Grande Prairie Regional College
Department of Science and Technology

EG 2100 – Engineering Graphics
Fall, 2003
3.5(2-1-3)UT

Course Outline

Sketching, drafting and interpretation of pictorials and multiviews of three-dimensional objects, visual design, introduction to scales, sectioning, and dimensioning are included in the course content. (CADD is required for one third of the course credit.)

Note: Chemical, Electrical, Computer Engineering and Engineering Physics will not accept this course.

Instructor	Jaime P. Santiago J209 539-2865 jsantiago@gprc.ab.ca			
Lecture/Sketching Lab		W	1:00 - 3:50 pm	J202
CAD Lecture/Lab	L1:	F	1:30 – 4:20 pm	J101
	L2:	T	2:30 – 5:20 pm	J101
Textbook/Workbook	Engineering Graphics, Text and Workbook by Jerry W. Craig and Orval B. Craig Applying AutoCAD 2000 A Step-by-Step Approach by Terry T. Wohlers			
Course Website	http://www.gprc.ab.ca/departments/engineering and follow the links			

Course Objectives

Sketching

Develop 3D visualization abilities and improve freehand sketching skills through sketching exercises based on actual objects and 3D CAD models.

Engineering Drawings

Learn to read and draw standard engineering drawings and understand the theory of projections which is the basis of 2D engineering drawings. Multiview drawings, sectional and auxiliary views, dimensioning and tolerancing, and working drawings will be introduced using freehand sketches and AutoCAD drawings.

Computer-Aided Design

Develop basic skills in computer solid modeling. Learn to use AutoCAD to create 3D solid models. Introduce the student to create 2D engineering drawings from 3D solid models using AutoCAD.

Marks Distribution

Assignments/Sketch Books	4 %	Sketching Exam 1	8 %
Sketching Labs	10 %	AutoCAD Exam 1	8 %
AutoCAD Labs	10 %	Drawing Exam 2	20 %
AutoCAD Project	20 %	AutoCAD Exam 2	20 %

Marking Method

Marking of engineering sketches have objective and subjective components. Drawing mistakes and errors include drawn elements inconsistent with drawing standards and conventions as well as omissions and missing drawing elements. The evaluation of neatness, clarity and quality is subjective. Markers do not have the time to comb through all the fine aspects of a submitted work. A satisfactory drawing is always easy to spot when you see it. Therefore, submitted assignments and lab work will be marked using the following scale.

Mark	Interpretation	Numerical Score
✓+	superior, exceeds expectations, professional	4
✓	satisfactory, meets expectations	3
✓-	incomplete or below standard; need more care and attention	2
×	not submitted or not on time; too many errors and major deficiencies; insufficient effort	0

- Illegible lettering on any submitted work will result in a mark of × (score of 0)
- Photocopies will not be accepted and will receive a score of zero.
- No late work will be accepted unless cleared with the instructor or with a medical slip.

Marking Symbols

The following symbols will be used to identify errors or areas requiring improvement.

Notation	Meaning
+	too big, too much, too heavy, too dense, . . .
-	too small, too little, too light, too sparse, . . .
LW	line weight
LQ	line quality (straightness, evenness, . . .)
LC	line contrast
LP	lines not parallel or perpendicular
DI	distorted figure
CL	construction lines not used or to heavy
TX	unsatisfactory text and lettering
PP	proportions
AC	accuracy
SC	choice of scale
CV	curvature problems with circles, arcs, ellipses and general curves
VP	viewpoint not a good choice, wrong choice of views
SH	shading
DE	detail
XH	section lining/hatching
MV	misaligned views
TB	border/title block errors

Lecture and AutoCAD Timetable

Wednesdays			Fridays or Tuesdays
Week (Wed. to Tues.)	**Lecture Topics**	**Craig and Craig pages**	**AutoCAD Topics (Chapters are from Wohlers)**
1	Introduction to course; the graphic language and design, sketching lines and lettering	A1-C4	Introduction to AutoCAD, Web browser and FTP software Chapter 1: Tour of AutoCAD Chapter 2: User Interface Chapter 23: Plotting and Printing
2	Pictorial Views	C5 (Lecture material to supplement text)	Chapter 3: Entering Commands Chapter 4: Basic Objects Chapter 11: pp143-147 Chapter 5: Object Selection Chapter 6: Entering Coordinates
3	Projections and Multiview Drawings; Alphabet of Lines; Multiviews and Pictorials	D1-D48, C6	Chapter 9: Object Snap Chapter 10: Helpful Drawing Features Chapter 11: Construction Aids Chapter 12: AutoCAD's Magnifying Glass Chapter 13: Panning and Viewing
4	Multiview Drawings: Normal, Inclined and Oblique Surfaces	E1-E44, F1-F32, G1-G30	Chapter 14: Solid and Curved Objects Chapter 15: Adding and Altering Objects Chapter 16: Moving and Duplicating Objects Chapter 17: Modifying and Maneuvering
5	Multiview Drawings: Cylindrical Surfaces; Drawing Scales	H1-H36 (Lecture Material to Supplement Text)	Chapter 18: Notes and Specifications Chapter 19: Text Editing Chapter 20: Hatching and Sketching Chapter 21: Drawing Setup Chapter 22: Layers and Linetypes
6	Auxiliary Views	I1-I22	Chapter 23: Plotting and Printing Chapter 24: Multiple Viewports Chapter 29: A Calculating Strategy Chapter 30: Groups Chapter 31: Building Blocks
7	Sectional Views	J46	Chapter 32: Symbol Libraries Chapter 33: Attributes Chapter 25: Basic Dimensioning Chapter 26: Advanced Dimensioning Chapter 27: Fine-Tuning Dimensions
8	Sketching Exam 1		AutoCAD Exam 2
9	Dimensioning	L1-L28	Chapter 28: Tolerancing Chapter 36: The Third Dimension Chapter 37: Point Filters Chapter 38: User Coordinates
10	Tolerancing	M1-M26	Friday : Free Tuesday: Remembrance Day

11	Threads and Fasteners; Assembly and Working Drawings	K1-K30 (lecture to supplement text material)	Chapter 39: 3D Revolutions Chapter 40: Advanced Surfaces Chapter 41: 3D Primitives Chapter 42: Shading and Rendering
12	Contour Maps; Bearing and Slope of a Line, Strike and Dip; Outcrop, Profiles	Lecture and Handout	Chapter 44: Solid Regions Chapter 45: Solid Primitives Chapter 46: Basic Solid Modeling Chapter 47: Boolean Operations Chapter 48: Tailoring Solid Models
13	Work on Project		Work on Project
14	Work on Project		AutoCAD Exam 2

Sketching Labs (All sketching lab work are due at the end of the period.)

Date	Topic	Drawing Sheets (due at end of lab)	Assignment in Sketch Book (due at start of next lab)
Sept. 3	Lettering; Sketching Lines, Arcs, Circles and Polygons	C&C Sheets L-1, L-2, SK-1 On a blank sheet of paper, sketch Prob 1 of Sheet A-1 but rotated 90 degrees about a vertical axis.	C & C Sheets: L-3 (top 2 lines only), S-3 (rights side of sheet only) Sketch Prob 2 of Sheet A-1 but rotated 90 degrees about a vertical axis.
Sept. 10	Sketching Isometric and Oblique Pictorials	C&C Sheet C-19 Sketch isometric and oblique pictorials of the objects shown in the lab.	Sketch an oblique pictorial of a microwave oven. Sketch an isometric pictorial of a box of Cheerios.
Sept. 17	Sketching Visible, Hidden and Center Lines; Multiview from Pictorial; Isometric From Multiview; Missing Lines; Third View; Precedence of Lines	Using the pages C-12 and C-16 sketch the preferred 3 views of Prob 1 and 4 of sheet A-2. Use an appropriate scale. Do sheets A-8, A-12 and A-13.	In sketchbook, sketch the isometric pictorial shown in Prob 1 sheet A-4. Then sketch the front, top and right side views. Sketch an isometric pictorial of the object given in sheet A-7.
Sept. 24	Multiview Problems involving Normal, Inclined and Oblique Surfaces	C&C Sheets N4, N7, I3, I4, O2 and O4	Sketch the preferred 3 views of N-100 on page E-43, I-20 on page F-29. Do not dimension.
Oct. 1	Multiviews involving Cylindrical Surfaces	C&C Sheets C2, C5 and C9 (first 5 rows only)	No assignment.
Oct. 8	Primary and Secondary Auxiliary Views	C&C Sheets AUX-1, AUX-3 and AUX-5.	Handout problems on primary and secondary auxiliary view. Tape sheets into workbook.
Oct, 15	Sectional Views	C&C Sheets S-2, S-4 and S-6	C&C Sheet S-11. Tape sheet into workbook.
Oct. 22	Midterm Exam		

Oct. 29	Dimensioning	C&C Sheets DIM-3 and DIM-5.	No assignment
Nov. 5	Tolerancing; Basic Hole and Shaft Systems; ANSI and ISO standards	Tolerance calculations handout.	Tolerance calculations handout.
Nov. 12	Contour Maps, Outcrop Profiles	Handouts	No assignment
Nov. 19	Slope and Bearing of a Line Strike and Dip	Handouts	No assignment
Nov. 26	AutoCAD Lecture	Surface Modeling Shading and Rendering	AutoCAD Demo
Dec. 3	AutoCAD Lecture	2D Orthographic Drawings from 3D Solid Models	AutoCAD Demo

Materials:

0.5 mm mechanical pencil, F or HB lead
Workbook
3.5" floppy diskette, blank CD-R cd (for project)

AutoCAD Drawing Assignments

All drawing assignments are from Wohlers. All drawings must be printed and handed in to the instructor at the end of the lab. AutoCAD drawing files must be named as indicated in the table below and uploaded via FTP. Create a subdirectory for each week's assignments (call the directories Week1, Week2, etc.) and FTP the required files to the proper directory**. Print outs will be marked if the corresponding drawing files are uploaded. However, only one or two drawing files chosen at random will be checked for accuracy. Files with incorrect names and in the wrong folders/directories will not be marked.**

Date Assigned	Date Due	Drawings/Problems	Directory Name	Filenames
Sept. 5/9	Sept. 12/16	Upload the file *Single cavity mold.dwg* located in the AutoCAD Sample folder. Start AutoCAD and open the drawing. Pick Model space. Use Zoom Window to display the Plan of Ejector. Use Mtext to add your name and the Directory(folder) name. Plot with Display as plot area and Scaled to Fit for Plot Scale.	Week1	Single cavity mold.dwg
Sept. 12/16	Sept. 19/23	Fig 3-4, p31 ENGINE.DWG after completing Chapter 4 GASKET.DWG after completing Chapter 6 Fig 6-11, p78	Week2	prb3-1.dwg engine.dwg gasket.dwg prb6-3.dwg

Sept. 19/23	Sept. 26/30	BIKE.DWG after completing Chapter 9 Fig 9-9 p121 Fig 10-9, p136 (Start from a brand new AutoCAD session. Add your name before printing in Notepad.) SNAP.DWG after completing Chapter 11 Fig 12-7A and Fig 12-7B p172, No. 3. Then add Fig 13-6 p182. Do both No. 5 and 6.	Week3	bike.dwg prb9-9.dwg prb10-9.dwg and prb10-9.txt snap.dwg prb13-6.dwg
Sept. 26/30	Oct. 3/7	Fig 14-7 p200, Fig 14-10 p201 and Fig 14-11 p201 Chapter 14 (in the same drawing please) GASKET.DWG and MULTI.DWG after completing Chapter 15 Fig 16-17 and Fig 16-18 Chapter 16 (in same drawing) Fig 17-8 p254 Chapter 17	Week4	prb14-7.dwg gasket.dwg multi.dwg prb16-17.dwg prb17-8.dwg
Oct. 3/7	Oct. 10/14	Fig 18-10 No. 6 p270 Chapter 18 Fig 19-5 No. 2 p282 Fig 20-4 No 1 p296 TMP1.DWG after completing Chapter 21 TMP1.DWT after completing Chapter 22	Week5	prb18-10.dwg prb19-5.dwg bushing.dwg tmp1.dwg tmp1.dwt
Oct. 10/14	Oct. 17/21	STAIRD.DWG after completing Chapter 23 PSPACE.DWG after completing Chapter 24 Fig 29-9 p447 Chapter 29 (Download flplan.dwg.) Copy results of Inquiry Command from the text window into Notepad. Edit in notepad. Then insert result back into the drawing as MTEXT. Fig 31-8 No. 2 p471 Chapter 31	Week6	staird.dwg pspace.dwg prb29-9.dwg prb31-8.dwg
Oct. 17/21	Oct. 24/28	WORKSHOP.DWG after completing Chapter 32. LIB1.DWG after completing Chapter 33. BASE.DWG after completing Chapter 25 Fig 26-4 No. 3 p394 of Chapter 26	Week7	workshop.dwg lib1.dwg base.dwg prb26-4.dwg
Oct. 24/28		**Exam 1**	Week8	**Exam 1**
Oct. 31/Nov. 4	Nov. 7/12	TOLER.DWG after completing Chapter 28 3D.DWG after completing Chapter 36 3D2.DWG after completing Chapter 37 3D3.DWG after completing Chapter 38	Week9	toler.dwg 3d.dwg 3d2.dwg 3d3.dwg
Nov. 7/11		**Nov. 7 free day** **Nov. 11 Remembrance Day**		
Nov. 14/18	Nov. 21/25	Fig 39-5 to Fig 39-8, No. 1-4 p575 Chapter 39 (all objects in one drawing. Use pspace vports.) IBEAM.DWG and CONTOUR.DWG after completing Chapter 40 EDIT3D.DWG after completing Chapter 41 Fig 42-8 No. 7 p612 Chapter 42	Week11	prb39-5.dwg ibeam.dwg contour.dwg edit3d.dwg prb42-8.dwg
Nov. 21/25	Nov. 28/Dec. 2	REGION2.DWG after completing Chapter 44 PRIMIT.DWG after completing Chapter 45 SHAFT.DWG after completing Chapter 46 COMPOS.DWG after completing Chapter 47 TABLE.DWG after completing Chapter 48	Week12	region2.dwg primit.dwg shaft.dwg compost.dwg table.dwg
Nov. 28/Dec. 2	Dec. 5/9	Work on Project	Week13	Work on Project
Dec. 5/9		**Exam 2**	Week14	**Exam 2**

AutoCAD Project

AutoCAD projects are group projects. Each group of two students shall submit a project proposal before midterm exam week. (Forms and further instructions will be provided by the instructor at a later date.) This year all projects are in the Mechanical Engineering area. The project must be an assembly solid model of a practical mechanical device. This year you are not required to create detailed 2D engineering drawings. Look at the MecE 265 website (U of A) for some ideas or consult with your instructor.

Note: You will not learn 3D solid models in AutoCAD until near the end of the course (as opposed to Pro/E which uses solids from the start). However, you should gather all the relevant information such as dimensions, etc. and sketch out your final drawing as soon as possible so you can quickly jump into the project drawing in the last two weeks of the course. Your report must include sketches, research, design criteria and other information leading to the final design.

Grades

Letter Grade	***4-Point Equivalent***	***Designation***
A+	4.0	Excellent
A	4.0	
A-	3.7	First Class Standing
B+	3.3	
B	3.0	Good
B-	2.7	
C+	2.3	Satisfactory
C	2.0	
C-	1.7	
D+	1.3	Minimal Pass
D	1.0	
F	0.0	Fail