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

Instructors: Prof. Yung C. Shin, Potter 222 email: shin@purdue.edu
Lectures: 9:30am-10:20am in WALC 3138 on Tuesdays and Thursdays
Office hours: 11:00am-noon on Mondays and Wednesdays
https://purdue.webex.com/meet/shin

Prof. Benxin Wu, 2550 Northwestern Ave, Room 1900G email: wu65@purdue.edu
Lectures: 1:30pm-2:20pm in WALC 3138 on Tuesdays and Thursdays
Office hours: 4pm-4:50pm on Tuesdays and Thursdays via Zoom
Join Zoom Meeting
https://purdue-edu.zoom.us/j/92406632094
Meeting ID: 924 0663 2094

Course Website: 1. Brightspace (one for the **lecture** and the other one for the **lab**)
(Begin with the Start Here tab, which offers further insight to the course and how you can be successful in it. It is strongly suggested that you explore and become familiar not only with the site navigation, but also with content and resources available for this course. See the Student Services widget on the campus homepage for resources such as Technology Help, Academic Help, Campus Resources, and Protect Purdue).
2. https://engineering.purdue.edu/ME363/

Course Description:
Credit Hours: 3.00. Manufacturing processes for engineering materials, both metallic and non-metallic. Fundamentals of manufacturing processes with a "hands-on" laboratory sequence. Analysis and design of processes for various engineering materials and their link to engineering design. Hands-on experiences through laboratory experiments and demonstrations. Not open to students with credit in IE 37000.

Learning Outcomes:
Gain understanding on various manufacturing processes and hands-on experiences.

Teaching Assistants and their office hours:
- Vaidyanath Harinarayana, vharinar@purdue.edu
  Office hour: Mondays from 12.00-1.45 PM, https://vharinar.my.webex.com/meet/vharinar
- Albin John, john41@purdue.edu
  Office hour: Mondays from 3:00-4:30pm, Wang 4070

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 (8:00-10:00pm, Oct. 17)	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.

Incidents of academic misconduct in this course will be addressed by the course instructor and referred to the Office of Student Rights and Responsibilities (OSRR) for review at the university level. Any violation of course policies as it relates to academic integrity will result minimally in a failing or zero grade for that particular assignment, and at the instructor's discretion may result in a failing grade for the course. In addition, all incidents of academic misconduct will be forwarded to OSRR, where university penalties, including removal from the university, may be considered.

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/
https://www.purdue.edu/policies/academic-research-affairs/ia3.html

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 a medical quarantine but is still in a condition good enough to take the exam, 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 posted on the course webpage and Brightspace on a lecture day and announced during the lecture. The 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 will be posted in Brightspace (lecture session) and the course webpage, and announced on a lecture 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 instruction	The lab instruction manual for each lab will be posted in Brightspace (lecture session) and the course website in advance. Students need to print it and bring to the lab themselves.	NA
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 (Albin John): Tuesday 11:30-2:20pm
Section 2 (Vaidyanath Harinarayana): Wednesday 8:30-11:20pm
Section 3 (Vaidyanath Harinarayana): Wednesday 2:30-5:20pm
Section 4 (Albin John): Thursday 11:30-2:20pm

Week (Week of)		***Topic***	***Room***	***Points***
1	Aug. 21	Orientation	Potter333 and student machine shop	
2	Aug. 28	Metrology	Potter333	50
3	Sept. 4	Metrology	Potter333	50
4	Sept. 11	Machining I	student shop	50
5	Sept. 18	Machining II	student shop	50
6	Sept. 25	Machining III	student shop	50
7	Oct. 2	CNC machining	Potter333	50
8	Oct. 9	No lab. (October break)		
9	Oct. 16	CNC machining	Potter333	50
10	Oct. 23	CNC machining	Potter333	50
11	Oct. 30	Micro fabrication and FormingTutorial	Potter333	
12	Nov. 6	Micro fabrication	Potter333	100
13	Nov. 13	3D printing and Forming Project	Potter333	
14	Nov. 20	No lab. (Thanksgiving week)		
15	Nov. 27	3D printing	Potter333	100
16	Dec. 4	Final Lab report	Potter333	

Additional Information or Statements

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

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

Mental Health/Wellness:

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 a.m.- 5 p.m.

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 free and can be done on BoilerConnect.

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.

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.

Emergency Preparation:

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 onto the course website or can be obtained by contacting the instructors or TAs via email or phone. You are expected to read your @purdue.edu email on a frequent basis.

A link to Purdue's Information on Emergency Preparation and Planning is located on our Brightspace under "University Policies and Statements." This website covers topics such as Severe Weather Guidance, Emergency Plans, and a place to sign up for the Emergency Warning Notification System. I encourage you to download and review the *Emergency Preparedness for Classrooms document (*PDF*) or (*Word*).*

The first day of class, I will review the **Emergency Preparedness plan for our specific classroom**, following Purdue's required Emergency Preparedness Briefing. Please make note of items like:

- The location to where we will proceed after evacuating the building if we hear a fire alarm.
- The location of our Shelter in Place in the event of a tornado warning.
- The location of our Shelter in Place in the event of an active threat such as a shooting.

Attendance Policy

This course follows the University Academic Regulations regarding class attendance, which state that students are expected to be present for every meeting of the classes in which they are enrolled. Attendance will be taken at the beginning of each class and lateness will be noted. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification to is not possible, contact me as soon as possible by email or phone. For absences that do not fall under excused absence regulations (see below), this course follows the following procedures:

1. Do not come to class if you are feeling very ill, but DO email instructors and TAs, with the subject line: ME363 absence. We do not need details about your symptoms. Just let us know you are feeling ill and cannot come to class. If it is an emergency situation, please follow the University regulations on emergent medical care (see below).
2. Unless it falls under the University excused absence regulations (see below), any work due should be submitted on time.
3. If that day's class involves assessed work such as a test or presentation, you and I will plan if and how you can make up the work, following the assignment guidelines. This plan must be done before the next class period, so again, email me immediately when you know that you will miss class.
4. The most important consideration in any absence is how it will affect your achievement of the assignment objectives and the course learning outcomes.

   For cases that fall under **excused absence regulations**, you or your representative should contact or go to the Office of the Dean of Students (ODOS) website to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so plan ahead.

Copyright:

See the University Policies and Statements section of Brightspace for guidance on Use of Copyrighted Materials. Effective learning environments provide opportunities for students to reflect, explore new ideas, post opinions openly, and have the freedom to change those opinions over time. Students and instructors are the authors of the works they create in the learning environment. As authors, they own the copyright in their works subject only to the university's right to use those works for educational purposes. Students may not copy, reproduce, or post to any other outlet (e.g., YouTube, Facebook, or other open media sources or websites) any work in which they are not the sole or joint author or have not obtained the permission of the author(s).