San José State University
Department of Mechanical Engineering
ME/ISE 110 Syllabus (rev A)
Manufacturing Processes, Section 1, Fall 2022

Course and Contact Information

Instructor:	Edward Cydzik
Office Location:	Virtual – request a Zoom meeting
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Office Hours – by email appointment	Section 1 - TuTh 18:00- 19:00 (6:00 - 7:00 PM)
Class Days/Time:	**Section 1 - TuTh 16:30-17:45 (4:30 - 5:45 PM)**
Classroom:	Section 1 – Course is a Hybrid format. Zoom will be used. Classroom CL226 (Clark Hall) for Midterm Exams and some lectures. **8/23, 9/20, 10/18, 11/15 and 12/06 on campus in CL226**
9/20, Prerequisites:	ME 20 with a grade of "C" or better, and MatE 25 (co-requisite)

Course Format

This is a mixed-mode class, with both in-person and online components. Online components require use of the Canvas learning management system, accessed via https://sjsu.instructure.com/. Successful completion of course requirements necessitates accessing the course website frequently, typically at least twice a week on a regular basis. Technical support for Canvas is available at http://www.sjsu.edu/at/ec/canvas/. **Important communications regarding this class will be sent via Canvas or to email addresses listed in MySJSU**, and thus each student is expected to maintain up-to-date contact information in both systems. It is up to the student to track announcements and watch lecture recordings prior to the next lecture.

Course Description

Fundamentals of manufacturing processes such as alloying, machining, forming, casting, molding and welding.
Surface treatments, powder-based processes, and microfabrication methods.
Materials behavior and selection for manufacturing.
Geometric dimensioning and tolerancing.
May require access to SolidWorks™ for some activities and homework.

Recording Zoom Classes

This course or portions of this course (i.e., lectures, discussions, student presentations) may be recorded for instructional or educational purposes. The recordings will only be shared with students enrolled in the class through Canvas. The recordings will be deleted at the end of the semester. If, however, you would prefer to remain anonymous during these recordings, then please speak with the instructor about possible accommodations (e.g., temporarily turning off identifying information from the Zoom session, including student name and picture, prior to recording). Students are not allowed to record without instructor permission .Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings.

Instructor Materials

Materials created by the instructor for the course (syllabi, lectures and lecture notes, presentations, etc.) are copyrighted by the instructor. This university policy (S12-7) is in place to protect the privacy of students in the course, as well as to maintain academic integrity through reducing the instances of cheating. Students who record, distribute, or post these materials will be referred to the Student Conduct and Ethical Development office. Unauthorized recording may violate university and state law. It is the responsibility of students that require special accommodations or assistive technology due to a disability to notify the instructor.

Learning Outcomes

Upon successful completion of this course, students will be able to:

1. Identify candidate materials and processes appropriate for given design requirements.
2. Make relative comparisons among a wide variety of engineering materials in terms of mechanical properties and workability.
3. Describe capabilities and limits for several manufacturing processes in terms of size, resolution, precision, surface quality, rate, and cost.
4. Communicate effectively across design, manufacturing, and inspection perspectives, specifically using geometric dimensioning & tolerancing (GD&T).
5. Propose sensible strategies for fabricating new engineering components that have no pre-existing standard production method.

Required Texts/Readings (Required)

Textbook

1) Manufacturing Engineering and Technology, 7th edition, by Serope Kalpakjian and Steven R. Schmid, Prentice Hall, 2010, ISBN 9780133128741. The immediate previous edition (6th edition) is also acceptable.
2) Geometric Dimensioning and Tolerancing,© 2009, James D. Meadows, sections available from the MLK Library for download. https://sjsu-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=01CALS_ALMA71456175050002901&context=L&vid=01CALS_SJO&search_scope=EVERYTHING&tab=everything&lang=en_US
    a. The following will be a list of chapters you should download and read through (in the order I recommend) for the Spring 2022 semester. In addition, you should follow all examples by working through them with pencil and paper. This should include sketching the actual blocks and plates, applying the GD&T symbology, and performing the calculations.

b. Please note that the order that I recommend is based on my approach to teaching GD&T. While Meadows' book has an extensive amount of material, it is sometimes confusing to one trying to understand the basics.

c.

Source		Pages	Topic
Cydzik	Lecture		Intro to GD&T – history and basics
Meadows	Text	381-390	Why use GD&T – conversion from Coordinate dimensioning to GD&T
		508-509	GD&T as a language
		20-28	Selecting Datums and Datum Features, tolerancing scheme, and introduction to Feature Control Frames
		217-231	Datums and Datum Features, cont'd – Datum Reference Frames for rectangular and cylindrical parts,
		264 – 278	Centerplane Datums -
		294 – 304	Floating Fasteners
		279 – 293	Fixed Fasteners
		398 – 404	Composite Tolerancing – when a hole pattern is more critical than the location of a hole pattern
		442 – 457	Tolerance Stack-Up Analysis

3) Highly Recommended reference: Mechanical Tolerance Stackup and Analysis, Second Edition, Bryan R. Fischer, CRC Press, 2011, ISBN 978-1-138-31713-0. Available in the MLK Library.

4) Highly Recommended reference: Materials Selection in Mechanical Design, Fifth Edition, Michael F. Ashby, Butterworth-Heinemann, 2017, ISBN 9780081005996.

Course Requirements and Assignments (Required)

The course will require active participation in class by students including frequent oral presentations by individuals and/or Breakout Teams. In addition, homework will be assigned.

There will be **two** mid-term examinations based on a) traditional materials and manufacturing methods, b) rapid prototyping and manufacturing methods, and c) SPC and Geometric Dimensioning and Tolerancing. These may be adjusted some during the course of the semester.

Short quizzes will also be held at the beginning of lectures so students can demonstrate comprehension of the reading material.

"Success in this course is based on the expectation that students will spend, for each unit of credit, a minimum of 45 hours over the length of the course (normally three hours per unit per week or nine hours per week) for instruction, preparation/studying, or course related activities, including but not limited to internships, labs, and clinical practice. Other course structures will have equivalent workload expectations as described in the syllabus."

Final Examination or Evaluation

In addition to two mid-term exams, we **may** have a Final Evaluation presentation by each student team covering a product (previously discussed and agreed to with the professor) describing the major components of the product and how these were manufactured based on visual inspection.

Grading Information (Required)

45 % for each Mid Term (2) – will use Lockdown Browser during Mid Term exams
3 % for Homework (2 anticipated), Quizzes

The overall grade shall be calculated from a weighted sum of all graded components.

Grades and percentages are as follows:

92.0% -	100%	A
90.0% -	91.9%	A-
87.0% -	89.9 %	B+
83.0% -	86.9 %	B
80.0% -	82.9%	B-
77.0% -	79.9%	C+
73.0% -	76.9%	C
70.0 % -	72.9%	C-
67.0% -	69.9%	D+
63.0 % -	66.9%	D
60.0 % -	62.9 %	D-
0%	59.9%	F

Classroom Protocol

Lectures will start on time and end on time. If you are not able to attend, please send me an email.

Attendance is strongly advised.

Students are expected to participate, ask questions, and add to the discussion based on their work experience.

No cell phone use during lecture. If you have to take a call, excuse yourself and step out of the lecture room.

Closed Laptops/ Tablets during lecture unless you are taking electronic notes.

Midterm exams will be open book, open note. Laptops will be allowed during midterm exams due to the hybrid mode of the course.

University Policies (Required)

Per University Policy S16-9, university-wide policy information relevant to all courses, such as academic integrity, accommodations, etc. will be available on Office of Graduate and Undergraduate Programs' Syllabus Information web page at http://www.sjsu.edu/gup/syllabusinfo/"

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EXPECT ADDITIONAL CHANGES

Course Schedule

Week	Calendar date Week	Topics, Readings, Assignments, Deadlines
1	8/23	Introduction – Green Sheet review – Read Introduction and Chapter 1
1		Introduction Continued
2	8/30	Material properties and behavior – Read Chapter 2
2		Material properties and behavior – Read Chapter 3
3	9/6	Deformation and shaping processes – Read Chapters 13 and 14
3		Deformation and shaping processes – Read Chapters 13 and 14
4	9/13	Deformation and shaping processes – Read Chapters 15 and 16
4		Cutting processes – Turning and Hole Making – Read Chapter 23
5	9/20 Lecture in CL226	Cutting processes – Milling, Broaching, Sawing, Filing, and Gear Manufacturing – Read Chapter 24
5		Solidification processes – metal casting – Read Chapters 10, 11, and 12
6	9/27	Solidification processes - polymer structures - Read Chapter 7
6		Deformation processes – forming and shaping plastics and composite materials – Read Chapter 19
7	10/4	Joining processes – Fusion Welding – Read Chapters 30, 31, and 32
7		Joining processes – Solid-State Welding, Brazing, Soldering, Adhesive Bonding and Mechanical Fastening Processes
8	10/11	**Midterm #1**
8		Surface Finishing and Treatments, Coatings and Cleaning – Read Chapter 34
9	10/18	Powder Metal Processes – Read Chapter 17
9		Rapid Prototyping Processes and Operations - Read Chapter 20
10		Fabrication of Microelectronic Devices – Read Chapter 28
10		Fabrication of Microelectromechanical Devices – Read Chapter 29
11		Statistical Process Control – Read Chapter 36
12		Statistical Process Control
12		GD&T – Introduction – Read Chapter 5 in the Meadows Text

Week	Calendar date Week	Topics, Readings, Assignments, Deadlines
13		GD&T – Why use GD&T – Read Chapter 20 in the Meadows Text and Chapter 35
13		GD&T – Datums, converting Coordinate tolerancing to True Position tolerancing
14		GD&T – Datums, Feature Control Symbols
14		GD&T – Floating Fasteners, Fixed Fasteners
15		GD&T – Tolerance Stack-Up Analysis
15		Midterm 2 review
16		**Midterm 2 – GD&T, Polymers, Extrusion, and Molding based on lectures presented after Midterm 1**