



# Fundamentals of Engineering Design

FED 101 ME

## Required Materials

### Textbooks:

1. **Fundamentals of Graphics Communication, 5th Edition**, Bertoline *et al*, WCB/McGraw-Hill, 2006.
2. **Pro/ENGINEER Tutorial Wildfire 2.0**  
Tutorial and Multimedia CD by Roger Toogood, SDC Publications.

### Reference:

**The Engineering Design Process, Second Edition**, Ertas *et al*, John Wiley & Sons, 1996.

#### Chapter 10– ENGINEERING ETHICS (p. 427 – 468)

- Ethics and the University
- The Foundation of Ethics
- Ethics in Engineering
- Legal and Responsibilities of Engineers
- Codes of Ethics
- Codes Rules and Interpretations
- The NSPE Code of Ethics for Engineers

### Drawing Materials:

- Mechanical pencils
  - i. 0.7 mm with HB lead
  - ii. 0.5 mm with HB & 4H
- White plain (unlined) paper (8-1/2" X 11")
- Sheets of isometric lined paper.
- Scales / ruler, a set of triangles (30-60-90 and Isoceles).

### Miscellaneous:

- NJIT Academic Honor Code will be upheld, and any violations will be brought to the immediate attention of the Dean of Students – visit <http://www.njit.edu/academics/honorcode.php>.
- For any modifications or deviations from the syllabus throughout the course of the semester, instructor will consult with students and the students must agree to.

Week Number:	TOPICS	Reading Assignment	Workbook Exercises/Quizzes Special Assignments
1	<b>Lecture:</b> <ul style="list-style-type: none"> <li>• Introduction - Design Process &amp; Technical Graphics used in the design process (p.1).</li> <li>• ENGINEERING ETHICS – Hand-out and Review</li> <li>• Overview of traditional drawing tools (p.21): pencils, compass, triangles, and etc.</li> <li>• ANSI Standard Sheet Sizes (p.23).</li> <li>• ANSI Standard Title Blocks and Borders</li> </ul>	Chapter 1, 2	Pro/ENGINEER CAD assignment

	<p>(p.73).</p> <ul style="list-style-type: none"> <li>• CAD: Computer as technical drawing tool; Pro/ENGINEER as a solid modeling software package.</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>• Introduction to Pro/ENGINEER</li> </ul>		
2	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Alphabet of Lines (p.14).</li> <li>• Line Drawing Techniques.</li> <li>• Scales (p.23).</li> <li>• Hand and CAD Lettering a Technical Drawing (p.57).</li> <li>• Freehand Sketching Techniques (p.38-51).</li> <li>• Coordinate Space (p.80).</li> <li>• Classification of Geometric Elements and Construction (p.87).</li> <li>• 3-D Modeling (p.113).</li> </ul> <p>Read Chapters 1-2, Chapter 3</p> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>• Pro/ENGINEER: Lesson 2 – Creating a Simple Object Part I</li> </ul>	Chapter 1, 2, and 3	Assignments on Isometric Sketches
3	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Engineering Geometry Chapter 3</li> <li>• Introduction to Projections – multiview, isometric (one type of axonometric), oblique, and perspective (p.196).</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>• Pro/ENGINEER: Lesson 3 – Creating a Simple Object Part II (Hole, Chamfer, Round etc.)</li> <li>• Pro/ENGINEER: Lesson 3 – Implementing Design Intent using Relations (simple equations)</li> </ul>	Chapter 3, 5	<p>Quiz #1 covering Engineering ethics, Isometric Sketches and questions on Reading Assignments Chapters 1-2/Class Notes.</p> <p>Multiview Chapter 5 Problems.</p>
4	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• Visualizing a multiview drawing (p.199).</li> <li>• The Six Principal Views (p.202) – First and Third angle projections.</li> <li>• Multiview sketching (p.211).</li> <li>• Multiviews from 3-D CAD Models (p.220)</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>• Pro/ENGINEER: Lesson 4 – Revolved Protrusions, Mirror Copies, Model Analysis</li> </ul>	Chapter 5	Handout Exercises
5	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>• View Selection (p.220).</li> <li>• Fundamental Views of Edges and Planes for Visualization (p.223-232)</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>• Pro/ENGINEER: Lesson 5 – Obtaining Information about the Model; Suppressing and Resuming Features; Modifying Feature Definitions; Insert Mode</li> </ul>	Chapter 5	Chapter 5 - Problems

6	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Multiview Representation for Sketches (p. 232-241).</li> <li>ANSI Standards for Multiview Drawings and Sketches (p.241)</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 6 – Sketcher Tools and Datum Planes</li> </ul>	Chapter 5	Quiz #2 Chapter 5/ Multiview Drawings.
7	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Visualization for Design (p.246).</li> <li>Multiview Drawing Visualization (p.259)</li> <li>Dimensioning, Size and Location Dimensions, Detail Dimensioning &amp; Dimensioning Techniques (p.434-455)</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 7 – Patterns and Copies</li> </ul>	Chapter 5, 9	Assignments decided by Instructor
8	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Auxiliary View Projection Theory (p.312)</li> <li>Auxiliary View Classifications (p.315)</li> <li>Auxiliary View Applications (p.323)</li> <li>Auxiliary View in CAD</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 8 – Engineering Drawings</li> </ul>	Chapter 6	Handout Ex.
9	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Pictorial Projections – Axonometric Projections (Isometric, Dimetric and Trimetric); Oblique Projections; Perspective Projections.</li> <li>Section Views in Isometric Drawings</li> <li>Isometric Assembly Drawings</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 8 – Engineering Drawings (Continued ... )</li> </ul>	Chapter 7	Handout Ex.
10	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Section Views – Sectioning Basics, Section View Types and Special Sectioning Conventions.</li> <li>Section Views using 3-D CAD Techniques</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 8 – Engineering Drawings (Continued ... )</li> </ul>	Chapter 8	Project Assignment
11	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Tolerancing – Interchangeability (p.455).</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 9 – Assembly Fundamentals and Constraints</li> </ul>	Chapter 9	Working on Project
12	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Tolerance Representation</li> </ul>	Chapter 9	Working on Project

	<ul style="list-style-type: none"> <li>Tolerances in CAD</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 10 – Assembly Operations (Information, Part Modifications, Exploding Assembly, Create Sections etc.)</li> </ul>		
<b>13</b>	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Working Drawings and Assemblies – Basic Concepts; Working Drawings; Part Lists etc.)</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 10 – Assembly Drawings</li> </ul>	Chapter 10	Quiz #3 Multiview Drawings/Dimensioning/Tolerancing
<b>14</b>	<p><b>Lecture:</b></p> <ul style="list-style-type: none"> <li>Working Assembly Drawings.</li> <li>Using CAD to Create Production Assembly Drawings</li> <li>Review</li> </ul> <p><b>Lab:</b></p> <ul style="list-style-type: none"> <li>Pro/ENGINEER: Lesson 11 – Sweeps and Blends</li> </ul>	Chapter 10	Project Report/Drawings

Note: Assignments may vary as determined by your instructor.