

Industrial Quality Control
ESI4221C (Section: 1H89)

Class Periods and Location: M, W, F Period 7 (1:55 pm – 2:45 pm), WEIM1094

Academic Term: Spring 2020

Instructor:

McKenzie Landrum, landrum@ise.ufl.edu, (352-294-7732)

Office Hours: Tuesday and Thursday 12:00 – 1:00 pm, or by appointment, Weil 415

Teaching Assistant:

Yiruo Lu, office hours to be posted on Canvas

Course Description

Factors affecting variation in product quality; use of control charts to evaluate and control manufacturing processes. Techniques for acceptance and reliability testing. Laboratory exercises illustrate the operation and control of manufacturing processes and hazard function. Typical failure distributions, redundant systems, models of repair and maintenance (3 credits).

Course Pre-Requisites

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

Course Objectives

This course provides an introduction to statistical techniques used in the design, control and improvement of quality in processes with observable output variation. The course includes an introduction to design of experiments and response surface methods.

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

- “Introduction to Statistical Quality Control,” Wiley (2012) 7th Edition D. Montgomery
 - ISBN : 978-1-118-14681-1
 - Previous editions of the textbook are useful; however, the numbering of problem sets used for homework are likely to differ book by book and you will be required to solve these discrepancies.
- Lecture notes and tutorials (posted online)
- RStudio (a free and open-source integrated development environment (IDE) for R, which is a programming language for statistical computing and graphics)

Course Schedule

Week	Monday Topics	Wednesday Topics	Friday Topics	Chapters	Assignments (due at 11:59 pm on Wed. unless otherwise noted)	Exams
1					Intro. Assignment (due Sat. at 11:59 pm)	
2	Intro and DMAIC	Modeling Process Quality	Modeling Process Quality	1,2,3		
3		Showcase	Modeling Process Quality	3		
4	R Session (Chap 3)	Inferences about Product Quality	Inferences about Product Quality	3,4	Chapter 3 Problems	
5	Inferences about Product Quality	R Session (Chap 4)	Inferences about Product Quality	4		
6	Inferences about Product Quality	Statistical Process Control	Control Charts for Variables	4,5,6	Chapter 4 Problems	
7	Review for Exam 1		Control Charts for Variables	6		Exam 1 (likely Tues. 2/18)
8	Control Charts for Variables	R Session (Chap 6)		6	Chapter 6 Problems (due Sat. at 11:59 pm)	
9						
10	Control Charts for Attributes	Control Charts for Attributes	Control Charts for Attributes	7		
11	R Session (Chap 7)	Process Capability Analysis	R Session (Chap 8)	7,8	Chapter 7 Problems	
12	Process Capability Analysis	R Session (Chap 8)	Process Capability Analysis	8	Chapter 8 Problems (due Sat. at 11:59 pm)	
13	Review for Exam 2		Factorial Experiments for Process Design	13		Exam 2 (likely Tues. 3/31)
14	Factorial Experiments for Process Design	R Session (Chap 13)	Factorial Experiments for Process Design	13		
15	Acceptance Sampling	Acceptance Sampling	Acceptance Sampling	15	Chapter 13 Problems	
16	R Session (Chap 15)	Review for Exam 3		15	Chapter 15 Problems	
Finals Week						Exam 3 (4/30 at 3 pm)

Attendance Policy and Class Expectations

Attendance is required and counts for 5% of the grade. Attendance will be randomly taken and 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.

(*) If you do not think you will be able to attend most of the classes, you have the option to have this 5% 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 Monday August 26th. However, you will be responsible for all material covered in class. The instructor will not repeat material in office hours just because you didn't attend class.

Lectures are there to facilitate efficient learning, not chatting with friends, surfing the net, or sleeping. You should be focused on the course material and the in-class exercises assigned, not on activities that do not involve course work. Those who behave inappropriately will be asked to leave. If you cannot follow the lecture anymore, you can leave the class quietly; I will not be offended. Please, remember to turn off your cell phone as soon as you enter the classroom.

Make-Up Policy

Excused absences require appropriate documentation.

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 night-exams, several homework assignments, attendance, and a case study presentation.

In each exam, I will include a few challenging tasks, which only the best students will be able to answer. These are the questions that distinguish the A students.

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.

Exam-1	25%
Exam-2	25%
Exam-3*	25%/30%
Attendance*	5%/0%
Homework	10%
Case Study	10%

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 IIE Transactions, ASQ, etc.

You will create your group and submit a short proposal for case study approval by March 18th. Each team must have two unique case studies; therefore, this one-pager 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 paper should identify:

1. Team Members
2. Case Studies that your team has selected (with PDFs of the case studies attached)

3. Reason/Motivation for selected 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

The presentation file will be due April 11th and presentations will be scheduled individually with the instructor after this date.

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 team member will evaluate his/her teammates. Your individual grade will be based not only on your team score but also on your teammates' evaluations of you.

Grade Scale

Grade	Range	Grade Points
A	[93-100]	4.00
A-	[90-93)	3.67
B+	[87-90)	3.33
B	[83-87)	3.00
B-	[80-83)	2.67
C+	[77-80)	2.33
C	[73-77)	2.00
C-	[70-73)	1.67
D+	[65-70)	1.33
D	[60-65)	1.00
D-	[55-60)	0.67

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, and the percentage of As has historically been in the 10% range. 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 requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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.aa.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.aa.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://www.dso.ufl.edu/sccr/process/student-conduct-honor-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
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, 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 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

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.
<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://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf.

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