ME 355 Introduction to Manufacturing Processes

Winter 2006

Instructors: Professor Vipin Kumar

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Teaching Assistant:

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Laboratory Instructor:

Russ Noe, ILF Manager Office: Engineering Annex 116A Phone: 543-5548 E-mail: <u>rnoe@u.washington.edu</u>

- Lectures: M W F, 9.30- 10.20, MEB 246
- Labs: Monday, 1:30 4:20 pm Wednesday, 1:30 - 4:20 pm Thursday, 9:30 - 12:20 pm
- **Textbook:** John A. Schey, *Introduction to Manufacturing Processes*, McGraw Hill, 3rd Edition (2000).

Course Web Site: To be Announced

- **Course Description:** Introduction to manufacturing processes, including interrelationships between the properties of the material, the manufacturing process and the design of components. Prerequisite: ME 354.
- **Course Objectives:** This course is designed to provide students with an *overview of a number of manufacturing processes*. There will not be a large amount of detail on any specific topic. Instead, the principles behind the processes will be discussed with the intent of providing a working knowledge of a broad range of manufacturing processes. Some hands-on experience will be gained from the machine shop in which the students will build a fan driven by a sterling engine.

Course Format:

Lectures: 3 one-hour lectures a week

Homework: Assigned weekly in class. Solutions will be posted after the due date. **Special "Portfolio" Assignment**

Recent studies suggest that student portfolios may enhance learning for engineering students. I am collaborating with Prof. Jennifer Turns of Technical Communications towards development of a portfolio exercise as a tool to enhance the educational experience in this course. A portfolio may also provide a powerful means to demonstrate your competence and skills to a potential employer.

You will do this assignment in week 10. In week 3 Prof. Turns will explain what the exercise is all about. In week 9 Prof. Turns will introduce you to E-Portfolio, a UW Web tool that is especially designed to make portfolios. More about this later.

Labs: We will start with first two lab sessions devoted to safety issues in the machine shop.

Fan Fabrication Project: You will make a 10 inch fan powered by a Stirling engine. You will work in groups to develop a process plan, fabricate the components and assemble and test the final product. A final presentation will be required at the end of week 9. We estimate that this project will take every individual approximately ten hours of out of class time to finish. So put in time early to avoid crisis at the end.

Special Concerns on Labs:

Safety First! You are responsible for your safety and the safety of the people around you.

You will be divided into teams of 2-4 people, each of which will be responsible for (a) completing a weekly lab exercise, and (b) fabricating various components for the course fan project.

When you miss a lab, it is your responsibility to make the lab up during a different section's time. Be sure to notify Russ Noe, **in advance**, that you will be missing the lab.

Grading :

This course is a heavy course and I hope that everybody will work hard so that the mean of your grades can be set higher relative to other courses at the same level.

Homework: 15%. Portfolio Assignment: 5% Fan Project: 25%.

The fan project grade will primarily be a group grade: (a) If the fan doesn't get done, the best grade possible for the group will be 70%, (b) If the fan gets done, but doesn't work, the best group grade possible will be 80%, and (c) If the fan gets done, and works, the best group grade possible is 100%. Outstanding individual performance will be recognized as extra credit based on recommendation from Russ Noe, Lab Manager.

Midterm Exams 1 and 2: 15% each.

The exams will include questions that will directly test your understanding of homework problems. You may also expect midterm and final exams to have questions based on materials covered in labs and lab demonstrations.

Final Exam: 25%. Cumulative. All exams will be closed book and closed notes.

Email List: Your instructor and the TA will use email to communicate with you. If you don't have an email address, contact CRC, 102 Suzzalo (543-0681).

Disability Accommodation:

Contact Disabled Student Service, 448 Schmitz Hall, 543-8924 (V/TTY) and discuss with your instructor.

Tips for Success:

- Come to class. Stay awake in class. This is not that hard. Ask questions and give an honest attempt to get interested in the subject – even if it is boring. The fact is that there are a lot of things that are boring that build together to make some pretty cool stuff. Don't miss out on the cool stuff because you didn't bother to pay attention to the boring background.
- 2) Think big picture. Try to understand the principles and the details will follow. Don't make things complicated. Even complex things are usually a composite of individually simple items. If you are faced with a seemingly difficult challenge, go back to the principles and try to break it down to its simple components. Divide and conquer.
- 3) Please read the chapters in advance if possible. I know that many classes ask for this, and few people do it. The reason for this is simple. Class time is free, very effective study time. If you have a clue going in, you will get much more out of class. You will most likely need to study less and still get better grades.
- 4) Make an honest attempt at everything. For example: if you are taking a test and have no idea on a problem, break it down to its simple components. Tell me what your engineering gut feel is and how you would go about solving the problem. You will get more points telling me how you would solve the problem than attempting to solve it with randomly recalled equations.

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Week	Date	Topics	Reading	Laboratory
1	1/4 1/6	Introduction Engineering Metrology	Ch. 1, 2 Ch. 3	No Labs this week
2	1/9 1/11 1/13	Properties of Materials Materials in Design and Manufacturing Friction & Wear	Ch. 4, 8 Ch. 5 Handout	Safety
3	1/16 1/18 1/20	Holiday: Martin Luther King Day Friction & Wear Machining	Handout Ch. 16	Intro to lathes and milling machines
4	1/23 1/25 1/27	Machining Review Midterm Exam 1	Ch. 16	Fan Project
5	1/30 2/1 2/3	Bulk Metal Forming Friction in forming Forging/Rolling/Extrusion/Drawing	Ch 8, 9 Ch 8, 9 Ch 8, 9	Fan Project
6	2/6 2/8 2/10	Metal Casting Metal Casting Processing of Plastics	Ch. 6, 7 Ch. 6, 7 Ch. 13, 14	Fan Project
7	2/13 2/15 2/17	Processing of Plastics Review Midterm Exam 2	Ch.13,14	Fan Project
8	2/20 2/22 2/24	Holiday: President's Day Joining Processes Joining Processes	Ch. 18 Ch. 18	Fan Project
9	2/27 3/1 3/3	UW Manuf. Reaserch: TBA UW Manuf. Reaserch: TBA Fan Project Demonstrations		Microcellular Plastics Lab Tour (MEB129)
10	3/6 3/8 3/10	Non-traditional Mcchninig Processes Integration of Design and Manufacturing [Portfolio Assignment Due] Course Review	Ch 17	Welding and Brazing Demo
11	3/15	Final Exam 8:30am – 10:20am, MEB 246		

ME 355 Winter 2006 Kumar Tentative Course Schedule

Managing your time:

This is four credit course, with a budget of 12 to16 hours a week. Of this you will spend six hours in lectures and labs. Of the remaining time, we suggest you budget about 1-2 hr a week in support of the fan project, about 3 hours a week on homework, and the rest on reading your textbook.

There is a lot of information in the text. You are not expected to memorize the details. Browse the chapters to get an overview and then go back and read about the points covered in the lectures and in the handouts.