ME 498: Manufacturing Data and Quality Systems
Fall 2018

3 Credit Hours Time: MW 1pm–2:20pm Room: 158 Loomis Lab

Instructor:	Dr. Chenhui Shao
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Office Hours:	2:30pm–4:30pm on Mon. or by appointment

Teaching Assistant

Mr. Siyuan Chen, siyuanc2@illinois.edu, Office Hours: 2pm–4pm on Tu. and 10am–12pm on Fri. in 32 MEB

Course Website

- Compass. https://compass2g.illinois.edu. Homework assignments, solutions, and class handouts will be posted on Compass. Please bring handouts to class.
- Piazza. https://piazza.com. Class-related online discussions will be conducted in Piazza. You are encouraged to ask questions here instead of via emails.

Textbook

No textbook is required. Recommended references:

- D. C. Montgomery, *Introduction to Statistical Quality Control*, 7th Edition, Wiley, 2014, ISBN: 978-1-118-14681-1.
- R. O. Duda, P. E. Hart, and D. G. Stork, *Pattern Classification*, 2nd Edition, Wiley, 2000, ISBN: 978-0-471-05669-0.
- Academic papers as recommended.

Prerequisite

ME 270; and introductory probability and mathematical statistics.

Computing

The software we will be using for this course is Python. You are suggested to use Anaconda, which is an excellent Python data science platform, to perform data analysis. The download page is https://www.anaconda.com/download/. If you prefer different software, you are welcome to use it, but sample codes and TA assistance will only be provided for Python.

Grading Policy

Homework	30%
Midterm	30%
Small Project	5%
Final Project	35%

Your course grade will be based on the weighting scheme presented above. There is no fixed grading scale for this course; conversion from your percentage score to letter

grades will be carried out at the end of the course. Your final grades will mainly be determined based on your relative performance in the class.

Homework Assignments

- There will be approximately six homework assignments during the course. Generally, the homework will be assigned every other Wednesday.
- Homework shall be turned in hard copies *at the beginning of class* on the due date.
- No late homework will be accepted. If you are unable to attend class, email your homework, which can be scanned copies, to the TA before the due date.

Midterm

- Midterm is scheduled at 1pm–2:20pm on October 17, 2018 (in class).
- The exam will be designed to take less than 80 minutes to complete it.
- Requests for a conflict or make-up exam will be individually evaluated. Only requests that, in the instructor's opinion, are fully justified (i.e., with the appropriate official documentation) will be granted.
- Students can ONLY request a re-grading of their exams within the first 48 hours of receipt of their exams. Note that re-graded exams may potentially receive a lower grade, if applicable.

Course Project

- There are two projects in this course: (1) a small project on measurement system analysis (MSA) and (2) a final project on selected quality problems.
- You are expected to work in groups of four.
- The MSA project will consist of measurement data collection (to be conducted in class), data analysis, and a written report.
- The final project will consist of a project proposal, data analysis, a written report, and an oral presentation. A mock industry review will be adopted for the grading of the final project.

Tentative Course Outline

1. Course overview
2. Modeling of process quality
3. Inferences about quality
4. Methods and philosophies of SPC
5. Control charts for variables
6. Control charts for attributes
7. Measurement system analysis
8. Quality monitoring in today's manufacturing
9. Feature generation
10. Feature selection
11. Bayesian decision
12. Support vector machine
13. KNN classifier
14. Classification tree

15. Neural networks
16. High-performance computing

Course Policy

- Please show respect for your classmates by limiting distractive behavior. Turn your cell phones off during class and please keep any side discussions short and quiet.
- You are expected to adhere to all of the rules pertaining to academic integrity outlined in the Student Code. Failure to do so will result in an automatic F for the course.
- It is expected that each student will be courteous and respectful to all members of the class and will carry his or herself in an orderly manner for the entire duration of the course as outlined in the Student Code.
- Regular class attendance and punctuality are expected.
- You are encouraged to discuss homework problems with your fellow classmates. But your final answers should be based on your own understanding. Copying other's work is NOT acceptable.

Special Accommodations

If you have any condition, such as a physical or learning disability, which will make it difficult for you to carry out the work as it has been outlined or which will require special accommodations, please notify the instructor during the first week of the course with the appropriate written documentation. To contact the Division of Rehabilitation-Education Services (DRES), you may visit 1207 S. Oak St., Champaign, IL 61820, call (217) 333-1970, or email disability@illinois.edu.