

Course Overview

ME355 Introduction to Manufacturing Processes

Professor Junlan Wang

Winter 2015

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

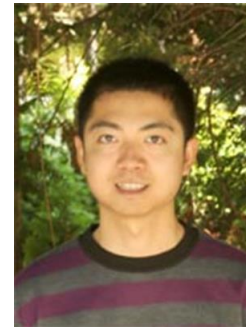
- This course is designed to provide students with *an overview of a wide variety of manufacturing processes*.
- The fundamental principles behind the processes will be discussed with the intent of providing a working knowledge of a broad range of manufacturing processes.
- Lab section has been designed to provide valuable hands-on experience in machining as well as working in teams.
- Students will fabricate a fan driven by a stirling engine.

Instructor

- Professor Junlan Wang
- Email: junlan@u.washington.edu
- Phone: 206-543-4601
- Office: MEB 208
- Office Hours: M W F 11:00-12:00 pm (or by appointment)

Teaching Assistants

- Kevin Kadooka
 - Email: kkado@u.washington.edu
 - Office hours: T & Th 4:00-5:30 pm
 - MEB 236 (TA conference room)
- Zhou (Joe) Yang
 - Email: yangz3@u.washington.edu
 - Office hours: W F 5:00-6:30pm
 - MEB 236 (TA conference room)



Laboratory Instructor

- Eamon McQuaide
 - Office: Engineering Annex 116A
 - Phone: 206-543-5548
 - Email: eamonm@uw.edu

Schedule

- **Lectures:** MWF 1:30pm-2:20 pm, MEB 238
- **Labs:** All labs in Engineering Annex 116
 - AA: Tuesday, 1:30-4:20 pm
 - AB: Wednesday, 2:30-5:20 pm
 - AC: Thursday, 9:30 am-12:20 pm
 - AD: Friday, 2:30-5:20 pm

Textbook

Serope Kalpakjian and Steven R. Schmid,
Manufacturing Processes for Engineering
Materials, Pearson Prentice Hall, 5th Edition
(2008).

Yes, it is required.

Course Web Site

- [http://courses.washington.edu/me355b.](http://courses.washington.edu/me355b)
 - Syllabus
 - Lecture notes
 - Assignments and solutions
 - Exam schedule and solutions
 - Lab hours and documents
 - Password for PDF files: **UWME355A**

Class Distribution List

- Whole class: me355a_wi15@uw.edu
 - AA: me355aa_wi15@uw.edu
 - AB: me355ab_wi15@uw.edu
 - AC: me355ac_wi15@uw.edu
 - AD: me355ad_wi15@uw.edu

Emails to these lists require approval from Prof. Wang

Your personal email will be used for instructor and TA to communicate with you, check at least once a day.

Course Format

- Lectures - three 50-minute lectures/week
- Homework
 - Assigned weekly (usually on Fridays)
 - Due at 1pm (following Fridays) in MEB front office hw box
 - Graded on 20 pts scale
 - 10 pts for completing all assigned problems
 - 10 pts for correct solution of the graded problem
 - Suggested Format
 - Briefly state the problem
 - If applicable, use Given/Find/Sol. or Given/Prove/Proof
 - Write on one side of the paper only
 - Partial solutions to be posted after the due date
 - Get questions clarified during TA office hours

Course Format (cont.)

- Labs
 - Will be solely handled by Lab Instructor
 - First lab this week on safety issues in machine shop
- Fan Project
 - You will make a 10 inch fan powered by a Stirling engine.

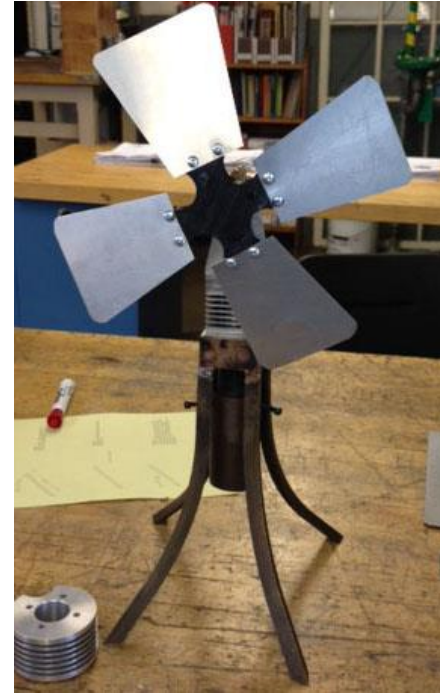
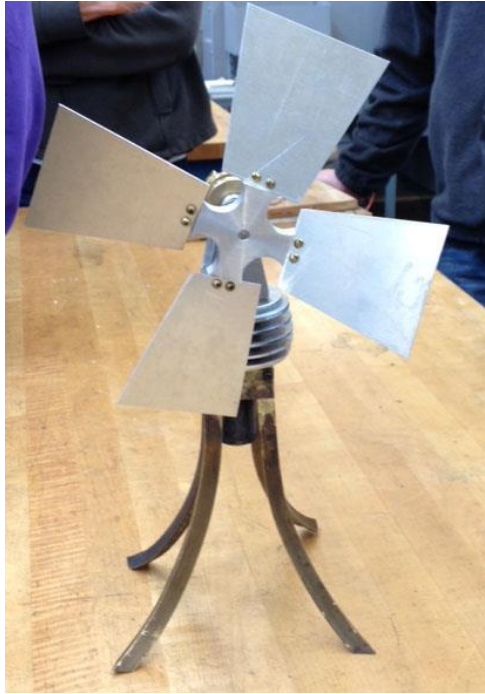


Fan Fabrication Project



- Each section makes a 10 inch fan powered by a Stirling engine.
- Students work in groups to develop a process plan, fabricate the components, and assemble and test the final product.
- A final presentation will be required in the 9th week.
- It is estimated 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.

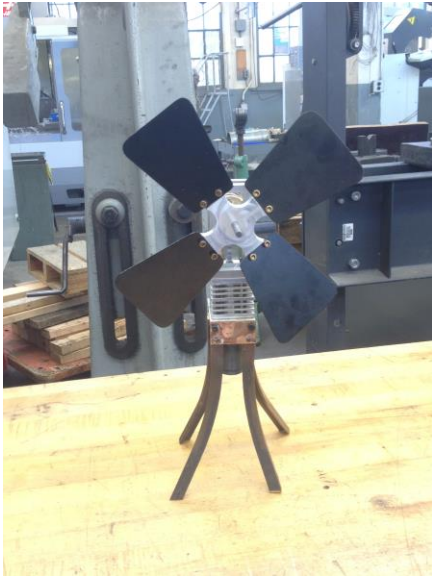
Fans from Spring 2012



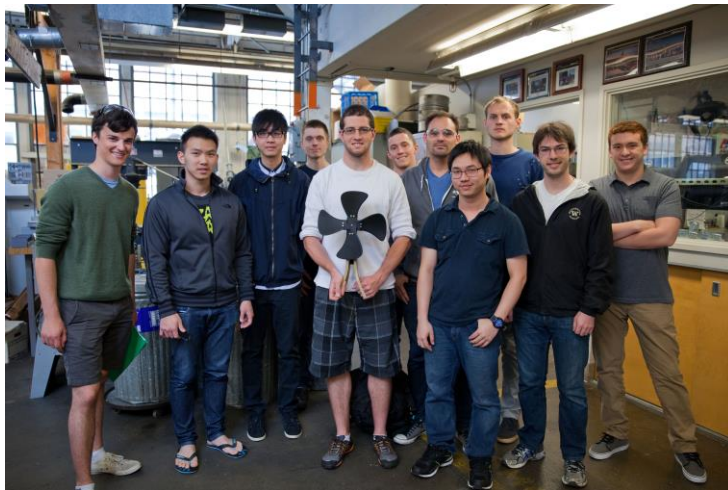
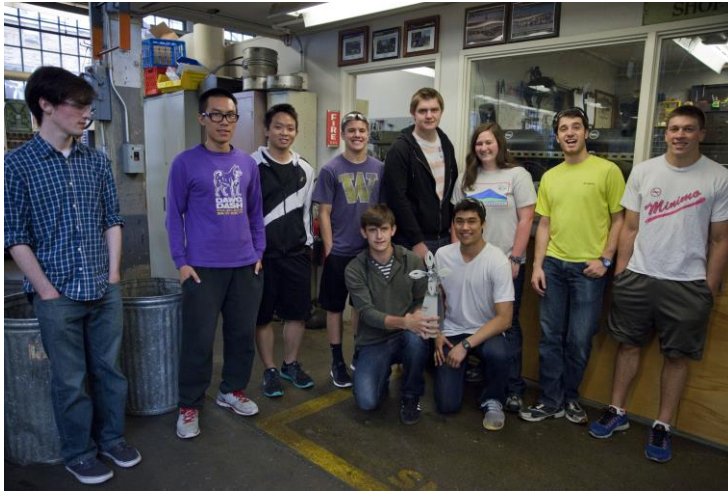
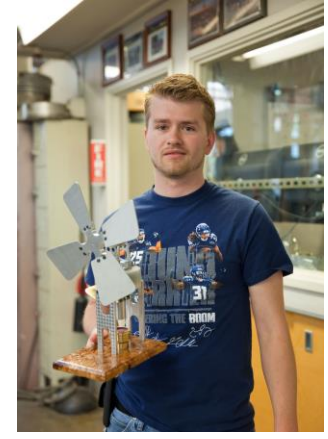
Fans from Spring 2013



Fans from Winter 2014



Fans from Spring 2014



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
 - Completing a weekly lab exercise,
 - Turn in a weekly progress report at end of each lab, and
 - Fabricating various components for the course fan project.
- What if you have to miss a lab?
 - Make the lab up during a different section's time.
 - Be sure to notify lab instructors (and your partner), **in advance**, that you will be missing the lab.

Grading

- Fan Project: 25%
 - Weekly attendance/progress, process plan, quality of fabricated components
- Homework: 15%
- Exams: 20% each (×3)
 - Closed book, closed notes, one page cheat sheet
- Final: no final exam
- Bonus: up to 5%
 - Pop quiz
 - Survey
 - Classroom participation

Disability Accommodation

- Contact Disabled Student Service, 448 Schmitz Hall, 543-8924 (V/TTY)
- Discuss with instructor in advance

Tips for Success

- Come to class
 - You will get a lot more out of the class than just studying the lecture notes.
 - Class setting and atmosphere enhance learning, understanding and memory.
- Think big picture
 - Don't get lost in details.
- Review previous lecture and read the chapters in advance if possible
 - If you have a clue going in, you will get much more out of class.
 - You will more likely need to study less and still get better grades.

Course Contents

- Introduction (1 lecture)
- Fundamental properties of materials
 - Mechanical behavior (1 lecture)
 - Structure and manufacturing properties (2 lectures)
 - Surface property and tribology (2 lectures)
- Manufacturing processes
 - Metal casting (3 lectures)
 - Bulk deformation (2 lectures)
 - Machining (3 lectures)
 - Joining (2 lectures)
 - Non-traditional machining (1 lecture)
 - Polymer, plastics and composites (3 lectures)
- Current manufacturing research (1 guest lecture)
- 3 mid-term exams and 3 review lectures

Tentative Schedule

Week	Date	Topics	Reading	Laboratory
1	1/5	Course Overview		
	1/7	Introduction to Manufacturing Processes	Ch. 1	Lab Safety
	1/9	Fundamentals of Mechanical Behavior	Ch. 2	
2	1/12	Structure and Manufacturing Properties of Metals	Ch. 3	Intro to lathes and milling machines
	1/14	Structure and Manufacturing Properties of Metals	Ch. 3	
	1/16	Surface Properties	Ch. 4	
3	1/19	Holiday – Martin Luther King Day		Intro to Fan Project Team Assignment Process Plan
	1/21	Tribology: Friction, Wear and Lubrication	Ch. 4	
	1/23	Metal Casting	Ch. 5	
4	1/26	Metal Casting and Midterm 1 Review	Ch. 5	Waterjet Demo Fan Project
	1/28	Mid-term Exam 1		
	1/30	Bulk Deformation	Ch. 6	
5	2/2	Bulk Deformation	Ch. 6	3-axes Mill Demo Fan Project
	2/4	Machining	Ch. 8	
	2/6	Machining	Ch. 8	
6	2/9	Machining	Ch. 8	Welding/Brazing Demo Fan Project
	2/11	Properties of Polymers and Plastics	Ch. 10	
	2/13	Processing of Polymers and Plastics	Ch. 10	
7	2/16	Holiday - President's Day		Fan Project
	2/18	Review		
	2/20	Mid-term Exam 2		
8	2/23	Polymer-Matrix-Reinforced Plastics	Ch. 10	Fan Project
	2/25	Joining	Ch. 12	
	2/27	Joining	Ch. 12	
9	3/2	Non-traditional Machining Processes		Fan Project Demo
	3/4	Boeing Manuf. Technologies: Sanders: Ti alloys	Ch. 9	
	3/6	Fan Project Demonstration		
10	3/19	Catch up		
	3/11	Course Review		
	3/13	Mid-term exam 3		
11	3/16	No traditional final exam is scheduled		

Any questions?

Precourse Survey

- Clearly print your name
- Briefly answer
 - Do you have any prior manufacturing and/or machine shop experience? (No, Yes)
 - If yes, briefly describe your experience
 - Home project ...
 - School project/student clubs ...
 - Job ...
 - Casting, welding, machining