

## STA 4664/5666 Statistics for Quality and Productivity Fall 2019

### Course Info

**Instructor:** Dr. Steven Ramsier  
**Office:** 106A OSB  
**Phone:** 644-3218 (Main Office)

**E-mail:** ramsier@stat.fsu.edu  
**Office hours:** 12:30 to 1:30 PM on Tuesdays and  
10:30 to 11:30 AM on Wednesdays.

**TA Grader:** Yaqi Jing

**E-mail:** yj16d@my.fsu.edu

**Class URL:** fsu.instructure.com

### Key Dates

**Class Meeting Times:** 11:00 AM – 12:15 PM in 108 OSB, Tuesdays and Thursdays  
**Scheduled Midterms:** October 10 and November 21 (Both Thursdays)  
**Assignments Due:** Sept. 12, Oct. 3, Oct. 31, Nov. 14 (All Thursdays)  
**STA5666 Presentations:** November 7 (Thursday)  
**Project Presentations:** Tuesday, December 3; Thursday, December 5; Dec. 11 at 12:30 (if necessary)  
**Final Period:** Wednesday, December 11, 12:30 PM to 2:30 PM

### Course Details

**Text (Recommended):** Montgomery, D.C. (2013), *Introduction to Statistical Quality Control*, Wiley, 7<sup>th</sup> Edition; ISBN: 978-1-118-14681-1; E-Text ISBN: 978-1-118-32416-5.

Other references will be provided during the course of the semester.

**Prerequisite:** One of STA 2122, 2171, 3032, 4442, 4321 or consent of instructor.

**Software:** Access to JMP 13 or 14 and SAS Studio (OnDemand version) or SAS 9.4. JMP and SAS 9.4 are available on campus computer labs. Students may obtain JMP from the department for free and free online access to SAS through SAS Studio OnDemand.

**Course Description:** An investigation of Deming's ideas, graphical methods, quality tools, measurement system assessment, control charts, design of experiments for product and process improvement.

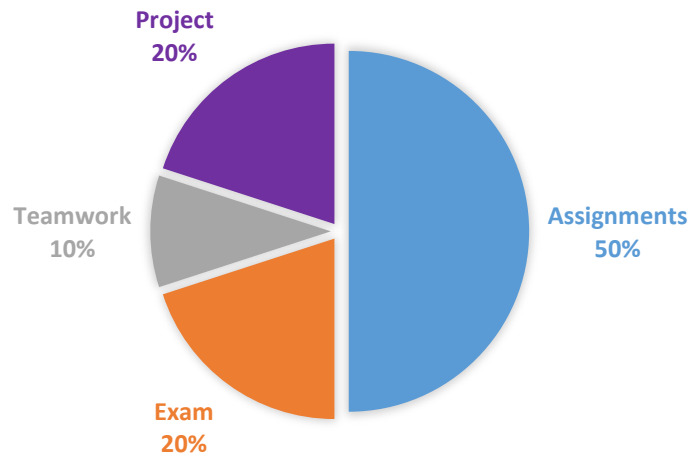
**Course Objectives:** Students who complete this course will be able to:

- Understand the vital importance of process control over product (output) control.
- Discuss the role of statistics in quality function deployment in an organization.
- Understand various approaches to quality improvement (Six Sigma, TQM, ISO standards).
- Structure quality improvement activities using the DMAIC (Define-Measure-Analyze-Improve-Control) methodology.
- Construct and interpret appropriate control charts.
- Calculate and interpret capability indices.
- Conduct various measurement system assessment studies.
- Plan and perform a sequence of designed experiments, letting previous experiments inform the next.
- Implement an acceptance sampling plan.
- Choose the appropriate technique useful for a given quality problem.
- Describe the underlying statistical principles of the techniques applied.
- Apply these techniques in the spirit of continuous process improvement.
- Interpret and communicate results of techniques implemented to non-technical audiences.

## Grades

### Grade Composition (Course Points):

4 Take-Home Assignments (125 each)	500
2 Midterm Exams (100 each)	200
5 Teamwork's (20 each)	100
Project or Presentation/Project Component	
Graduate Student Presentation (50) and	
Graduate Student Project (150); or	
<u>Undergraduate Team Project (200)</u>	<u>200</u>
<b>Total Points for the Course</b>	<b>1000</b>



### Grade Assignments:

A	930-1000	B-	800-829	D+	670-699
A-	900-929	C+	770-799	D	630-669
B+	870-899	C	730-769	D-	600-629
B	830-869	C-	700-729	F	0-599

## Assignments and Responsibilities

**Take-Home Assignments:** The assignments will consist of a combination of homework-style problems, software applications, and simulated consulting scenarios where you are required to make a recommendation and demonstrate a solution to the problem. You are free to discuss the assignment with any of your classmates; however, students may not “work together” as write-ups must be done independently. That is, **you must generate all your own written material**, your interpretations must be **in your own words**, and **you must generate all of your own JMP/SAS output**. Graduate students will be asked to complete an extra problem on each assignment. Late, unexcused assignments will be penalized as follows: One day late: 90% of grade, two days late: 75% of grade, and no credit for more than two days late.

**Exams:** Two midterm exams will be given, each with a duration of one class period. The exam is closed-book but open notes. Notes must be on paper and no electronic forms (computer, tablet, smartphone, etc.) will be permitted. Graduate students may be asked to work additional questions. In general no make-up exams are given unless a medical issue or personal/family emergency prevents you from taking the exam. Documentation is needed for make-up approval by the instructor.

**STA 5666 Presentation:** This is an oral presentation given to the class by graduate students (STA5666 students only). It will consist of a statistical approach or theory applied to a quality issue found in a professional journal, magazine, or recent text section focusing on quality and process improvement. Examples of such magazines and journals are *Quality Magazine*, *Quality Progress*, *Six Sigma Forum*, *Journal of Quality Management*, *Quality Engineering*, *the Journal of Quality Technology*, and *Technometrics*. You will be asked also to identify any of the elements of the DMAIC methodology that were related to the article and translate how the application may be applied in other situations. The techniques used should be new to the class (i.e., a modification or something completely different than was covered in class). This will count for 50 out of the 200 points allocated to the course project for STA5666.

**Teamwork:** Several in-class group activities will be carried out during the term. These activities are designed to reinforce concepts learned, provide practical experience with quality improvement, and build teamwork. Some of the activities may facilitate completing teams' course projects. There are no opportunities to make up teamwork. Missed teamwork grades will be replaced by the percentage made on the total of the midterm exams scaled to a score between 0 and 20.

**Team Project:** STA4664 students may work in teams of 3 or 4. STA5666 students may work with one other individual (team of 2). The project will focus on the quality improvement of some process of your own choosing. The project should focus on a process that is familiar all team members for which you believe can be improved. The improvement strategy used for the project will be to first assess your measurement process, monitor the process using an appropriate control chart, and design an experiment that is sequentially conducted, and analyzed. In addition, other elements of the six sigma methodology, DMAIC (Define-Measure-Analyze-Improve-Control), will be incorporated. Teams will develop a proposal, carry out the study, and present results during a class poster session. The project is worth all of the 200 allocated points for STA4664 students and 150 out of the 200 project points for STA5666 students.

## University Information

### **University Attendance Policy:**

Excused absences include documented illness, deaths in the family and other documented crises, call to active military duty or jury duty, religious holy days, and official University activities. These absences will be accommodated in a way that does not arbitrarily penalize students who have a valid excuse. Consideration will also be given to students whose dependent children experience serious illness.

**Academic Honor System:** The Florida State University Academic Honor Policy outlines the University's expectations for the integrity of students' academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process. Students are responsible for reading the Academic Honor Policy and for living up to their pledge to ". . . be honest and truthful and . . . [to] strive for personal and institutional integrity at Florida State University." (Florida State University Academic Honor Policy, found at <http://fda.fsu.edu/Academics/Academic-Honor-Policy>.)

**Americans with Disabilities Act:** Students with disabilities needing academic accommodation should:  
(1) register with and provide documentation to the Student Disability Resource Center; and  
(2) bring a letter to the instructor indicating the need for accommodation and what type.

Please note that instructors are not allowed to provide classroom accommodation to a student until appropriate verification from the Student Disability Resource Center has been provided.

This syllabus and other class materials are available in alternative format upon request.

For more information about services available to FSU students with disabilities, contact the:

Student Disability Resource Center  
874 Traditions Way  
108 Student Services Building  
Florida State University  
Tallahassee, FL 32306-4167  
(850) 644-9566 (voice)  
(850) 644-8504 (TDD)  
sdrc@admin.fsu.edu  
<http://www.disabilitycenter.fsu.edu/>

**Syllabus Change Policy:** Except for changes that substantially affect implementation of the evaluation (grading) statement, this syllabus is a guide for the course and is subject to change with advance notice.

**Certificate in SAS Programming and Data Analysis:**

This course satisfies one of the four courses required for the SAS Programming and Data certificate jointly sponsored by FSU and the SAS Institute. **Students** interested in the program **must apply to the program before** the end of the semester in which **the second course in the program is taken**. In addition, a portfolio is required to be submitted in the last semester of program and a representative assignment and/or project from this course must be included. For more details see <http://stat.fsu.edu/sas-certificate>.

**Tentative Schedule**

<b>Tuesday</b>	<b>Thursday</b>		<b>Tuesday</b>	<b>Thursday</b>
August 27, 2017	August 29, 2017		October 22, 2017	October 24, 2017
Intro Quality Definition Quality Systems Ch. 1	Six Sigma Ch. 2 QFD		<b>Teamwork 4</b>	Overview of Experimentation 13-1, 13-2, 13-3
September 3, 2017	September 5, 2017		October 29, 2017	October 31, 2017
Basic Quality Tools 5-4 Critical to Quality (CTQ's) Process	Understanding Process <b>Teamwork 1</b>		Sequential Exp. 13-4, 13-5, 13-6	Process Optimization Ch 14-1, 14-2 <b>HW 3 Due</b>
September 10, 2017	September 12, 2017		November 5, 2017	November 7, 2017
Process Continued, SAS	SPC Concepts 5-1, 5-2, 5-3, 5-4 <b>HW 1 Due</b>		Response Surface	<b>Graduate Presentations</b> EVOP 14-3
September 17, 2017	September 19, 2017		November 12, 2017	November 14, 2017
SPC Concepts 5-6 Variables Control Charts 6-1, 6-2	Variables Control Charts 6-3, 6-4		<b>Teamwork 5</b>	Project Overview <b>HW 4 Due</b>
September 24, 2017	September 26, 2017		November 19, 2017	November 21, 2017
<b>Teamwork 2</b>	More Variables Control Charts 6-5, 6-6		Acceptance Sampling Overview Ch. 15 & 16	<b>Exam 2</b>
October 1, 2017	October 3, 2017		November 26, 2017	November 28, 2017
Attribute Control Charts 7-1, 7-2, 7-3, 7-4, 7-5	CUSUM & EWMA 9-1, 9-2 Other SPC Charts <b>HW 2 Due</b>		Project Day	Thanksgiving No Class
October 8, 2017	October 10, 2017		December 3, 2017	December 5, 2017
<b>Teamwork 3</b>	<b>Exam 1</b>		Project Results Presentations	Project Results Presentations
October 15, 2017	October 17, 2017		Wednesday, Dec.11, 12:30 – 2:30 PM	
Capability 8-1, 8-2, 8-3, 8-4	Measurement Systems Assessment (MSA) 8-7, 8-8		Project Results Presentations (if necessary)	