

Manufacturing Processes, EMCH 377: Class meeting: **T, Th, 3:30-4:45** Room B103, 300 Main Street
 Class Text: **Manufacturing Engineering and Technology, 4th ed.** Kalpakjian and Schmid
Instructor: Dr. Xiaodong "Chris" Li, Department of Mechanical Engineering
Office Hours: Mondays 10:00-12:00, Most days around lunchtime for a quick question. **Office:** Room A117, 300 Main Street. **Phone:** 777-8011, **email:** lixiao@enr.sc.edu

Grading as follows: life-long-learning exercise @ 5%, 3 tests which **total** 60%, Homework @ 15%, Final exam @ 20%.

Grading Scale:

90-100 A 87-89 B+ 80-86 B 77-79 C+ 70-76 C 60-69 D < 60 F

Course Outline

Properties of Materials Related to Manufacturability

Chapter 1-2 Structure of Metals, Mechanical Properties and Mechanical Testing..... January 11
 Chapter 3-4 Physical Properties of Materials, Property modification by heat treatment..... January 13
 Chapter 7-9 Properties of polymers, ceramics, composites January 18

Metal Casting and Forming

Chapter 10 Fundamentals of Casting January 20
 Chapter 11 Metal Casting Processes January 25
 Chapter 12 Materials and Design for Casting..... January 27
 Chapter 13 Rolling of Metals..... February 1
 Chapter 14 Forging of Metals February 3
 Chapter 15 Extrusion of Metals February 8
 Chapter 16 Sheet Metal Forming Processes..... February 10
 Chapter 18 Forming Plastics and Composites..... February 15

Test 1 (20%) February 17

Machining Operations: Turning, Drilling, Milling

Chapter 20 Cutting Fundamentals..... February 22
 Chapter 21 Cutting Tool and Cutting Fluids..... February 24
 Chapter 22 Machining Round Shapes..... March 1
 Chapter 23 Machining Various Shapes March 3
 Chapter 24 Machining and Turning Centers..... March 15

Machining DEMO March 17

Test 2 (20%) March 22

Joining

Chapter 27 Fusion Welding March 24
 Chapter 28 Solid State Welding..... March 29
 Friction Stir Welding DEMO March 31
 Chapter 30 Brazing, Soldering, Mechanical Fastening. April 5

Surface Technology

Chapter 31 Surfaces April 7
 Chapter 32 Tribology April 12
 Chapter 33 Surface Treatment. April 14
 Chapter 34 Microelectronic Devices April 19

Test 3 (20%) April 21

Review April 26

Final Exam: Tuesday, April 28 - 5:30 p.m.

Some Important Course Objectives

1. Students will describe a variety of major manufacturing processes, such as casting, bulk metal working, plastics processing, machining and welding.
2. Students will apply concepts from engineering materials, heat transfer, fluid mechanics and solid mechanics to understand the origin of, and to estimate the value of, the relevant process parameters for major manufacturing processes.
3. Students will identify causes of common manufacturing defects and recommend process changes to reduce defects.

Special Notices:

1) Life-long learning exercise: you will be required to write a brief term paper using resources in the library as references. The paper is only worth 5% of the class grade, but it is required. So, if you don't do it, you will fail.

You must have an approved topic for your paper by 2/10/05. The topic must be *related* to this class *but need not be on a subject directly covered in class*.

The five page paper (1 inch margins, 1.5 line spacing) must have at least 5 references from **Journals** in the library or available electronically: not internet sources or text books. The final paper will be due one week before the final exam date.

2) Most homework (5% of your grade) will be assigned, collected, and graded, but not checked. That is, I will determine whether or not you have made a good faith effort to do the homework (2 points), turned in junk (1 point), or not done it at all (0 points). This is in part, a way of assessing your level of "class participation" and attendance. Answers to the homework will be available so that you can check your own work and know when to get help. There will be two more complex HW assignments that will be graded and will account for 10% of your total grade.

3) Several demonstrations will be given during the course of the semester. Discussions during demonstrations are equivalent to classroom lecture and are fair game for test questions.

4) Do not bring a "live" cell phone into class. If your phone rings during lecture, you will be assessed a 1% penalty on your grade.

5) If you are taking notes using a laptop, please sit in the back of the class so that other students are not distracted by your screen content.