

ISE 515 - 651

Manufacturing Process Engineering

Summer 2025

Instructor: Professor Yuan-Shin Lee, Ph.D., P.E.

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Course web site: <http://wolfware.ncsu.edu>

EOL web site:

[ISE 515 Manufacturing Process Engineering - Engineering Online \(ncsu.edu\)](http://www.ncsu.edu/ise515)

Office Hours:

Section 651: For distance education students, Email questions at any time to me, and I will answer as soon as possible. (When I am in traveling for meetings, I might be slow in responding E-mails though). For DE students, I will have on-line real-time office hours via university Google Meet at: **Wednesday, 1:00-2:00PM.**

Dr. Lee's Office Hour GoogleMeet link: (Wednesday, 1:00-2:00PM):

<https://meet.google.com/rdi-okek-pzy?authuser=0&hs=122&ijlm=1746025236094>

by Phone: (US) +1 413-752-1213

Passcode: 454 712 778#

Prerequisites: Graduate Standing.

Text Book: Fundamentals of Modern Manufacturing – Materials, Processes and Systems, Mikell P. Groover, the 7th. Edition (or later version), ISBN 978-1-119-47521-7, John Wiley & Son, 2019 (earlier 5th or 6th editions might also acceptable, but chapter numbers might be different)

* All lecture notes available through the ISE515 class Moodle site.

Course Overview:

This is a graduate introductory level engineering course intended to introduce students to manufacturing process engineering. The course reviews basic properties of materials and then exposes students to both traditional and non-traditional methods of fabricating products. No prior knowledge of manufacturing processes is assumed. The course

includes lectures, two midterm exams, a final exam, and approximately 5-6 homework assignments.

Course Objectives:

Upon completion of this course, students should be capable of:

- Understanding the composition of materials
- Measuring material properties
- Understand the basic concepts of modern manufacturing processes
- Understand Quality Control concepts related to manufacturing processes
- Understand the limitations of different manufacturing processes

COURSE ORGANIZATION:

This course consists of the following:

1. Lectures
2. Homework assignments* & In-class quizzes* - homework or in-class quizzes* will be given from time to time. (*: The exact number of homeworks, in-class quizzes will be determined throughout the course of the semester.)
3. Midterm Tests - Two midterm tests will be given in the class.
4. Comprehensive Final Exam will be given according to the University schedule.

GRADING:

Homeworks	15%
In-class Quizzes	5%
Midterm Tests (2)	50% (25% each)
Final Exam	30%
<hr/> Total	<hr/> 100%

The plus/minus grading system will be used in this class. The course letter-grade is determined by the plus/minus grading system will be used in this class. The course letter-grade is determined by the following scale (G = grade):

$100 > G \geq 96.67 = A+$; $96.67 > G \geq 93.33 = A$; $93.33 > G \geq 90 = A-$;
 $90 > G \geq 86.67 = B+$; $86.67 > G \geq 83.33 = B$; $83.33 > G \geq 80 = B-$;
 $80 > G \geq 76.67 = C+$; $76.67 > G \geq 73.33 = C$; $73.33 > G \geq 70 = C-$;
 $70 > G \geq 66.67 = D+$; $66.67 > G \geq 63.33 = D$; $63.33 > G \geq 60 = D-$;
 $60 > G = F$

COURSE MATERIAL AND SCHEDULE: (next page)

COURSE SCHEDULE:

Week	Date	Lect.	Topic	Textbook	Homwk, Quz
1	5/14 5/17	1	Introduction of manufacturing	Chapt. 1	
2	5/18 5/24	2 3 4	The Nature of Materials Mechanical Properties of Materials (1) Mechanical Properties of Materials (2)	Chapt. 2 Chapt. 3 Chapt. 3	Qz1 HW#1 Qz2
3	5/25 5/31	5 6 7	Physical Properties of Materials Metals (1) Metals (2)	Chapt. 4 Chapt. 6 Chapt. 6	Qz3 Qz4 HW#2
4	6/1 6/7	8 9 10	Heat Treatment of Metals (1) Heat Treatment of Metals (2) Dimensions, Surfaces, and Measurement (1)	Chapt. 26 Chapt. 26 Chapt. 5	Qz5 Qz6
5	6/8 6/14		Exam 1 - (6/11 - 6/14, Time: 90 min.)		
		11	Dimensions, Surfaces, and Measurement (2)	Chapt. 5	Qz7
6	6/15 6/21	12 13 14	Quality Control and Inspection (1) Quality Control and Inspection (2) Fundamentals of Metal Casting	Chapt. 40 Chapt. 40 Chapt. 10	HW #3 Qz8 Qz9
7	6/22 6/28	15 16 17	Metal Casting Processes Theory of Machining (1) Theory of Machining (1)	Chapt. 11 Chapt. 20 Chapt. 20	HW#4,Qz10 Qz11
8	6/29 7/5		(*Independence Day – 7/4)		
		18 19	Machining Operations and Machine Tools Cutting Tool Technology	Chapt. 21 Chapt. 22	Qz12 Qz13
9	7/6 7/12		Exam 2 - (7/9- 7/12, Time: 90 min.)		
		20 21	Grinding and Abrasive Processes Non-Traditional Manufacturing Processes (1)	Chapt. 24 Chapt. 25	Qz14
10	7/13 7/19	22 23 24	Non-Traditional Manufacturing Processes (2) Powder Metallurgy Processes Polymers and Composite Materials Processing (1)	Chapt. 25 Chapt. 15 Chapt. 9	Qz15 HW#5,Qz16
11	7/20 7/25	25 26	Polymers and Composite Materials Processing (2) Plastic Shaping Processes	Chapt. 9 Chapt. 13	Qz17
12	7/27 7/29		Exam 3 (7/28 – 7/29, Time: 2 and half ours or 150 minutes)		

ADMINISTRATIVE POLICIES:

1. No late homework will be accepted. Homework is due during on the date and time specified at the course web page and should be submitted through the online system before the due time.
2. **No after-fact excuse** on missing assignment or test will be accepted. If you shall have a job interview you will have to let me know at least a week in advance. After-fact excuse is not acceptable.
3. You must show all calculations or procedures in your exams and homework assignments in order to get full credit.
4. This is an engineering course, you are expected to act as a responsible engineer. Every document handed-in must be neatly prepared. Sloppy work may cost you points.
5. **Academic Integrity:** It is understood and expected that all work turned in under your name is your own work and that you have neither given nor received unauthorized aid. The University policy on academic integrity can be found in the Code of Student Conduct (see [Appendix L](http://www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm) of the Handbook for Advising and Teaching: www.fis.ncsu.edu/ncsulegal/41.03-codeof.htm).
6. **Incomplete Grades and Late Assignments:** If requested by a student, the grade of Incomplete will be given for work not completed because of a serious, documented interruption in the student's work not caused by their own negligence.
7. **Absences and Scheduling Make-up Work:** A make-up exam will be scheduled if a student has an excused absence according to the University regulations (see http://www.ncsu.edu/provost/academic_regulations/attend/reg.htm for NC State's policy on excused absences). There are no make-up in-class quizzes; the lowest one of all the in-class quizzes will be dropped in lieu of any absence.

Non-discrimination Policies

NC State provides equal opportunity and affirmative action efforts, and prohibits all forms of unlawful discrimination, harassment, and retaliation ("Prohibited Conduct") that are based upon a person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability, gender identity, genetic information, sexual orientation, or veteran status (individually and collectively, "Protected Status"). Additional information as to each Protected Status is included in NCSU REG 04.25.02 (Discrimination, Harassment and Retaliation Complaint Procedure). NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or <https://oied.ncsu.edu/divweb/>. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Health and Well-Being Resources

These are difficult times, and academic and personal stress is a natural result. Everyone is encouraged to take care of themselves and their peers. If you need additional support, there are many resources on campus to help you:

- Counseling Center (<https://counseling.dasa.ncsu.edu/>)
- Health Center (<https://healthypack.dasa.ncsu.edu/>)
- If the personal behavior of a classmate concerns or worries you, either for the classmate's well-being or yours, we encourage you to report this behavior to the NC State CARES team: (<https://advising.dasa.ncsu.edu/resources-for-advisors/advisors-toolkit/cares/>)
- If you or someone you know are experiencing food, housing or financial insecurity, please see the Pack Essentials Program (<https://dasa.ncsu.edu/pack-essentials/>).

Other Important Resources

- Keep Learning: <https://dasa.ncsu.edu/students/keep-learning/>
- Protect the Pack FAQs: <https://www.ncsu.edu/coronavirus/frequently-asked-questions/>
- NC State Protect the Pack Resources for Students:
<https://www.ncsu.edu/coronavirus/reactivating-campus/resources-for-students/>
- NC State Keep Learning, tips for students opting to take courses remotely:
<https://dasa.ncsu.edu/students/keep-learning/>
- Introduction to Zoom for students: <https://youtu.be/5LbPzzPbYEw>
- Learning with Moodle, a student's guide to using Moodle:
<https://moodle-projects.wolfware.ncsu.edu/course/view.php?id=226>