

**San José State University**  
**Department of Mechanical Engineering**  
**ME/ISE 110, Manufacturing Processes, Section 1, 2, and 3 , Fall 2021**

**Course and Contact Information**

Instructor:	Edward Cydzik
Office Location:	Virtual – request a Zoom meeting
Telephone:	650.954.7278
Email:	edward.cydzik@sjsu.edu
Office Hours:	Section 1 - MW 19:30-20:45 (7:30 PM- 8:45 PM) Section 2 – TuTh Section 3 – TuTh 19:30-20:45 (7:30 PM- 8:45 PM)
Class Days/Time:	Section 1 MW 19:30-20:45 (7:30 PM - 8:45 PM) Section 2 TuTh 17:45–19:00 (5:45 PM – 7:00 PM) Section 3 TuTh 19:30-20:45 (7:30 PM- 8:45 PM)
Classroom:	Section 1 - TBD Section 2 - TBD Section 3 - TBD
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 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.

## 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, 7<sup>th</sup> edition, by Serope Kalpakjian and Steven R. Schmid, Prentice Hall, 2010, ISBN 9780133128741. The immediate previous edition (6<sup>th</sup> 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=01CAL5\\_ALMA71456175050002901&context=L&vid=01CAL5\\_SJO&search\\_scope=EVERYTHING&tab=everything&lang=en\\_US](https://sjsu-primo.hosted.exlibrisgroup.com/primo-explore/fulldisplay?docid=01CAL5_ALMA71456175050002901&context=L&vid=01CAL5_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 Fall 2021 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. **Please feel free to contact me during the semester break if you want to discuss a topic that may require additional clarification.**
  - 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.

Source		Pages	Topic
Cydzik	Lecture		Intro to GD&T – history and basics
Meadows		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 three mid-term examinations based on a) traditional 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 three 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)

25 % for each Mid Term (3)

25 % for Homework, Quizzes, Team Presentations

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](http://www.sjsu.edu/gup/syllabusinfo/) at <http://www.sjsu.edu/gup/syllabusinfo/>

## ME/ISE 110, Manufacturing Processes, Section 1, 2, and 3 , Fall 2021

### Course Schedule

Week	Calendar date Week	Topics, Readings, Assignments, Deadlines
1	Thu 8/19/21 – W33	Introduction – Green Sheet review – Read Introduction and Chapter 1
2	8/23 – 8/27	Material properties and behavior – Read Chapter 2
2	8/23 – 8/27	Material properties and behavior – Read Chapter 3
3	8/30 – 9/3	Deformation and shaping processes – Read Chapters 13 and 14
3	8/30 – 9/3	Deformation and shaping processes – Read Chapters 13 and 14
4	9/7 – 9/10	Deformation and shaping processes – Read Chapters 15 and 16 – 9/6 is Labor Day
4	9/7 – 9/10	Cutting processes – Turning and Hole Making – Read Chapter 23 - 9/6 is Labor Day
5	9/13– 9/17	Cutting processes – Milling, Broaching, Sawing, Filing, and Gear Manufacturing – Read Chapter 24
5	9/13– 9/17	Solidification processes – metal casting – Read Chapters 10, 11, and 12
6	9/20 – 9/24	Solidification processes - polymer structures - Read Chapter 7
6	9/20 – 9/24	Deformation processes – forming and shaping plastics and composite materials – Read Chapter 19
7	9/27 -10/1	Joining processes – Fusion Welding – Read Chapters 30, 31, and 32
7	9/27 -10/1	Joining processes – Solid-State Welding, Brazing, Soldering, Adhesive Bonding and Mechanical Fastening Processes
8	10/4-10/8	Midterm #1
8	10/4-10/8	Surface Finishing and Treatments, Coatings and Cleaning – Read Chapter 34
9	10/11 – 10/15	Powder Metal Processes – Read Chapter 17
9	10/11 – 10/15	Rapid Prototyping Processes and Operations - Read Chapter 20
10	10/18-10/22	Fabrication of Microelectronic Devices – Read Chapter 28
10	10/18-10/22	Fabrication of Microelectromechanical Devices – Read Chapter 29
11	10/25-10/29	Midterm #2
11	10/25-10/29	Statistical Process Control – Read Chapter 36
12	11/1 -11/5	Statistical Process Control
12	11/1 -11/5	GD&T – Introduction – Read Chapter 5 in the Meadows Text
13	11/8-11/12	GD&T – Why use GD&T – Read Chapter 20 in the Meadows Text and Chapter 35
13	11/8-11/12	GD&T – Tolerance Stack-Up Analysis – Read Chapter 23 in the Meadows Text

Commented [EC1]:

Week	Calendar date Week	Topics, Readings, Assignments, Deadlines
14	11/15 – 11/19	GD&T – Tolerance Stack-Up Analysis
14	11/15 – 11/19	GD&T – Tolerance Stack-Up Analysis
15	11/22 – 11/26	Midterm#3 11/24 is a Non Instruction Day prior to Thanksgiving
16	11/29 – 12/3	Presentations
16	11/29 – 12/3	Presentations
17	11/17	Presentations
Final Exam		Presentations

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