ME 363
Principles and Practice of Manufacturing Processes
Spring 2023
Purdue University, West Lafayette IN, USA

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Here are ways to get information about changes in this course.

Instructors: Prof. Yung C. Shin, MEG082 email: shin@purdue.edu
Lectures: 10:30am-11:20am in ME 3006 on Tuesdays and Thursdays
Office hours: 11:00am-noon on Mondays and Wednesdays
https://purdue.webex.com/meet/shin

Prof. Benxin Wu, MEG091 email: wu65@purdue.edu
Lectures: 1:30pm-2:20pm in ME3006 on Tuesdays and Thursdays
Office hours: 2:30pm-3:20pm on Tuesdays and Thursdays
https://purdue-edu.zoom.us/j/99566787005
Meeting ID: 995 6678 7005

Course Website: 1. Brightspace (one for the **lecture** and the other one for the **lab**)
2. https://engineering.purdue.edu/ME363/

Teaching Assistants and their office hours:

- Vaidyanath Harinarayana, vharinar@purdue.edu
  Office hour: 12:00-1:45 PM on Mondays, https://vharinar.my.webex.com/meet/vharinar
- Mengchen Wu, wu1695@purdue.edu
  Office hour: 2:30-4:30pm on Mondays, https://purdue-edu.zoom.us/j/4885515652
  Zoom ID: 488 551 5652

Technical Services Managers:
Potter 333 Instruction Support Engineer: Kyle Baer, ckbaer@purdue.edu
Student Maker Spaces Senior Manager: Darrin Wilcoxson

Student Machine Shop Supervisor:
John Wheeler, Student Shop, 4-5851

Required Text: Manufacturing Engineering and Technology, by Serope Kalpakjian and Steven Schmid, Prentice Hall, 6th edition, 2009.

Suggested References:

1. Materials and Processes in Manufacturing, by E. P. DeGarmo, J.T. Black and R.A. Kohser, 9th edition, John Wiley & Sons, Inc., 2003.
2. Fundamentals of Modern Manufacturing, by M.P. Groover, 3rd edition, John Wiley & Sons, Inc., 2007.
3. Manufacturing Processes and Equipment, by George Tlusty, Prentice Hall, 2000.
4. Other course handouts.

Grading Policy

Exam #1	25%
Exam #2	25%
Laboratory	35%
Projects and Homework	15%
Total	100%

Safety Policy

Students need to understand that safety is of the primary concern in the laboratory. All students must follow all the safety policies and guidance given to them by the instructor, the TA and the technical staff in the lab, which include (but may not be limited to):

Students must wear safety glasses with side shields at all times in all the lab areas where safety glasses are required. Students must wear shoes or boots (preferably with a steel toe), which are not open-toed. Students, if have long hair, must tie it back. Students are not permitted to wear loose clothing, and are required to remove all jewelry (or any other things that can be easily caught by a machine) in the lab. No food, drink or horseplay in the lab. Students must follow the safety operation procedures for all the machines, equipment, devices, etc., they use in the lab. If a student finds equipment damage (or any other similar problem) in the lab, the student needs to immediately report this to the TA.

If a student fails to adhere to any relevant safety procedure or policy in this class, the student will not be allowed to participate in the lab, and will get a grade of zero for the lab. In this document, "the laboratory" or "the lab" means any laboratory or lab involved in this class.

Lab Attendance and Lab Report Policy

Lab attendance is required:

- If a student has to miss a lab due to acceptable reasons under the university policies (https://www.purdue.edu/advocacy/students/absences.html), then the student is required to (1) notify the lab session TA **in advance (well before the missed lab) as early as possible** (if this is feasible) to schedule a make-up lab, and (2) following the TA's instruction, attend the make-up lab (or attend an alternative lab session) and submit the lab report by the new due date (typically one week after the lab unless instructed otherwise). The available times for the make-up lab depend on the schedule of the TA, the related ME lab facility and the schedule of the lab staff

(when relevant). The TA and the class instructor have the final right to determine the make-up lab time. **A student needs to complete all labs & submit all lab reports to pass this class.**

- **If a student's lab missing is NOT due to acceptable reasons under the university policies, then NO make-up lab opportunity will be given to the student**.

Some labs may need to be performed in groups, while some individually. A formal individual report will typically be required for every lab. Students need to turn in the lab report by the due date. A lab report submitted late will lose 1/3 of the full points for every day it is late. Students need to complete all labs and submit all reports (which need to follow the report requirement) in order to pass this class (even if the reports are over 3 days late).

Regrading Policy

A student who wants to request regrading for a lab report or homework must submit the request with written reasons. For homework regrading, the request (hardcopy) has to be submitted at the beginning of the next lecture after the returning of the graded homework. For lab report regrading, the request (hardcopy) has to be submitted by the beginning of the next lab after the returning of the graded lab report. Regrading could lead to a higher, lower or the same grade.

Academic Honesty

Academic integrity is one of the highest values that Purdue University holds. Individuals are encouraged to alert university officials to potential breaches of this value by either emailing integrity@purdue.edu or by calling 765-494-8778. While information may be submitted anonymously, the more information is submitted the greater the opportunity for the university to investigate the concern. More details are available on our course Brightspace table of contents, under University Policies.

Please note and read the policy about academic honesty on the following Purdue webpages:
https://www.purdue.edu/odos/osrr/resources/documents/responding_to_academic_dishonesty.html
https://www.purdue.edu/odos/osrr/academic-integrity/

Other Policies

- **No make-up exams will be given**. If a student cannot attend an exam due to reasons out of the student's control, the student needs to contact the instructor in advance as early as possible. In particular, if a student cannot attend an exam in person due to COVID quarantine, the student needs to contact the instructor in advance to schedule the exam via Zoom (the exam will have the same problems and take place at the same time as the regular exam).
- Homework problems will typically be given to students during the lecture (the electronic copy will also be posted in Brightspace on that day). A homework is typically due on a lecture day one week after its announcement, and needs to be submitted at the beginning of the lecture (hardcopy only, and electronic copy will NOT be accepted). **You are required to write your lab session TA's name clearly on the first page of your homework submission.**
- Lecture attendance is required. A student will not lose any point if 2 (or less) lecture classes are missed. However, starting from the 3rd missed lecture, the student will lose 1% of the class total grade for every lecture missed, unless the missing of the lecture is due to acceptable reasons under

the university policies (see https://www.purdue.edu/advocacy/students/absences.html), in which case the students need to notify the instructor in advance.

- If a homework is submitted late, its grade will be reduced by 1/3 per day late, unless under very special or extreme conditions (which are up to the instructor's discretion). If a late submitted homework is lost for any reason, the student will be fully responsible for any consequence.
- Homework, project, lab and exam grades will be posted in Brightspace, and students should regularly check the grades to make sure they are correct, and have to report any problem found within 1 week of the grade posting date, and also before the date of the final exam (students will be fully responsible for problems not reported in time).
- Students are permitted to discuss with each other on homework questions. However, the submitted homeworks have to be each student's own work, without anything copied from other students or from any other source. Students are not permitted to collaborate in any way during any exam.
- Students are fully responsible to ensure that they have done the right homework questions, which are the same as those assigned.
- Announcements about the class information may be made during the class lecture time, the lab session, through emails, and/or in Brightspace during the semester. Students should pay attention to these announcements, and will be fully responsible for any consequence due to the missing of any announced information.
- All the documents and materials given to the students in any way (electronically or through hard copies or any other approach) during this class are only for the teaching and learning purpose within this class. The students are not permitted to use any part of the documents or materials for any other purpose. The students are not permitted to distribute or reproduce any part of the documents or materials in any way.
- **The instructors reserve the full right to make supplements and other changes to the class syllabus, policies, and contents, etc., for both the lecture and the lab sessions in the semester.**

Organization chart of the class

	How to pick up?	**How to submit?**
Lecture notes	Lecture notes will be posted in Brightspace (lecture session) in advance. Students need to print (if they want) and bring notes to the lecture themselves.	NA
Homework	Homework problems (hardcopy) will be distributed during the lecture, and an electronic copy will be posted in Brightspace (lecture session) on the same day.	Submit a **legible hardcopy** of your completed homework at the beginning of the lecture on the due day. An electronic copy will NOT be accepted unless the student has to miss the lecture due to acceptable reasons under the university policies.
Lab	The lab instruction manual for each lab will be posted in Brightspace (lecture session)	NA

instruction	and the course website in advance. Students need to print it and bring to the lab themselves.	
Lab report	NA	Submit the hardcopy lab report at the beginning of the following lab or by a specified due date (if different).

Real-time Feedback:

The instructor and TAs will make their best efforts to improve the teaching during the semester. **Students are welcome and encouraged to provide their anonymous feedbacks and suggestions about the class via the following online-spreadsheet at any time during the semester**:

https://docs.google.com/spreadsheets/d/1QnlH3RttMncaQgP0nptI6hzkItvFWUwGdeEJ_fx2GCQ/edit?usp=sharing

(Do NOT distribute the link to anyone outside this lecture session. Do NOT use the above spreadsheet for any purpose beyond its intended one)

Emergency Statement:

In the event of a major campus emergency, course requirements, deadlines and grading percentages are subject to changes that may be necessitated by a revised semester calendar or other circumstances beyond the instructor's control. Relevant changes to this course will be posted in Brightspace or can be obtained by contacting the instructors or TAs via email or phone.

Lecture sequence and reading assignment

Periods	*Material*	*Reading*
1-5	Introduction, materials, metrology	
	- introduction	Introduction
	- metrology	Ch. 35
	- quality and process capability	Ch. 36
	- properties of materials	Ch. 2
6-8	Mechanics of cutting	Ch. 21
	- chip formation	
	- forces, stresses and power	
9-10	Cutting tools	Ch. 22, 25.8
	- machinability, tool life and wear	
	- economics of machining	
	- geometry and materials	
10-11	Machining processes	Ch. 23,24,25,26
	- turning, boring	
	- milling and grinding	
	- high speed machining	
12-14	CNC machining	Ch. 37
15	Exam #1	
16-19	Advanced manufacturing processes	Ch. 25.7,26.6,27
	- nontraditional machining processes	
	- new and advanced manufacturing processes	
	- laser-based processes	
20-22	Micro/nano processes	Handouts
	- microfabrication	
	- soft lithography	Ch. 28,29
23-26	Forming Processes	
	- forging	Ch. 14
	- rolling	Ch. 13
	- extrusion and drawing	Ch. 15
	- sheet metal forming	Ch. 16
	- rapid prototyping and additive manufacturing	Ch. 20

27-28	- powder metallurgy of metals and ceramics	Ch. 17
29-30	- fabrication of plastics, and composites	Ch. 19
	- ceramics	Ch. 18

Laboratory Schedule and Grading

Section 1 (Vaidyanath Harinarayana): Tuesday 11:30am-2:20pm
Section 2 (Vaidyanath Harinarayana): Tuesday 2:30-5:20pm
Section 3 (Mengchen Wu): Wednesday 8:30-11:20am
Section 4 (Mengchen Wu): Wednesday 2:30-5:20pm

Week (Week of)		***Topic***	***Room***	***Points***
1	Jan. 9	Orientation	Potter333 and student machine shop	
2	Jan. 16	Metrology	Potter333	50
3	Jan. 23	Metrology	Potter333	50
4	Jan. 30	Machining I	student shop	50
5	Feb. 6	Machining II	student shop	50
6	Feb. 13	Machining III	student shop	50
7	Feb. 20	CNC machining	Potter333	50
8	Feb. 27	CNC machining	Potter333	50
9	Mar. 6	CNC machining	Potter333	50
10	Mar. 13	No lab. (Spring break)		
11	Mar. 20	Micro fabrication	Potter333	
12	Mar. 27	Micro fabrication	Potter333	100
13	Apr. 4	3D printing and Forming Tutorial	Potter333	
14	Apr. 10	Forming Simulation	Potter333/Computer Lab	100
15	Apr. 17	3D printing/Assembly	Potter333	100
16	Apr. 24	Final Lab report	Potter333	

Additional Information or Statements

Protect Purdue: https://protect.purdue.edu/
Any student who has substantial reason to believe that another person is threatening the safety of others by not complying with Protect Purdue protocols is encouraged to report the behavior to and discuss the next steps with their instructor. Students also have the option of reporting the behavior to the Office of the Student Rights and Responsibilities. See also Purdue University Bill of Student Rights and the Violent Behavior Policy under University Resources in Brightspace.

Purdue's Honor Pledge: "As a Boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

Purdue's Nondiscrimination Policy Statement: A hyperlink to Purdue's full Nondiscrimination Policy Statement is included in our course Brightspace under University Policies.

Accessibility: Purdue University is committed to making learning experiences accessible. If you anticipate or experience physical or academic barriers based on disability, you are welcome to let me know so that we can discuss options. You are also encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247.

Mental Health/Wellness Statement:

If you find yourself beginning to feel some stress, anxiety and/or feeling slightly overwhelmed, try WellTrack**.** Sign in and find information and tools at your fingertips, available to you at any time.

If you need support and information about options and resources, please contact or see the Office of the Dean of Students. Call 765-494-1747. Hours of operation are M-F, 8 am- 5 pm.

If you find yourself struggling to find a healthy balance between academics, social life, stress, etc., sign up for free one-on-one virtual or in-person sessions with a Purdue Wellness Coach at RecWell. Student coaches can help you navigate through barriers and challenges toward your goals throughout the semester. Sign up is completely free and can be done on BoilerConnect. If you have any questions, please contact Purdue Wellness at evans240@purdue.edu.

If you're struggling and need mental health services: Purdue University is committed to advancing the mental health and well-being of its students. If you or someone you know is feeling overwhelmed, depressed, and/or in need of mental health support, services are available. For help, such individuals should contact Counseling and Psychological Services (CAPS) at 765-494-6995 during and after hours, on weekends and holidays, or by going to the CAPS office on the second floor of the Purdue University Student Health Center (PUSH) during business hours.

CAPS also offers resources specific to COVID-19 on its website. Topics range from "Adjusting to the New Normal" to "How to Talk with Professors about Personal Matters."

Basic Needs Security:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. There is no appointment needed and Student Support Services is available to serve students 8 a.m.-5 p.m. Monday through Friday. Considering the significant disruptions caused by the current global crisis as it relates to COVID-19, students may submit requests for emergency assistance from the Critical Need Fund

Academic Guidance in Event of Quarantine/Isolation:

If you must miss class at any point in time during the semester, please reach out to me via Purdue email so that we can communicate about how you can maintain your academic progress. If you find yourself too sick to progress in the course, notify your adviser and notify me via email. We will make arrangements based on your particular situation. Please note that, according to Details for Students on Normal Operations for Fall 2021 announced on the Protect Purdue website, "individuals who test positive for COVID-19 are not guaranteed remote access to all course activities, materials, and assignments."