Montserrat 106N – Identifying Patterns
Syllabus – Fall 2009

Professor: John Little
Office: Swords Hall 331
Office Phone: (508) 793-2274
Office Hours: MTWF 10-12noon, W 2-3pm, R 11-12noon
Course Homepage: `http://mathcs.holycross.edu/~little/Montserrat/Fall.html`

Course Description

The mathematical topics we will study in this course will all deal with elementary aspects of *statistics*. Statistical thinking is one method human beings have developed to discern and demonstrate the existence of underlying patterns in the information we gather from the natural world. Statistical reasoning allows us to address questions such as: Do our historical records of temperature readings justify the claim that we are experiencing global climate change? Do the results of medical studies justify the claim that a high-fat diet leads to increased risk of certain cancers? This application of mathematics is an ever-growing component of public debate on issues in the environment, human health, and politics. In this course, you will learn the basic tools of descriptive statistics and statistical inference and how they are applied to real-world data.

Course Objectives

The major objectives of the course will be:

1. To introduce you to basic methods of data analysis and descriptive statistics (mean, standard deviation, correlation coefficient, regression) and develop your proficiency at computing these statistics by hand and with appropriate software.
2. To develop your skill in interpreting data and formulating reasonable conclusions.
3. To develop your ability to read and analyze reports of scientific studies in the popular press and other general-audience sources.
4. To further your development as writers and speakers.
5. To participate in and contribute to the common activities of the Natural World Cluster of the Montserrat program:

   a. Campus Arboretum Tour
   b. Panel Discussion – what do literature, art, science tell us about the natural world?
   c. Campus Visit and Lecture by Frederick Grinnell.

   Note: Dates and times will be announced when plans are finalized.

Texts

The main mathematical text for the course is *Statistics, 4th edition* by Freedman, Pisani, and Purves, published by W.W.Norton. We will cover Parts I,II,III and the start

of IV this semester, and most of the rest of the book in the spring. In addition, we will be discussing readings from the Natural World Cluster common text, *Everyday Practice of Science* by F. Grinnell, published by Oxford University Press.

Course Schedule

A detailed day-by-day course schedule and listing of required and suggested outside events will be maintained on the course homepage. That listing is a tentative, evolving schedule, so you will probably want to refer to it frequently. Any important changes will also be announced in class well in advance.

Assignments and Grading

1. Midterm Exam (20 % of course grade) – tentative date: Friday, October 23.
2. Final Exam (25 % of course grade) – the final will be given at the established time for MWF 9 am classes: Thursday, December 17 at 2:30pm.
3. Problem Sets (about 6 through the semester – 15 % of course grade)
4. In-class group work and computer labs (about 4 assignments – 10 % of course grade)
5. Two short (roughly 5 page) papers related to the common reading or other topics. (More information and guidelines to be distributed later) (15 % of course grade)
6. *Presentation/Discussion Days*: During the semester, each student, working with a classmate, will prepare a 10-minute oral presentation on a recent newspaper or magazine article relevant to the subject of the course. For each such assignment, the pair will also prepare several discussion questions for the class and lead a discussion for an additional 15 minutes. (10 % of course grade)
7. Class participation (5 % of course grade)

I will be keeping your course average in numerical form throughout the semester, and only converting to a letter for the final course grade. The course grade will be assigned according to the following conversion table (also see Note below):

- A – 94 and above
- A- – 90 - 93
- B+ – 87 - 89
- B – 84 - 86
- B- – 80 - 83
- C+ – 77 - 79
- C – 74 - 76
- C- – 70 - 73
- D+ – 67 – 69
- D – 60 - 66
- F – 59 and below.

Note: Depending on how the class as a whole is doing, some downward adjustments of the above letter grade boundaries may be made. No upward adjustments will be made,

however. (This means, for instance, that an 85 course average would never convert to a letter grade of B- or below, although it might be a B+ in some circumstances.) If you ever have a question about the grading policy or your standing in the course, don't hesitate to ask me.

Advice On How To Succeed In This Class

A good "work ethic" is key. You do not need to be a "math genius" to master this material and do well. But you will need to put in a consistent effort and keep up with the course.

Come to class. Unless you are deathly ill, have a genuine family emergency, etc. plan on showing up here at 9:00 am every Monday, Wednesday, and Friday this semester. Many of the class meetings of this course will be structured around discussions or student presentations. Your participation is expected and needed for the success of the course!

Take notes and use them. This may seem obvious, but it is worth saying! Used intelligently, your notes can be a valuable resource as you work on problem sets and prepare for exams.

Use the textbook and class notes actively. Plan to look over the section to be covered each day *before* coming to class. That will make the class activity or lecture more understandable. After the class, if things were not clear, you will find alternate explanations of concepts in the text that may help you past a "block" in your understanding. Reading a math book or rereading your class notes is not like reading a novel, though. You will need to read very carefully, with pencil and paper in hand, perhaps working through the examples again in detail. In addition, our textbook has a set of study questions at the end of many sections and full answers are provided at the end of the book. It will be very beneficial to do a good selection of these as part of your regular study. As you do this, if there are things you are not understanding, make a list of questions to ask in office hours or at the next class. An important thing to bear in mind is that the *result* (the "answer") of an example or practice question is often secondary to the *process used in obtaining the result* or the way the statistical ideas were applied to derive a conclusion – that process or the way the conclusion was reached is the real point, and that's what you should take away from studying the example.

Set up a regular study schedule and work at a steady pace. It's not easy to play catch-up in a mathematics course (even when the course is part of a first-year program with additional goals beyond the mathematics), since each topic builds on the previous ones. You should expect to budget at least 6 hours in a typical week for work outside of class. The best way to use your time is to do a few problems, a little reading from the book, and reviewing of class notes every day.

Most importantly, if you are having difficulty learning something, get help as soon as possible. You can do this by asking questions during class (any time something isn't clear), or seeing me during office hours.

Statement on Academic Integrity

All education is a cooperative enterprise between teachers and students. This cooperation works well only when there is trust and mutual respect between everyone involved. To be become an engaged and advanced learner, you must be able to think and work both independently and in concert with your peers. The College academic honesty policy states: As an institution devoted to teaching, learning, and intellectual inquiry, Holy Cross expects all members of the College community to abide by the highest standards of academic integrity. Any violation of academic honesty undermines the student-teacher relationship, thereby wounding the whole community. The principal violations of academic honesty are plagiarism, cheating, and collusion.

Plagiarism is the act of taking the words, ideas, data, illustrative material, or statements of someone else, without full and proper acknowledgment, and presenting them as ones own.

Cheating is the use of improper means or subterfuge to gain credit or advantage. Forms of cheating include the use, attempted use, or improper possession of unauthorized aids in any examination or other academic exercise submitted for evaluation; the fabrication or falsification of data; misrepresentation of academic or extracurricular credentials; and deceitful performance on placement examinations. It is also cheating to submit the same work for credit in more than one course, except as authorized in advance by the course instructors.

Collusion is assisting or attempting to assist another student in an act of academic dishonesty.

The full statement on Academic Honesty in the College Catalog will be posted on the Natural World/Montserrat Moodle site and is available at

`http://www.holycross.edu/catalog/academic-honesty-policy.pdf`

The temptation to engage in an act of academic dishonesty will almost certainly arise, but the chance to possibly enhance a single grade is not worth the loss of your personal integrity. If you do not know how to correctly cite reference materials, consult with the campus Writers Workshop, or visit one of the links below (also posted on the Natural World/Montserrat Moodle site).
Department of History:

`http://www.holycross.edu/departments/history/website/academichonesty.htm`

Department of English (link to Houghton Mifflin booklet, "Understanding Plagiarism: A Student Guide to Writing Your Own Work"):

`http://college.cengage.com/english/plagiarism_prevention.html`

Houghton Mifflin, The Plagiarism Zone

`http://college.hmco.com/english/plagiarism_prevention.html`

NOTE: If in doubt about what you plan to do or write violates academic honesty, PLEASE ASK!

Specific Guidelines for this Course

In this course, all examinations will be closed-book. No sharing of information with other students in any form will be permitted during exams. On group discussion and computer lab write-ups, close collaboration with the other members of your group is expected. On the individual problem sets, discussion of the questions with other students in the class and with me during office hours is allowed, *even encouraged*. However, your final problem solutions should be prepared individually and the wording and organization of your final problem solutions should be entirely your own work. Moreover, if you do take advantage of any of the above options for discussion of problems with others, you will be required to state that fact in a footnote accompanying the problem solution. Failure to follow this rule will be treated as a violation of the College's Academic Integrity policy. For the two short papers, if you do consult a source other than the course texts, include a full reference in a bibliography section at the end of your paper, and identify any direct quotations. Information about the acceptable formats for doing this will be distributed with the paper assignments.