Course Goals

1. Students will be able to design data collection strategies (experiments and samples) that are appropriate for statistical analyses.

2. Students will be able to choose appropriate graphical and numerical techniques to summarize univariate data and to describe the relationship among variables.

3. Students will be able to choose an appropriate statistical model in several situations.

4. Students will be able to construct confidence intervals and hypothesis tests for parameters of several statistical models.

5. Students will be proficient in the use of a standard statistical package (R).

6. Students will be able to state the underlying assumptions of the particular probabilistic models used in the course and explain the role that such assumptions play in probabilistic models generally.

7. Students will be able to read journal articles that rely on statistical methods, to explain these methods, and to evaluate the appropriateness of the use of those methods.

Textbook  The textbook (Statistical Modeling: A Fresh Approach) has a website with additional resources including the exercises.

Course Webpage   There is a webpage for this course. You should check this often. In particular, it will contain copies of all class handouts, due dates for all assignments, and a description of what you should do to prepare for class each day. You are responsible for any announcements that are made through the website (although of course not immediately after they appear). This course does not use Moodle.

Class Activity   While there will be some lecture, considerable classroom time will be devoted to working on data analysis projects, often with a partner or two. These investigations present data from a real study and introduce a data analysis strategy in the context of that data. In order for you to participate effectively in these activities, it will be necessary that you bring to class a laptop that can connect to the internet using the Calvin wireless network.
**R** Doing statistics requires statistical software. We will use the statistical package R to do our work. R is a free but professional-quality statistical software system. While you can download and install R on your own computer, we will use a web-based interface to R that provides several useful features beyond the language itself. Therefore it will be necessary for you to have access to the internet in class and for homework. The textbook is integrated with R and provides some instruction but there will be several resources provided to help you learn the language.

**Homework** There will generally be two kinds of homework. First, there will be readings and activities that must be completed before we cover the material in class. While there will usually be nothing to turn in based on these activities, class might start with a quiz or other exercise to make sure that everyone has done the work and to assess how well we understood the reading. This kind of homework will usually be due on Monday and Thursday. Second, there will be homework problems to be completed and turned in. These will be on material that we have already covered. These problems are generally collected on Tuesdays and Fridays but the web homework schedule gives precise details. No late homework is accepted for any reason. In general 3 PM at my office (NH 279) is the hard deadline.

**Tests** There will be three tests. The computer will be necessary for all or part of each test. You will need to bring a laptop to the test. More information about the format of the tests will be given well in advance of the first test. There are no makeup tests. Parts of the tests may be take-home.

**Projects** There will be two or three short projects that requires you to conduct a statistical study. You will formulate a research question, collect data relevant to the question, perform an appropriate analysis, and write a report about your results. These projects may be done alone or in groups of two or three.

**Final Exam** The final exam is given only at the scheduled time. The college requires that I give and you take the exam at this time! The final exam is cumulative. A portion of the exam may be take-home.

**Collaboration** It is perfectly acceptable to help each other. Indeed much of class time will be devoted to working with each other. I also encourage you to work together on any assignment unless I explicitly say otherwise. Of course academic honesty and common sense require that only honest effort on your part be rewarded; do not turn in “joint” work which is really only the work of someone else. However you do not have to feel guilty turning in work that reflects mostly the good ideas of someone else if you were genuinely working together. Even if your work is joint, you should write your own solutions as independently as possible. That is, do not simply copy from others. This is to ensure that you really understand the solution. You should always indicate who you collaborated with on a problem. Failure to do this is a form of academic dishonesty.

**See Me** If you are having trouble with the course, if you don’t understand something important, if you have some special circumstance that is getting in the way of performing well in this class, or you just want to talk about the course, see me. While I have office hours, I encourage you to come see me anytime that I am in my office. While I check email regularly and will answer it promptly, email isn’t very useful for answering the more technical questions that might come up.
in homework. Also, don’t assume that just because you are awake and writing email that I am awake and reading email!

**Attendance** While I do not explicitly require attendance, the work in class will usually be important for understanding the material and therefore students who don’t attend class will likely do poorly on tests and the exam. Also, there will be a component of the grade devoted to in-class activities and if you miss class on those days you cannot receive that credit. I will start and end class on time and I expect you to do likewise. If you must come late or leave early, do so as unobtrusively as possible and do not make it a habit.

**Disabilities** Calvin will make reasonable accommodations for persons with documented disabilities. Students should notify the Coordinator of Services for Students with Disabilities located in the Student Academic Services office. Students requiring such accommodations should meet with me during the first week of class.

**Final Grade** Your final grade $F$ will be computed from your grades (suitably normalized) on the homework ($H$), classroom activities ($C$), projects ($P$), tests ($T$), and final exam ($E$) by the following formula:

$$F = .30E + .35T + .15H + .15P + .05C$$

In order to account for the fact that you may not be able to take all the tests (due to illness, athletic events, or mysterious events involving non-functional alarm clocks), $T$ will be computed by using your exam grade for any test for which the exam grade is greater. (Note that this policy implies that $T \geq E$ in the equation above since each test will be at least $E$.) Your homework grade will be based on the homework that you turn in on time. Since late homework is not accepted for any reason, some allowance will be made for missed homework.

**Exceptions** I reserve the right to make changes or exceptions to the above policies either for the whole class or for individuals. The ultimate goal in this course is learning and formal requirements should not unnecessarily stand in the way of this. As a consequence, if you (individually or collectively) think that any of the above conditions are interfering with learning, let me know and we’ll see what can be done.

*Statistical thinking will one day be as necessary for effective citizenship as the ability to read and write.*

H. G. Wells

*An approximate answer to the right question is worth a good deal more than the exact answer to the wrong problem.*

John Tukey

*Not everything that counts can be counted and not everything that can be counted counts.*

Albert Einstein