San José State University
Department of Mechanical Engineering
ME/ISE 110 Manufacturing Processes, Section 02, Fall 2022

Course and Contact Information

Class Days and Time:	Tuesdays and Thursdays 10:30 AM to 11:45 AM
Classroom:	ENG 232
Registration Codes:	51303 for ME 110, 51304 for ISE 110
Prerequisites:	ME 020 with a grade of "C-" or better
Pre/corequisite:	MATE 25 (either prior or concurrently)
Instructor:	Sang-Joon (John) Lee
Email:	sang-joon.lee@sjsu.edu
Telephone:	408-924-7167
Office Location:	Online only (link posted in Canvas)
Office Hours:	Mondays and Wednesdays 10:30 AM to 11:30 AM and by appointment

Course Format

All regular class meetings for this 3-unit class are in-person, but the class will also require use of the Canvas learning management system (LMS), accessed via https://sjsu.instructure.com/. Successful completion of course requirements necessitates accessing the course website frequently. Technical support for Canvas is available at http://www.sjsu.edu/ecampus/. Important communications regarding this class may be sent via Canvas or to student email addresses listed in MySJSU, and thus each student is expected to maintain up-to-date contact information in both systems.

Course Description: https://catalog.sjsu.edu/preview_course_nopop.php?catoid=10&coid=44339

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 dimensions and tolerancing.

Course 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. Apply geometric dimensioning & tolerancing (GD&T) concepts, rules, and nomenclature according to the ASME Y14.5 standard to encode and decode design intent in an engineering drawing.
5. Propose sensible strategies for fabricating new engineering components that have no pre-existing standard production method.

Required Textbooks

1. *Manufacturing Engineering and Technology*, 8th ed., by S. Kalpakjian & S. Schmid. Prentice Hall, 2020. An eText option is available from the publisher at https://www.pearson.com/en-us/subject-catalog/p/manufacturing-engineering-and-technology/P200000003217/. If helpful for cost savings, the 7th edition of the same textbook has sufficiently equivalent content but official page and section references in class will be based on the 8th edition.
2. ASME Y14.5-2018, Dimensioning and Tolerancing, ASME International, ISBN 9780791872192. Full text available for SJSU at https://subscriptions-techstreet-com.libaccess.sjlibrary.org/products/797087

Supplementary Textbooks

1. *Beginning GD&T for Design, Manufacturing and Inspection*, by Multi Metrics, Inc., 2013.
2. *Geometric Dimensioning and Tolerancing (per ASME Y14.5-2009)*, by J. D. Meadows, James D. Meadows & Associates, Inc., 2009, ISBN 9780791860915. Full text available via SJSU Library portal.

Library Resources

The engineering librarian as listed at https://library.sjsu.edu/staff-directory/subject-librarians can provide faculty and students with research instruction and resources, as needed, in person and online through the library website http://library.sjsu.edu/. Research guides http://libguides.sjsu.edu/ are accessible for departments and subject areas, including a guide specific to mechanical engineering at http://libguides.sjsu.edu/me.

Course Requirements and Assignments

University policies relevant to syllabi are posted at https://www.sjsu.edu/curriculum/courses/syllabus-info.php. As stated, "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 3 hours per unit per week with 1 of the hours used for lecture) for instruction or preparation/studying or course related activities including but not limited to internships, labs, clinical practica. Other course structures will have equivalent workload expectations as described in the syllabus."

- Participation Tasks: Throughout the semester there will be several participation tasks to promote active engagement. Specific examples may include assigned discussion posts, surveys, progress updates, and peer review. These will be tallied for credit with strict deadlines and there are no make-up options.
- Reading Quizzes (RQ): Reading is an important and mandatory part of this class, and short in-class quizzes will be distributed throughout the semester (tentatively but not necessarily always at the beginning of class on Tuesdays). The subject matter will be based on specific assigned reading sections from the textbooks, narrowed by online discussion boards for each respective topic. Quiz scores will be averaged among all submitted quizzes by each student, and a minimum of 9 quizzes must be submitted (i.e., a score of 0 will be assigned to any quiz below the minimum 9).
- Product Examination: This is a *team-based* project that involves disassembling a multi-component commercial product, as an opportunity to demonstrate the breadth and depth of your manufacturing process knowledge. The primary deliverable is a pre-recorded and well-organized video presentation that presents evidence-based reasoning about the processes that were likely involved in manufacturing of the product
- Real-World Processing Example: This is an *individual* project that involves selecting a specific manufacturing process, gathering information (i.e., capabilities, limitations, and interesting aspects as used in practice), and presenting effectively to the class. The primary deliverable is a pre-recorded and well-organized video presentation.
- Tolerancing Scenario: This is a *team-based* project that involves identifying and tolerancing specific concerns between mating parts. An important objective is to have distinct and clear understanding among imperfections of size, form, orientation, and location. The primary deliverable is a pre-recorded and well-organized video presentation that presents specific concerns and how to apply the concepts and tools of geometric dimensioning and tolerancing (GD&T) in order to manage imperfection.

Grading Information

The course grade is calculated from a weighted sum of all graded components as follows:

10% for Participation Tasks (individual)
25% for Reading Quizzes (individual)
20% for Product Examination (team)
20% for Real-World Processing Example (individual)
25% for Tolerancing Scenario (team)

This course overall is graded by letter grade, with percentage points corresponding to letter grades as follows:
93.0-100 A | 90.0-92.9 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

When individual assignments or projects are graded on a letter-grade basis, numerical conversions are as follows:
A+ 100 | A 95 | A- 91.5 | B+ 88.5 | B 85 | B- 81.5 | C+ 78.5 | C 75 | C- 71.5 | D 65
While specific criteria for any given assignment may differ, common expectations for all assignments are (1) completeness, (2) correctness, (3) clarity, and (4) compliance. Grades below D would earn scores between 60 and zero, depending on partial merits along these criteria. The grade of A+ is rare, generally earned for work that is not only excellent along all criteria, but furthermore *best-in-class* and usable as an exemplary model for peers to emulate.

Assignment Submission: All graded assignments must be submitted using the designated assignment tool in the Canvas course shell. Assignments will not be accepted over email.

Team Assignments and Peer Grading: Team assignments will be used for some portions of the course, and some assignments may involve peer grading. Alternative options will be considered for compelling reasons, but arrangements must be pre-approved in writing with ample time before corresponding deadlines (i.e. several days in advance).

Late Policy: Unless otherwise specified for a particular assignment, work that is submitted late will be accepted with reduced credit according to a depreciation rate of 1.5% for each late hour breached. Exams, however, are strictly limited to designated times; late exams are not accepted.

Exceptions: Any grading appeals or petitions must be communicated promptly in writing (or email). Exceptions will normally be evaluated at the very end of the semester in context with an individual's overall semester track record and all other exceptions class-wide. Special consideration for truly unavoidable and extenuating circumstances will depend on timeliness and supporting documentation (e.g., doctor's note, police report).

University Policies

In accordance with University Policy S16-9 http://www.sjsu.edu/senate/docs/S16-9.pdf, the following link contains university-wide policy information relevant to all courses, such as academic integrity, accommodations, and related concerns: https://www.sjsu.edu/curriculum/courses/syllabus-info.php.

Academic Technology Requirements

Students are required to have an electronic device (laptop, desktop or tablet) with audio. Campus-level resources for technology needs (including equipment loans) are described at https://www.sjsu.edu/learnanywhere/equipment/.

Recording Policy

Students are prohibited from recording class activities (including class lectures, office hours, advising sessions, etc.), distributing class recordings, or posting class recordings. Materials created by the instructor for the course (lectures and lecture notes, presentations, etc.) are copyrighted by the instructor.

Course Schedule

This schedule is a tentative plan, subject to change with fair notice via announcement in class or notification via Canvas.

Dates and Planned Topics	**Tentative and approximate deadlines**
8/23 Course introduction, material properties and behavior 8/25 Material properties and behavior	
8/30 Deformation and shaping processes (e.g., extrusion) 9/1 Deformation processes (e.g., forging, rolling, bending)	RQ01: material behavior
9/6 Cutting processes (e.g., shearing, drilling, turning) 9/8 Cutting processes (e.g., milling, broaching)	RQ02: deformation processes
9/13 Solidification processes: metal casting 9/15 Solidification processes: plastics molding	RQ03: cutting processes
9/20 Joining processes (fusion welding) 9/22 Joining processes (solid state, others)	RQ04: solidification processes
9/27 Surface processes (e.g., abrasion, ablation, etching) 9/29 Surface processes (e.g., electrochemical and other processes)	RQ05: joining processes
10/4 Powder net shaping 10/6 Additive (layer) manufacturing	RQ06: surface processes **Product Examination** videos due 10/9
10/11 **Product Examination** presentations, GD&T intro. concepts 10/13 **Product Examination** presentations, GD&T tolerance zones	RQ07: powder & additive layer processes
10/18 GD&T datums and datum reference frames 10/20 GD&T geometry control tools and feature control frames	RQ08: GD&T introductory concepts
10/25 GD&T implicit controls (e.g., "rule of size and form") 10/27 GD&T material condition and functional assembly	RQ09: GD&T datums and control tools
11/1 GD&T "bonus tolerance" 11/3 GD&T recap and review	**Real-World Processing Example** videos due 11/6
11/8 **Real-World Processing Example** presentations 11/10 **Real-World Processing Example** presentations	RQ10: GD&T functional assembly
11/15 Microfabrication processes (e.g., lithography, etching) 11/17 Microfabrication processes (e.g., vapor deposition)	
11/22 GD&T recap and review 11/24 *Thanksgiving holiday (university non-instructional day)*	RQ11: microfabrication processes
11/29 Statistical process control (process variability, distributions) 12/1 Statistical process control (control charts)	
12/6 Automation and productivity	RQ12: statistical process control **Tolerancing Scenario** videos due 12/4

The Final Exam period will be used for presentation and peer evaluation of the Tolerancing Scenario. The session will be held on **Tuesday, December 13th from 9:45 AM noon**, according to the university-designated dates and times posted at https://www.sjsu.edu/classes/final-exam-schedule/fall-2022.php.