



## 36-726 Statistical Practice

**Meeting Days, Times, Location:** MW, 1:30 pm to 2:50 pm, Wean Hall 5409

**Semester:** Spring **Year:** 2020

**Units:** 12

### Instructor Information

<b>Name</b>	Susan Buchman
<b>Contact Info</b>	sbuchman@andrew.cmu.edu
<b>Office location</b>	Baker Hall 232A
<b>Office hours</b>	By appointment
<b>Name</b>	Joel Greenhouse
<b>Contact Info</b>	joel@stat.cmu.edu
<b>Office location</b>	Baker Hall 229F
<b>Office hours</b>	Walk-in or by appointment

### Overview

Most statisticians in industry, government, and academia spend a fair bit of their time providing advice and analyzing data for colleagues whose specialties are in some other field. Often, the contributions of the statistician in a scientific collaboration is to sharpen the focus of an investigation by identifying what may, and may not, be learned from a particular data set. It is part of the appeal of our discipline that it is application-oriented, yet in most coursework there is inadequate time to take the applications seriously. **The main purpose of this course is to help students develop skills in interacting with a client and in digging more deeply into problems that involve statistical practice.** It is a course intended to aid you in making the transition from being a student of statistics to being a statistics professional.

Communication skills are essential for success. Through practice and discussion, this class will help you to improve your ability to interact with a client. A practicing statistician must be able to ask good questions, understand the context of the client's problem, summarize results and advise the client in a clear and useful manner, both verbally and in writing. Work on projects in this course will help you to improve these skills. Often, a lasting benefit to the client will be the education he or she receives from the statistician. This is another aspect of the process that

improves with experience, and which you should be conscious of in your work here.

## **Course Organization and Objectives**

In the first two weeks of class, clients present their projects. Student then rank projects and are assigned to a single project in groups of two or three. Each project is assigned one of the two faculty instructors as a mentor. Students work for 12 weeks with the client and the mentor to develop solutions to the client's problem in the framework of guided practice. Typically, a project involves:

1. Learning to work with the client, and fully understanding the client's needs
2. Understanding the data, where it came from and cleaning it
3. Optionally gathering new data, for example, by web scraping or other means
4. Testing various solutions to the client's problem
5. Fully developing one or more solutions
6. Providing interim reports to the client
7. Providing a final written report, a final oral report with slides, and well-documented software during the last two weeks of the semester

During the semester, some of the classes will be lectures about presentation skills, computational approaches, and new statistical theory and practice related to specific projects. The class will be organized around milestones which include practice talks, presenting incremental progress to date, as well as written progress reports. Each project group will meet weekly with their mentor. Written reports and group presentations will be evaluated for feedback at least twice during the semester. Furthermore, a major learning component of the course comes from listening, evaluating and interacting with other groups about their work, so that you are not only learning from your project but also from the context and the issues that arise from all the course projects.

The specific objectives of this course are that by the end of the semester you will be able to:

1. Demonstrate effective interpersonal skills related to working with clients and with your group
2. Demonstrate effective skills for data cleaning, analysis, and model verification
3. Demonstrate effective written and oral presentation skills.
4. Work effectively in a group setting
5. Demonstrate production of software that is sufficiently well-documented to be useful to a client
6. Grasp the entire arc of the consulting project, and explain how to approach a new project
7. Demonstrate mastery of issues related to the ethics of human use.

## **Learning Resources**

All necessary readings will be provided via Canvas. Required languages and software are open source and/or freely available, or access will be provided by the department.

## **Assessments**

Most of the class periods will be taken up by presentations by clients or student teams. You are expected to participate actively in class and interact both in class and outside with your team and with the client. The

appropriate frequency of client meetings should be determined in discussion with your faculty supervisor.

**Use of electronic devices, such as laptops, phones, tablets, etc., are not permitted during class meetings.**

The exception would be devices required for accommodations as documented by CMU's Office of Disability Resources, and devices used by teams presenting their practice talks.

As research on learning shows, unexpected noises and movement automatically divert and capture people's attention, which means you are affecting everyone's learning experience by using your cell phone, pager, laptop, etc. during class. Furthermore, an important professional skill is the ability to sustain focus without needing devices as a frequent distraction.

The final course grade will be calculated as follows:

Assessment	Percentage of Final Grade
Project and related group activities	70%
Non-project homework	10%
Participation and engagement	20%

**Initial Schedule (subject to change)**

Week of	Agenda
January 13, 2020	Client Presentations
January 20, 2020	Client Presentations
January 27, 2020	Additional Topics
February 3, 2020	First Practice Presentations
February 10, 2020	First Practice Presentations
February 17, 2020	Additional Topics
February 24, 2020	Second Practice Presentations
March 2, 2020	Second Practice Presentations
March 9, 2020	Spring Break - NO CLASSES
March 16, 2020	Additional Topics
March 23, 2020	Additional Topics/Third Practice Presentations
March 30, 2020	Third Practice Presentations
April 6, 2020	Third Practice Presentations
April 13, 2020	End of Analysis

April 20, 2020

April 27, 2020

Final Presentations to Clients

May 4, 2020

Final Presentations to Clients

## Course Policies

- **Attendance & Participation:** It is essential to the class that you participate actively. This means you must do all the assignments including the readings; you must take part in discussions; and you must be present and prepared for class. On-time attendance is mandatory.
- **Team Participation.** Every member of the project team is expected to contribute actively, productively, and professionally. We do not expect anything less than professional conduct and responsibility at all times.
- **Academic Integrity & Collaboration:** Collaboration and discussion of readings and homework problem is encouraged. However, each student is required to write up any non-group HW solutions independently based solely on your own understanding.
- **Late-work/Make-up work policy:** We will deduct 10% from a HW that is less than 24 hours late, and will not accept homework beyond that.
- **Accommodations for students with disabilities:** If you have a disability and require accommodations, please contact Catherine Getchell, Director of Disability Resources, 412-268-6121, [getchell@cmu.edu](mailto:getchell@cmu.edu). If you have an accommodations letter from the Disability Resources office, we encourage you to discuss your accommodations and needs with me as early in the semester as possible. We will work with you to ensure that accommodations are provided as appropriate.
- **Statement on student wellness:** As a student, you may experience a range of challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may diminish your academic performance and/or reduce your ability to participate in daily activities. CMU services are available, and treatment does work. You can learn more about confidential mental health services available on campus at: <http://www.cmu.edu/counseling/>. Support is always available (24/7) from Counseling and Psychological Services: 412-268-2922.