

**Industrial Quality Control**  
**ESI4221C (Sections: 2F47 and 3F25)**  
**Class Periods and Location:** M, W, F Period 2 (8:30 – 9:20 am), CSE E121  
**Academic Term:** Fall 2019

**Instructor:**

McKenzie Landrum, [landrum@ise.ufl.edu](mailto: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		Introduction	Introduction and DMAIC	1, 2	Introduction Assignment (due 8/24 at 11:59 pm)	
2	Modeling Process Quality	Modeling Process Quality	Modeling Process Quality	3		
3	Inferences about Product Quality	R Session (Chap 3)	Inferences about Product Quality	4	Chapter 3 Problems	
4	Inferences about Product Quality	R Session (Chap 4)	Inferences about Product Quality	4		
5	Inferences about Product Quality	Review for Exam 1		4	Chapter 4 Problems	Exam 1 – Wed. 9/18
6	Statistical Process Control	Control Charts for Variables	Control Charts for Variables	5, 6		
7	Control Charts for Variables	R Session (Chap 6)		6		
8	Control Charts for Variables	R Session (Chap 6)	Control Charts for Attributes	6, 7	Chapter 6 Problems	
9	Control Charts for Attributes	R Session (Chap 7)	Control Charts for Attributes	7		
10	Control Charts for Attributes	Review for Exam 2		7	Chapter 7 Problems	Exam 2 – Thur. 10/24
11	Process Capability Analysis	R Session (Chap 8)	Process Capability Analysis	8		
12	Process Capability Analysis	R Session (Chap 8)	Factorial Experiments for Process Design	8	Chapter 8 Problems	
13		Factorial Experiments for Process Design	Factorial Experiments for Process Design	13		
14	Acceptance Sampling	R Session (Chap 13)	Acceptance Sampling	13	Chapter 13 Problems	
15	Acceptance Sampling			15		
16	R Session (Chap 15)	Review for Exam 3		15	Chapter 15 Problems	
Finals Week						Exam 3 (12/12 at 12:30 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 26<sup>th</sup>. 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.

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

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 and present a case study paper.

You will create your group and submit a short proposal for case study approval by September 25<sup>th</sup>. Each team must have a unique case study; therefore, this one-pager will identify if there are two teams with the same study and conflicts will be solved on a first come – first serve basis.

The one-page paper should identify:

1. Team Members
2. Case Study that your team has selected (with a PDF of the case study attached)
3. Reason/Motivation for selected that case study
4. Course Topics that the case study uses
5. Back-up Case Study(s) – in the event you cannot get your first pick

The presentation file will be due November 14<sup>th</sup> 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
2. Analysis of the model/approach presented in the paper
3. Summary and critique of the results
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 have to 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 feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/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](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@ufl.edu](mailto:nishida@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: <http://registrar.ufl.edu/catalog0910/policies/regulationferpa.html>

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

#### ***Health and Wellness***

**U Matter, We Care:**

If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) or 352 392-1575 so that a team member can reach out to the student.

**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://www.dso.ufl.edu/documents/UF Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

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