

## Industrial Quality Control

ESI4221C Sections 19C7 & 3F25

**Class Periods:** Section 19C7: MWF, Periods 6, 12:50 PM - 1:40 PM

Section 3F25: MWF, Periods 2, 8:30 AM - 9:20 AM

**Location:** Online

**Academic Term:** Fall 2020

### **Instructor:**

Sima Sabahi

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Virtual Office Hours: Monday and Wednesday, 11:00 am-12:00 pm, 2:00 pm-3:00 pm, or by appointment

### **Course Description**

This course is about the use of modern statistical methods for quality control and improvement. It provides comprehensive coverage of the subject from basic principles to state-of-the-art concepts and applications. This course will give students a sound understanding of the principles and the basis for applying them in a variety of situations. (3 credits).

### **Course Pre-Requisites / Co-Requisites**

STA4321 (Introduction to Probability) and STA4322 (Introduction to Statistics Theory) with minimum grades of C.

### **Course Objectives**

At the end of this course, students will be able to:

- Apply both traditional and cutting-edge statistical quality control methods
- Learn appropriate statistical technique selection in real-world situations
- Implement process characterization and optimization experiments
- Apply fundamental techniques using real-world research and data

### **Materials and Supply Fees**

None

### **Professional Component (ABET):**

This course supports the ISE undergraduate program educational objectives of producing graduates who

- “will be successful professionals in industrial and systems engineering or other disciplines”,
- “can acquire advanced knowledge through continuing education or advanced degree programs”
- “can become active leaders in their profession and/or community”

### **Relation to Program Outcomes (ABET):**

Outcome	Coverage*
1. Ability to identify, formulate and solve engineering problems by applying principles of engineering, science, and mathematics	Medium
2. Ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare as well as global, cultural, social, environmental, and economic factors	Low
3. Ability to communicate effectively with a range of audiences	Low
4. Ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts	Low
5. Ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives	Low
6. Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. Ability to acquire and apply new knowledge as needed, using appropriate learning strategies	

\*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not part of the course.

### Required Textbooks and Software

- Title: Introduction to Statistical Quality Control
  - Author: Douglas C. Montgomery
  - Date and Edition: 2012 7th Edition
  - ISBN: 978-1-118-14681-1
- Lecture notes (posted online in Canvas)
- Videos (posted online in Canvas)
- RStudio

### Course Schedule

Date	Chapter	Topics	Assignments (due at noon)
8/31	-	Introduction	Homework 1
9/2	1 & 2	Intro and DMAIC	
9/4	3	Modeling Process Quality	
9/7	-	Holiday-No Class	
9/9	3	Modeling Process Quality	
9/11	3	Modeling Process Quality	
9/14	3	Modeling Process Quality	
9/16	3	R Session	
9/18	4	Inferences about Product Quality	Chapter 3 Homework
9/21	4	Inferences about Product Quality	
9/23	4	Inferences about Product Quality	
9/25	4	R Session	
9/28	4	Inferences about Product Quality	
9/30	4	Inferences about Product Quality	Chapter 4 Homework
10/2	-	Homecoming-No Class	
10/5	-	Exam 1 Review	
10/7	5	Statistical Process Control	Exam 1 (evening exam)
10/9	6	Control Charts for Variables	
10/12	6	Control Charts for Variables	
10/14	6	Control Charts for Variables	
10/16	6	R Session	
10/19	7	Control Charts for Attributes	Chapter 6 Homework
10/21	7	Control Charts for Attributes	
10/23	7	Control Charts for Attributes	Case Study Proposal
10/26	7	R Session	
10/28	8	Process Capability Analysis	Chapter 7 Homework
10/30	8	R Session	
11/2	8	Process Capability Analysis	
11/4	8	R Session	
11/6	8	Process Capability Analysis	
11/9	-	Exam 2 Review	Chapter 8 Homework
11/11	-	Holiday-No Class	
11/13	13	Factorial Experiments for Process Design	Exam 2 (evening exam)

11/16	13	Factorial Experiments for Process Design	
11/18	13	R Session	
11/20	13	Factorial Experiments for Process Design	
11/23	15	Acceptance Sampling	Chapter 13 Homework
11/25	15	Acceptance Sampling	
11/27	-	Holiday-No Class	
11/30	15	Acceptance Sampling	
12/2	15	R Session	
12/4	-	Case Study presentations	Chapter 15 Homework
12/7	-	Case Study presentations	
12/9	-	Case Study presentations	Case Study submission, Case Study peer assessment
12/16 or 12/17	-	Exam 3 (7:30 am-9:30 am)	Exam Review will be posted before 12/16

### ***Online Course Recording***

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

### ***Attendance Policy***

Attendance is required and counts for 5% of the grade. Attendance will be taken using the Zoom report. There will be two allowances for unexcused absences. If you have a conflict, email your instructor prior to class to ask to be excused. It will be to your benefit to attend all lectures. Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. If you cannot follow the lecture during class time, you can leave the meeting quietly. Please, remember to turn off your cell phone as soon as you join the Zoom meeting.

(\* If you do not think you will be able to attend most of the classes, you have the option to have the attendance grade be added to the percentage for Exam 3 (as shown below in the grading breakdown). If you chose this option, you will need to indicate this (in email) to the instructor by Friday, September 4th. However, you will be responsible for all material covered in class.

### ***Make-Up Policy***

If you missed an exam due to a health problem, you will need to provide documentation that indicates the date of the visit. A note indicating that you were seen at the health center the day of the exam is not sufficient documentation of a medically excused absence from an exam. The note must say that you were medically unable to take the exam. In case of an exam conflict, you will need to present evidence of the conflict to the instructor. Employment interviews, employer events, weddings, vacations, etc. are not excused absences.

### ***Grading Policy***

Your grade will be based on three evening exams, several homework assignments, attendance, case study presentation, and case study peer assessment. All assignments must be submitted via Canvas unless specified otherwise. Homework solutions will be posted right after the due date.

Assignment	Total Points	Percentage of Final Grade
Exam 1	100	20%
Exam 2	100	20%
Exam 3	100	30%
Homework	100	10%
Case Study	100	10%
Case Study Peer Assessment	100	5%
Attendance	100	5%

**Exams:** Exam grade disputes must be made to the instructor **within one week** after grades are posted. Any grade dispute after the specified period will not be considered. The following describes the procedure:

- (1) Within one week after your grade has been posted, e-mail the instructor requesting a grade breakdown,
- (2) Compare your solution to the solution posted on the web-site using the detailed grade breakdown you receive,
- (3) If you still have questions about your grade, to resolve the issue either go to the instructor's office hours or request an appointment.

**Case Study:** The case study team will consist of 4-5 students. Each team will complete a case study analysis on two papers published in reputable journals and present a case study paper. Example journals include IISE Transactions, ASQ, etc. You will create your group and submit a short proposal (one-page max) for case study approval by October 23rd. Each team must have two unique case studies; therefore, I will identify if there are two teams with the same studies and conflicts will be solved on a first come – first serve basis. The one-page case study proposal should identify:

1. Team members
2. Case studies that your team has selected (with PDFs of the case studies attached)
3. Reason/motivation for selecting that case studies
4. Course topics that the case studies use and how the studies are related
5. Back-up case studies – in the event you cannot get your first pick

Case study presentations should be 10-15 minutes and should include:

1. Definition of the problem that is interesting to the team and why is it important
2. Analysis of the model/approach presented in the papers
3. Summary and critique of the contributions and shortages in these papers
4. Suggestions for future contributions/improvements

At the end of the semester, each student will evaluate his/her classmates. Your case study grade will be based on instructor's, graders' and your classmates' evaluations of your work. A case study rubric will be provided to students for peer-assessment.

### **Grade Scale**

Percent	Grade	Grade Points
90.0 - 100.0	A	4.00
87.0 - 89.9	A-	3.67
84.0 - 86.9	B+	3.33
81.0 - 83.9	B	3.00
78.0 - 80.9	B-	2.67
75.0 - 79.9	C+	2.33
72.0 - 74.9	C	2.00
69.0 - 71.9	C-	1.67

66.0 - 68.9	D+	1.33
63.0 - 65.9	D	1.00
60.0 - 62.9	D-	0.67
0 - 59.9	E	0.00

There may or may not be a curve at the end of the semester. This depends on the overall performance of the class throughout the semester. Please keep in mind that this is a challenging and time-consuming class. You must study hard and perform well in every class activity in order to deserve an A. Please note that this is a required course for ISE students. This means that you must earn, at a minimum, a C in order to satisfy the requirement. More information on UF grading policy may be found at: <https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.ua.ufl.edu/public-results/>.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as

appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

### ***Campus Resources:***

#### *Health and Wellness*

##### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

#### *Academic Resources*

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to [Learning-support@ufl.edu](mailto:Learning-support@ufl.edu).  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus:** <https://care.dso.ufl.edu>.

**On-Line Students Complaints:** <http://www.distance.ufl.edu/student-complaint-process>.