Office, Room 2-115; Tel: 895-1397; E-mail: george@coe.drexel.edu

MEM201- FUNDAMENTALS OF COMPUTER-AIDED DESIGN,
LECTURE AND LAB SCHEDULES

Week	Date	TOPIC	*Homework*
1	1/7 - Monday	Lecture - Course Outline and Introduction Introduction to Computer-Aided Design CAD hardware and software Lab - MEM CAD Lab tour, Lab Procedure and meet TAs open and check your account. HW - Use Internet to search AutoDESK company product information, AutoCAD technical support, AutoCAD related products, and other CAD drafting software. Submit a report of your finding.	Lecture Room: Randel 327 Lab Room: 2 – 238A
2	1/14 - Monday	Lecture – CAD/CAM In modern design and manufacturing Lab - Getting start, Fundamentals, and 2D construction (Ch. 1 &2) • Toolbars, command line box and command tools • Set-up a drawing (dimensions, sheet size, grid, snap, precision) • Save, Save as, open, Help • LINE (coordinate values, polar values) • Circle and circle centerline • Move, Copy, Offset, Mirror, Array, Rotate • Trim, Extend, Break, Chamfer and fillet	Lab Exercise: EX1-8, 2-7, 2-9, 2-15, Home Work: EX2-20, 2-25, 2-26
3	1/21 - Monday	Lecture No lecture (University Holiday) Lab - Advanced commands (Chapter 3) • OSNAP and GRIPS • Edit Text • BLOCKS and Wblock • LAYERS, ATTRIBUTES, and title Blocks with Attributes • Designing using shape parameters Lab - Sketching (Chapter 4) • Introduction of sketching • Isometric sketches	Lab Exercise: SP3-1, SP3-2, DP3-2, EX3-50 EX4-23, EX4-46 Home Work: EX3-54 Chapter 4
4	1/28 - Monday	Lecture – Orthographic view, sectional views and auxiliary views I Lab – Orthographic Views (Chapter 5.1-5.23) • Three views of an object • Hidden Lines • Projection between views • Oblique surfaces • Holes • Cylinder	Lab Exercise: SP5-1, SP5-3, SP5-5 Home Work: EX5-5, 5-22, 5-36
5	2/4 - Monday	Lecture – Orthographic view, sectional views and auxiliary views II Lab – Create sectional and auxiliary views (Chapter 6 and Chapter 7) • Line and arrowhead type • Hatching an area and changing hatch style • Create, locate sectional view • Multiple sections • Create, locate auxiliary views	Lab Exercise: SP6-1, SP7-2 Home Work: EX6-16, 6-32 7-13

6	2/11 - Monday	Lecture –Dimensioning Lab – Dimensioning (Chapter 8) • Familiarized with Terminology and convention of dimension • Modify dimension style • Linear, Aligned, Radius, Diameter, angular dimension • Ordinate, baseline, continuous dimensioning • Quick dimension, center mark, quick leader • Dimension editing	Lab Exercise: EX8-2, 8-3 Home work: EX8-15, 8-16, 8-20, 8-25
7	2/18 - Monday	Lecture—Tolerance and geometric tolerance Lab – tolerance and geometric tolerance • Create Plus and minus tolerance, Limit tolerance ,Angular tolerance using AutoCAD • Hole and shaft (Standard fit, preferred and standard size) • Surface finish and surface control symbols • Create geometric tolerance using AutoCAD • Tolerance of form: flatness, straightness, circularity, cylindricity • Tolerance of orientation: perpendicularity, parallelism, angularity • Other geometric tolerances	Lab Exercise: SP9-2, 9-4 Home Work: EX9-10, 9-12, 10-13, 10-18
8	2/25 - Monday	Lecture – Project assignment, Working Drawings (Chapter 12) Lab – Threads and Fasteners (Chap. 11) Working Drawings (Chap. 12) • Thread Terminology, Thread Representations • Types of Threads, Bolts and nuts, Screws • Assembly Drawings • Drawing Formats, Title Block • Title block, tolerance Block, Release block • Part List, Detail Drawings • First Angle Projection, Drawing Notes, Design Layout	Lab Exercise: SP11-1, SP12-1 Home Work: EX12-2
9	3/3 - Monday	Lecture – Fundamentals of 3D Drawings, Surface Modeling and Solid Modeling Lab – Fundamentals of 3D Drawing (Chapter 14), Surface Modeling (Chapter 15) and Solid Modeling (Chapter 16) • The World Co-ordinate System, User Co-ordinate Systems • Orthographic Views, Elevation and Using Elevation to create objects • Surface and Solid Modeling of Box, Sphere, Cylinder, Cone, Wedge, Torus • Surface Modeling - 3D Face, 3D Mesh • Revolved, Tabulated, Ruled and Edge Surface	Lab Exercise: SP14-1, EX15-4, EX16-1 HW – EX14-3,
10	3/10 - Monday	Lecture – Fundamentals of 3D Drawings, Surface Modeling and Solid Modeling II Lab – Fundamentals of 3D Drawing (Chapter 14), Surface Modeling (Chapter 15) and Solid Modeling (Chapter 16) • Solid Modeling - Extrude, Revolve, Union and Subtraction • Solid Modeling and UCSs • Combining solid objects • List and MASSPROP	Lab Exercice: EX15-16 HW : EX16-4 EX16-18
11	3/17	Final Exam: TBA	

WHERE DOES MEM 201 FIT

As with all courses in the MEM program MEM 201 is designed to develop selected core technical skills, to produce several distinct outcomes required by the accrediting body, (Criteria 3 a-k), to contribute to the MEM educational objectives, and to satisfy professional components specified by ASME. So you know what the purpose of this course is please examine the following lists.

CORE TECHNICAL SKILLS:

1. Understanding fundamentals of the 2D design, computer hardware and software for CAD applications.
2. Understanding of Orthographic views, sectional views and auxiliary views, and knowing how to make an engineering drawing in AUTOCAD for those views.
3. Understanding of Dimensioning, surface finish, dimensional tolerance and geometric tolerance, and know how to assign these to a technical drawing in AUTOCAD.
4. Understanding of Assembly Drawings including Drawing Formats, Title Block, Tolerance Block, Part List, Detail Drawings, First Angle Projection, Drawing Notes, Design Layout
5. Understanding of Fundamentals of 3D Drawings, Surface Modeling and Solid Modeling, and know how to make 3D drawings in AUTOCAD.

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RELATION TO ABET CRITERIA 3 OUTCOMES:

0 = No content; 1 = Some content; 2 = Significant content

Outcomes a - k	**Content**	**Explanation**	**Evidence***
a. An ability to apply knowledge of mathematics, science and engineering	**2**	The homework assignment and final project on component design and assembly needs students to analysis and data processing.	The homework assignment an d final project
b. An ability to design and conduct experiments as well as to analyze and interpret data	**1**	A final project on component design and assembly needs students to analysis and data processing.	Project report.
c. An ability to design a system, component or process to meet desired needs	**2**	The assigned design problems are always required to meet societal or industrial needs.	Final project report.
d. An ability to function on multidisciplinary teams	**0**	N/A	N/A
e. An ability to identify, formulate and solve engineering problems	**2**	The problems and project require students to identify, formulate and solve engineering problems.	Homework, exams, final project
f. An understanding of professional and ethical responsibility	**1**	This is emphasized as part of the engineer's overall responsibility.	Classroom discussion; text book
g. An ability to communicate effectively	**1**	Final project	Final project reports
h. The broad education necessary to understand the impact of engineering solutions in a global/societal context	**1**	The impact of engineering design on the economy and society are covered.	Classroom discussion, text book
i. A recognition of the need for and an ability to engage in lifelong learning	**0**	N/A	N/A
j. A knowledge of contemporary issues	**2**	Latest CAD/CAM/CAE knowledge and software are introduced in the class	Homework, exams, Final projects
k. An ability to use the techniques, skills and modern engineering tools necessary for engineering practice	**2**	Computers and software packages are used to train their skills and solve real world problems.	Homework; Final projects, Tests.

RELATION TO PROGRAM OBJECTIVES:

0 = No content; 1 = Some content; 2 = Significant content

Objective	**Content**	**Explanation**	**Evidence***
1. To deliver a comprehensive mechanical engineering curriculum which emphasizes both the foundations and breadth of the mechanical engineering profession	**2**	This course requires students to learn fundamentals of engineering graphics, and its applications in CAD/CAM software.	Homework, examinations, final project , and project report.
2. To provide an education that equips students with the tools necessary to become successful mechanical engineers based on their Co-op experience, strong communication skills and an awareness for the need of continuous professional development.	**2**	The students need to do extensive design problems and a comprehensive final project to use learned CAD/CAM skills to solve real world problems, and train their communication skills.	Homework, Final project and project report.
3. To provide an education that will allow mechanical engineering students to understand the social, economic, environmental, political and ethical importance of their future profession.	**1**	They will mainly understand economy aspects.	CAD/CAM software survey project.
4. To provide mechanical engineering students with a thorough understanding of impact of mechanical engineers and the mechanical engineering profession in the development, implementation and creation of future technology	**2**	The latest CAD/CAM technology will have significant impact on nation's economy and industry.	Text book, teaching notes and discussion.