

## STA 4664/5666 Statistics for Quality and Productivity Fall 2015

### Course Info

**Instructor:** Dr. Steven Ramsier

**Office:** 106A OSB

**Office hours:** 9:30 – 10:30 AM Wednesdays, 2:00 – 3:00 PM Thursday, or by appointment.

**E-mail:** ramsier@stat.fsu.edu

**Phone:** 644-3218 (Main Office)

**Fax:** 644-5271

**Class URL:** <http://campus.fsu.edu>

### Key Dates

**Class Meeting Times:** 11:00 AM – 12:15 PM in 108 OSB, Mondays and Wednesdays

**Scheduled Exam:** Wednesday, November 18

**Assignments Due:** Sept. 23, Oct. 14, and Oct. 28 (All Wednesdays)

**STA5666 Presentations:** November 4 and 9 (if necessary)

**Project Presentations:** Wednesday, December 2

**No Final Exam Scheduled**

### 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 11 or 12 and SAS Studio (OnDemand version) or SAS 9.3 or 9.4. JMP and SAS 9.3 are available on campus computer labs. Students may obtain JMP from the department for free and free online access to SAS through SAS 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.

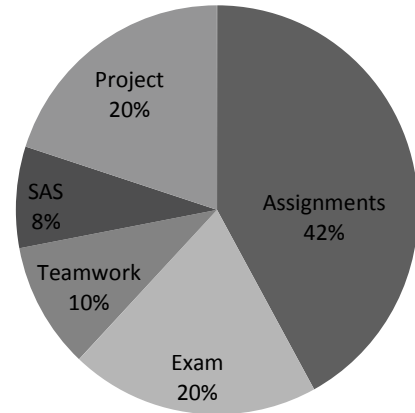
**Course Objectives:** Students who complete this course will be able to:

- 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 (1000 Points Total):

3 Take-Home Assignments (140 each)	420
1 Comprehensive Exam	200
5 Teamwork's (20 each)	100
4 SAS Exercises (20 each)	80
Graduate Student Presentation / Team Project	200



### 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, your write-up 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.

**Exam:** One comprehensive exam will be given with a duration of one class period. The exam is open book and open note. 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-ups.

**STA 5666 Presentation:** This is an oral presentation given to the class by graduate students (STA5666 students only). Graduate students may work in pairs. It will consist of statistical approach or theory 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 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 exam scaled to a score between 0 and 20.

**SAS Exercises:** Days scheduled for a SAS exercises will be conducted exclusively online. The exercise will consist of a student viewing a brief online lecture, viewing a SAS demonstration, and completing a

task involving SAS programming. Student work will then be submitted in Blackboard by the next class period. There are no opportunities to make up SAS exercises. Missed SAS exercise grades will be replaced by the percentage made on the exam scaled to a score between 0 and 20.

**Team Project:** STA4664 students may work in teams of 3 or 4. STA5666 students may 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 strategy of improvement 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 Policy:**

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. This should be done during the first week of class.

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:**

This syllabus is a guide for the course and is subject to change with advance notice.

<b>Tentative Schedule</b>
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M	W		M	W
August 24, 2015	August 26, 2015		October 19, 2015	October 21, 2015
Intro Quality Definition Quality Systems Ch. 1	Six Sigma Ch. 2 QFD FMEA		More MSA 8-8	Overview of Experimentation 13-1, 13-2, 13-3 <b>SAS Ex. 3 Due</b>
August 31, 2015	September 2, 2015		October 26, 2015	October 28, 2015
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	<b>HW3 Due</b> <b>Teamwork 4</b>
September 7, 2015	September 9, 2015		November 2, 2015	November 4, 2015
No Class	Process Continued, SAS		Process Optimization 14-1, 14-2	<b>Graduate Student Presentations</b>
September 14, 2015	September 16, 2015		November 9, 2015	November 11, 2015
SPC Concepts 5-1, 5-2, 5-3, 5-4 <b>SAS Ex. 1 Due</b>	SPC Concepts 5-6 Variables Control Charts 6-1, 6-2		<b>Graduate Student Presentations</b> (if necessary) Response Surface Designs	No Class
September 21, 2015	September 23, 2015		November 16, 2015	November 18, 2015
Variables Control Charts 6-3, 6-4	<b>HW1 Due</b> <b>Teamwork 2</b>		<b>Teamwork 5</b> EVOP 14-3	<b>Comprehensive Exam</b>
September 28, 2015	September 30, 2015		November 23, 2015	November 25, 2015
More Variables Control Charts 6-5, 6-6 <b>SAS Ex. 2 Due</b>	Attribute Control Charts 7-1, 7-2, 7-3, 7-4, 7-5		Acceptance Sampling Overview Ch 15 & 16 Project Overview	No Class
October 5, 2015	October 7, 2015		November 30, 2015	December 2, 2015
CUSUM & EWMA 9-1, 9-2	Capability 8-1, 8-2, 8-3, 8-4		Team Time <b>SAS Ex. 4 Due</b>	Project Results Presentations
October 12, 2015	October 14, 2015			
Measurement Systems Assessment (MSA) 8-7, 8-8	<b>HW2 Due</b> <b>Teamwork 3</b>			