



NORWICH UNIVERSITY

Founded in 1819

The David Crawford School of Engineering

**ME356 MANUFACTURING PROCESSES**

**SPRING 2014**

NAME	OFFICE	PHONE	EMAIL
R. Danner Friend	U140	485-2279	rfriend@norwich.edu

**CLASS MEETING TIMES**

Lecture: Monday, Wednesday, Friday 9:00 – 9:50 in U141

Laboratory: Section L2, Wednesday, 1:00-3:50 in Rooms U137 and U072

Section L1, Thursday, 1:00-3:50 in Rooms U137 and U072

Section L3, Friday, 1:00-3:50 in Rooms U137 and U072

**CATALOG DESCRIPTION**

A study of the principles of manufacturing processes. Metal removal, casting, joining and deformation processes are covered as well as introductions to numerically controlled machinery, computer-aided manufacturing, rapid prototyping, robotics, computer integrated manufacturing and modern manufacturing systems.

**PRE-REQUISITES**

ME311, EG203

**TEXTS/REFERENCES**

Course Textbook:

Manufacturing Engineering and Technology by Kalpakjian and Schmid, 6th ed., Pearson Prentice-Hall, Inc., 2010

Reference Textbook:

Introduction to Materials Science for Engineers, 7<sup>th</sup> edition, James F. Shackelford, Pearson Prentice-Hall, Inc.

**GOALS**

- 1) Apply the concepts, standards and methods of computer-aided design to the production of working drawings for the manufacturing of parts and assemblies.
- 2) Apply the concepts, standards and methods of mechanical measurement using instruments typically used in the manufacturing of parts.
- 3) Apply the fundamentals of machining and know the basic operations of machine tools for the manufacture of metal parts. Perform basic turning and milling by both manual and CNC methods.
- 4) Be able to use Computer Aided Manufacturing (CAM) software to create NC code for programming and controlling the building of parts on a CNC machine.
- 5) Know the major rapid prototyping processes and be able to compare their strengths and weaknesses.
- 6) Understand the fundamental concepts and differences between the processes of joining, casting, and forming.
- 7) Understand the role of industrial robotics as part of a computer integrated manufacturing system.
- 8) Understand and be able to compare the different manufacturing and production systems.
- 9) Know the design for manufacturability and assembly principles.
- 10) Strengthen written communication skills by writing laboratory reports and writing a technical paper on a specific topic in manufacturing.

## **ATTENDANCE:**

The university attendance policy will be enforced. Students are expected to attend punctually all scheduled classes and laboratory sections. You must make arrangements to take an hour test early if you know you will have an excused absence when a scheduled hour test is to be given. All laboratories must be completed, so if you miss your scheduled lab section, you will need to make arrangements to make up the labor attend one of the other lab sections. A grade of ZERO will be assigned for unexcused absences from Hour Tests, Quizzes, and Labs. If more than three unexcused absences occur, the student will be warned. The student will receive a grade of "F" in the course for more than 4 unexcused absences or for total absences (excused or unexcused) equal to or exceeding 15% of the class meetings.

## **GRADING:**

Hour Tests	35%
Laboratory and Technical Reports	30%
Homework and Quizzes	10%
Final Exam	25%

## **QUIZZES:**

Pop quizzes will be given throughout the semester. There will be a time limit on the quizzes. Be prepared everyday with calculator and text. A grade of ZERO will be assessed for unexcused absences from quizzes.

## **HOMEWORK:**

Homework assignments will be collected and graded on a 10 point scale. Assignments should be placed on the desk at the front of the room prior to the start of class. **NO LATE HOMEWORK WILL BE ACCEPTED** and will be assigned a grade of zero. If you are going to miss a class, you are still responsible for turning in the homework on time. The solutions to all problems will be made available after the assignment is turned in. Homework must be in a readable form with problem statements, assumptions, solutions and sketches.

Homework format:

- Place your name, the due date, and the course number on the top of the first page.
- Write out the problem statement using "Given" and "Find" sections. For problems involving short discussion answers, the problem statement can be summarized and included as part of the answer in paragraph format.
- Clearly state all assumptions.
- Diagrams should be drawn when appropriate using straight edges and circle templates.
- The final answer should be clearly visible and boxed in or underlined. Make sure you include appropriate units whenever you have a numerical answer.
- Use only the front side of the paper.
- Staple all pages together.
- Neatness is of primary importance. A reduction in grade will result if the proper format is not followed.

Students are encouraged to work together on homework, however, copying another person's work or using the solution's manual for the textbook is not allowed.

## **LABS AND LAB REPORTS:**

All labs must be completed. Arrangements must be made to make up a lab if you miss it. Lab reports are due at the beginning of the laboratory period on the date specified. Late reports will be assessed the following penalties:

Past due but less than one week late	minus 20%
More than one week late	minus 100%

## ME356 COURSE SCHEDULE

Week	Topic(s)	Reading	Lab
1	Course Introduction	I.1 – I.11	Lab #1: Intro to Mech. Labs Safety Training; Equipment Training
	Review of Materials Science Structure and Properties of Materials Ferrous and nonferrous metals and alloys	Chapters 1,2,4,5,6	
2	Engineering Metrology, Instrumentation, Tolerances	Chapter 35	Lab #1: Safety Training; Equipment Training (continued)
3	Fundamentals of Machining Machining of Round Shapes: Turning and Hole Making	Chapter 21 Chapter 23	Lab #2: Machining (turning, milling, and drilling operations)
4	Milling and Other Misc. Machining Processes	Chapter 24	Lab #2: (continued)
5	Cutting Tool Materials and Cutting Fluids <b>Hour Test #1</b>	Chapter 22	Lab #2: (continued)
6	Engineers Week Rapid Prototyping and Operations	Chapter 20	Lab #3 Computer Aided Design and Manufacturing; CNC Machining Lab
7	Computer Numerical Control (CNC) machines		Lab #3(continued)
8	Automation of Manufacturing Processes	37.1-37.6	Lab #3: (continued)
<b>Spring Semester Break</b>			
9	Computer Aided Manufacturing Computer Integrated Manufacturing Systems <b>Hour Test #2</b>	38.1-38.8 39.1 – 39.4	Lab #3(continued)
10	Just-in-Time Production Lean Manufacturing	39.1-39.6	Lab #3(continued)
11	Joining Processes	Ch. 30 – 32	Lab#4: Robotics and Computer Integrated Manufacturing (CIM)
12	Metal Casting Processes	Ch. 10 – 12	Lab #4 (continued)
13	Forming and Shaping Processes	Chapters 13,14,15,19	Lab#5 Welding Lab
14	Product Design and Process Selection <b>Hour Test #3</b>		Lab #5: Welding Lab
15	Design For Manufacturability and Assembly	40.1-40.9	Lab#6: TBD
<b>FINAL EXAMS</b>			