

Course No: MEEM 2500
Course Name: Integrated Design and Manufacturing
Credits: 4 semester credits, (0 – 3 – 3)
Semester: Fall 2007
Section: R02
Day / Time: Recitation MWF 11:05 - 11:55 (20-403)
 Lab Prep TH 11:05 - 11:55 (20-403)

Instructor: Mark A. Johnson Ph.D.
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Office Hours: M,W, F 10:00 – 11:00
 M,W 1:00 – 2:00

Textbook: Kalpakjian, Serope. & Schmid, Steven R. (2006). Manufacturing Engineering and Technology, 5th edition, Upper Saddle River, New Jersey: Prentice-Hall, Inc, ISBN#0-13-148965-8.

Prerequisites: ENG 1102 and MET2120 (Technology Students) or MY2100

Additional Materials/References: There may be additional reading, homework, etc. distributed via email or on reference in the library. Even though it is not listed on the syllabus, it is your responsibility to make sure that you review the material. This material could be included on exams.

Course Description: Focuses on practical aspects of design and manufacturing. Covers fundamentals of manufacturing issues that influence component design. Incorporates computer-aided manufacturing tools.

Course Objectives: After completing this course, you should be able to:

- Understand the basics of key manufacturing processes used to produce durable goods.
- Define relevant terminology relating to manufacturing.
- Apply the tools you have learned to real-life problems.
- Understand the importance of manufacturing and how it impacts the organization.

Class Sessions:

Instructional Methods

A variety of methods will be used to transfer the knowledge and skills of manufacturing to you as a student. The following methods will be used:

- Lecture
- Class Discussion
- Select DVD's of processes and material production and history
- Reviewing Sample Problems

Skills

You will be using many different skills in this course. There are several prerequisites prior to taking this course, which serve as the foundation for topics covered. It is important to have completed the prerequisites prior to taking this course. You will use the following skills:

- Problem solving skills
- Critical thinking skills
- Analytical skills

Course Evaluation: Grades will be based on the following:

• Quiz	15%	150 pts
• Lab Reports	25%	250 pts
• Exam #1	20%	200 pts
• Exam #2	20%	200 pts
• Exam #3	20%	200 pts
• Total Points	100%	1000 pts

Perfect Attendance and Class participation will earn 50 Bonus Points

Grading Scale:

A	93% and above (Excellent, with 4.0 grade points per credit)
AB	88-92 (Very good, with 3.5 grade points per credit)
B	82-87% (Good, with 3.0 grade points per credit)
BC	76-81% (Above average, with 2.5 points per credit)
C	70-75% (Average, with 2.0 points per credit)
CD	65-69% (Below average, with 1.5 points per credit)
D	60-64% (Inferior, with 1.0 points per credit)
F	59% and below (Failure, with 0.0 points per credit)
I	Incomplete; given only when a student is unable to complete a segment of the course because of circumstances beyond the student's control. It must be made up by the close of the next four quarters in residence or the incomplete grade becomes a failure. A grade of incomplete maybe given only when approved in writing by the department chair. Incomplete grades at graduation are considered (F) grades in computing the final grade

Homework:

No homework assignments will be given in this course, however it is highly recommended that you work all suggested problems in the syllabus. Exams and quizzes are based on knowledge gained working these text problems. If you have any questions, please feel free to contact the instructor for further information or direction.

Hour Examinations:

There will be three exams. The exams will consist of a combination of multiple choice, short answer, and problems. There will be no makeup exams except in extreme, documented circumstances.

Cheating or Plagiarism:

Proper professional and ethical behavior is expected of all students in this class. If cheating is suspected the Dean of Students will be notified and standard MTU policies will be followed.

Student Expectations:

The most important expectation would be to learn about manufacturing process that you could use in your working life. However, to be able to be successful in this course, the following are expectations I have to ensure your completion and a good grade:

- Attend every class (except under extreme circumstances that you should provide documentation to instructor).
- Read the required material prior to attending the course.
- Complete all assignments on time (Absolutely no late submissions accepted)
- Participate in class and group discussions.
- Be prepared for class.
- Present professional reports and presentations.
- Abide by the Academic Integrity policy.
- Use recommended software and word processing for required assignments.
- Interact with class members and be respectful of other's opinions.
- Apply continuous improvement and make recommendations to instructor.

This class is designed for you to participate in the learning experience. You are responsible for being a learner and a teacher of information. You can learn as much from the instructor as you can from exchanges and discussions with other students in the class. Many of the students bring valuable work experience that is relevant to the subjects being discussed.

If you are not in class, it is hard to participate. If you have an extreme situation, which prevents you from attending the course, please document the circumstance and provide the written notice to the instructor. Students that attend every recitation and participate will receive 50 points toward the final grade. **It will be your responsibility to sign the attendance sheet during class.**

Universities excused absences include documented plant trips and other university related business. Please provide **written notice of absence in advance** of missing class. Class participation includes full attendance, being prepared for in-class group work and discussions, and responding to discussion topics.

Notice:

If you have any special needs because of personal circumstances, please feel free to meet with me in the beginning of the semester or as soon as possible. MTU complies with all federal and state laws and regulations regarding discrimination, including the Americans with Disability Act of 1990 (ADA). If you have a disability and need reasonable accommodation for equal access to education or services at MTU, Associate Dean of Students at 487-2212. For other concerns about discrimination, you may contact your advisor, department head, or the Affirmative Action Office at 487-3310.

Time Management

This course is one of several courses you are required to complete for your degree. It is always helpful to have an idea of the time requirements associated with a particular course. It is estimated that outside of class you will need to spend approximately, on average, 2-3 hours per credit hour or 6-9 hours a week to complete the recommended assignments. It is possible in some weeks that it will be more and other weeks it will be less.

Web

All current material will be found on the university WEB CT/Blackboard site

Date Chapter/Required Reading/Suggested Problems**Week 1**

9/05 Course Introduction
Review of course syllabus

9/07 General Introduction:
Required reading: Text pages 1-45

LAB

Week 2

9/10 Chapter 5: Ferrous Metals and Alloys: Production, General Properties, and Applications.
Required reading: Text pages 149-168
Suggested Problems 5.19, 5.34, 5.37, 5.42
American Steel, Built to last DVD (A&E) WEB CT

9/12 Chapter 5: (Continued) Ferrous Metals and Alloys: Production, General Properties, and Applications.

9/14 Chapter 6: Nonferrous Metals and Alloys: Production, General Properties, and Applications.
Required reading: Text pages 169-190
Suggested Problems 6.13, 6.25, 6.38
Metal DVD (A&E) WEB CT

LAB Safety

Week 3

9/17 Chapter 6: (Continued) Nonferrous Metals and Alloys: Production, General Properties, and Applications.

9/19 Chapter 8: Ceramics, Graphite, and Diamond: Structure, General Properties, and Applications.
Required reading: Text pages 219-237
Suggested Homework 8.19, 8.41, 8.46, 8.52

9/21 Problem Set Review and in-class problem presentations

LAB Measurements

Week 4

9/24 Chapter 13: Rolling of Metals
Required reading: Text pages 347-370
Suggested Problem Set: 13.11, 13.31, 13.32

9/26 Chapter 13: (Continued) Rolling of Metals

9/28 Chapter 14: Forging of Metals
Required reading: 371-399
Suggested Problem Set: 14.14, 14.25, 14.26
Forging DVD (SME) WEB CT

LAB Tension Test

Week 5

10/01 Chapter 14: (Continued) Forging of Metals

10/03 Problem Set Review & Exam Review

10/05 Exam #1 (Chapters 5,6,8,13,14)

LAB Compression Test

Week 6

10/08 Exam #1 Returned

10/10 **Chapter 15: Extrusion and Drawing of Metals**
Required reading: Text pages 400-423
Suggested Problem Set: 15.30, 15.38, 15.35, 15.42
Extrusion Processes DVD (SME) (WEB CT)

10/12 **Chapter 15: (Continued) Extrusion and Drawing of Metals**

LAB Extrusion Test

Week 7

10/15 **Chapter 16 Sheet-Metal Forming Processes**
Required reading: Text pages 424-482
Suggested Problem Set: 16.27, 16.44, 16.56, 16.60

10/17 **Chapter 17: Processing of Power Metals, Ceramics, Glass, and Superconductors.**
Required reading: Text pages 483-512
Suggested Problem Set: 17.20, 17.23, 17.31, 17.32, 17.42
Powered Metallurgy DVD (SME) (WEB CT)

10/19 **Chapter 17: (Continued) Processing of Power Metals, Ceramics, Glass, and Superconductors.**

LAB Deep Drawing

Week 8

10/22 **Chapter 21: Fundamentals of Machining**
Required reading: Text pages 607-646
Suggested Problem Set: 21.18,21.40,21.43,21.54
Turning and Lathe Basics DVD (SME) (WEB CT)

10/24 **Chapter 21: (Continued) Fundamentals of Machining**

10/26 **Chapter 22: Cutting-Tool Materials and Cutting Fluids**
Required Reading: Text pages 647-673
Suggested Problem Set : 22.18,22.28,22.33,22.40
Cutting Tool Geometries DVD (SME) with class discussion

LAB Power Metallurgy

Week 9

10/29 **Chapter 22: (Continued) Cutting-Tool Materials and Cutting Fluids**
Cutting Tool Materials DVD (SME) (WEB CT)
Problem Set Review

10/31 **Chapter 23: Machining Process Used to Produce Round Shapes**
Required reading : Text pages 674-722
Suggested Problem Set: 23.14,23.17,23.33,23.43,23.45,23.48

11/02 **Chapter 23: (Continued) Machining Process Used to Produce Round Shapes**

LAB Lathe #1 NC Job

Week 10

11/05 **Chapter 23: (Continued) Machining Process Used to Produce Round Shapes**
Basic Holemaking DVD (SME) (WEB CT)

11/07 Problem Set Review & Exam Review

11/09 Exam #2 Chapters 15, 16, 17, 21, 22, 23

LAB Lathe #2 NC Job

Week 11

11/12 Exam #2 Returned

11/14 **Chapter 24: Machining Processes Used to produce Various Shapes**
Required Reading: Text Pages 723-759
Suggested Problem Set 24.3, 24.16, 24.39, 24.40, 24.43

11/16 **Chapter 24: Machining Processes Used to produce Various Shapes**
Milling and Machining Center Basics DVD (SME) (WEB CT)

LAB Mill #1 NC Job

Week 12

11/26 **Chapter 9: Composite Materials: Structure, General Properties, and Applications.**
Required Reading: Text pages 238-258
Suggested Homework : 9.23, 9.36, 9.41
Composite Materials and Manufacturing DVD (SME) (WEB CT)

11/28 **Chapter 9: (Continued) Composite Materials: Structure, General Properties, and Applications.**

11/30 **Chapter 19: Forming and Shaping Plastics and Composite Materials**
Required reading: Text pages 534-579
Suggested Problem Set: 19.31, 19.32, 19.41, 19.61

LAB Polymers

Week 13

12/03 **Chapter 26: Abrasive Machining and Finishing Operations.**
Required reading: Text pages 790-834
Suggested Problem Set: 26.14, 26.42, 26.50 Basics of Grinding DVD (SME) (WEB CT)

12/05 **Chapter 26: (Continued) Abrasive Machining and Finishing Operations.**

12/07 **Chapter 10: Fundamentals of Metal-Casting**
Required reading 261-284
Suggested Problem Set 10.17, 10.24, 10.31, 10.40, 10.42

LAB Mill #2 NC Job

Week 14

12/10 **Chapter 10: (Continued) Fundamentals of Metal-Casting**
Casting DVD (SME) (WEB CT)

12/12 **Chapter 11: Metal-Casting Processes**
Required reading: Text pages 285-322
Suggested Problem Set 11.13, 11.20, 11.38, 11.41

12/14 Exam #3 Review & Problem Review

LAB Casting

Finals Week December 17 -21

Exam #3 Chapters 7, 10, 11, 19, 24, 26

