San José State University
Department of Mechanical Engineering
ME 283 Manufacturing Process Control, Fall 2018

Course and Contact Information

Class Days/Time:	Tuesdays and Thursdays 4:30 PM to 5:45 PM
Classroom:	Engineering 401
Registration Code:	47414
Prerequisites:	BSME or instructor consent.
Instructor:	Sang-Joon (John) Lee
Office Location:	Engineering 310
Telephone:	408-924-7167
Email:	sang-joon.lee@sjsu.edu
Office Hours:	Mondays and Wednesdays 10:00 AM to 11:00 AM, and by appointment

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 may 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.

ME 283 Course Description: http://info.sjsu.edu/web-dbgen/catalog/courses/ME283.html

Develops general concepts for control of manufacturing processes. The concepts of and tools for process modeling, process optimization and process control. Emphasizes the integrated approach combining statistical process control (SPC) and automatic process control.

Course Learning Outcomes

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

1. Explain the significance and benefits for controlling variability as a fundamental goal in manufacturing process control.
2. Identify specific controllable parameters, measurable variables, and disturbance sources for specific manufacturing processes.
3. Apply tools from design-of-experiments, in particular factorial design, analysis-of-variance, regression models, and response surfaces.
4. Apply tools from statistical process control, in particular control charts for process monitoring.
5. Apply knowledge of manufacturing processes to tools of automatic process control, including transfer functions, feedback loops, and discrete process control.
6. Select and justify a strategy as well as a set of tools for reducing variability in a given manufacturing process..

Required Textbooks

Introduction to Statistical Quality Control, 7th Edition, by D. C. Montgomery. Published by John Wiley & Sons, 2013, ISBN 9781118146811.

Library Liaison

Linda Crotty, Academic Liaison Librarian, linda.crotty@sjsu.edu, 408-808-2636

Course Requirements and Assignments

According to the Office of Graduate and Undergraduate Programs http://www.sjsu.edu/gup/syllabusinfo/, "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 include assigned discussion posts, online quizzes or surveys, and peer review. These will be tallied for credit with strict deadlines and there are no make-up options.
- Homework: Routine homework will be assigned approximately one week before deadline. Collaboration among classmates on general approach and cross-checking intermediate values is welcome and even encouraged. However, all homework must still be freshly prepared and submitted individually. Raw copying of solutions or copy/paste use of figures is cheating. Homework will be graded not only on correctness but also on professionalism in presenting work.
- Projects: There are two projects in the course. Both are open-ended and team-based. Specific requirements and expectations are detailed in separate documentation for each project.
- Quizzes and Exams: Short quizzes will be held in class throughout the semester. These quizzes are intended to be short (typically 10-15 minutes) and will often echo skills developed from recent homework. There are no make-up quizzes and there is no extra time allowed for tardiness. Missing a quiz will result in a logged score of zero, but to accommodate unavoidable absence for any reason (e.g., illness, mandatory travel, work obligations, severe traffic, or family duties), the two lowest quiz scores for each student will be excused from average grade computation. The (cumulative) final exam is scheduled during the standard university-assigned time.

Grading Information

The course grade will be weighted as follows:
10% for Participation Tasks
15% for Quizzes
15% for Homework
10% for Statistical Process Control (SPC) Project
20% for Design-of-Experiments (DoE) Project
30% for Final Exam

The overall course grade is calculated from a weighted sum of all graded components. Graded percentage points correspond to letter grade 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

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; 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

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/ .

Course Schedule

This schedule is subject to change with fair notice via announcement in class or notification via Canvas. Specific reading assignments and deadlines will be communicated in Canvas.

Lesson topics	Approximate timing of graded work
[8/21] Introduction [8/23] Variation and distributions	
[8/28] Variation and distributions [8/30] Statistical inference	Homework 1, Quiz 1 on variation and distributions
[9/4] Statistical inference [9/6] Uncertainty analysis	Homework 2, Quiz 2 on statistical inference
[9/11] Statistical process control (SPC) overview [9/13] *SPC Project team formation and process selection*	
[9/18] Control charts (Shewart) [9/20] Control charts (individuals, moving range)	Homework 3, Quiz 3 on (conventional) control charts
[9/25] Control charts (cumulative sums, exponential weighting) [9/27] **SPC project presentations**	
[10/2] Design-of-experiments (DoE) overview [10/4] *DoE Project team formation and experiment selection*	Homework 4, Quiz 4 on (specialized) control charts
[10/9] Factorial design and factor effects [10/11] Factorial design and factor effects	
[10/16] Fractional factorials [10/18] Analysis of variance (ANOVA)	Homework 5, Quiz 5 on factorial design
[10/23] Regression modeling [10/25] Regression modeling	
[10/30] Response surfaces [11/1] Robustness	Homework 6, Quiz 6 on regression
[11/6] Automatic process control (APC) overview [11/8] Classical feedback control (review)	
[11/13] Digital feedback control (introductory) [11/15] Run-by-run control	Homework 7, Quiz 7 on feedback control
[11/20] Run-by-run control [11/22] *Thanksgiving holiday (no class)*	
[11/27] Discrete process control simulation [11/29] DoE project refinement	Homework 8 on discrete process control
[12/4] **DoE project presentations** [12/6] Review	**DoE project report due**

The **Final Exam** will be held on Friday, December 14th from 2:45 PM to 5:00 PM in the regular classroom.