

Statistics for Ecologists Spring 2015

Brief Description:

This course is intended to provide students with an introduction to probability and statistics as applied to ecological problems. This course fulfills a prerequisite for several upper-level courses in the Fisheries and Wildlife curriculum, and the material you learn in this course will provide a critical base for future courses you will take. The course format will include lectures and lab exercises. My goal is to provide you with the conceptual basis for statistical techniques, but include examples that will be relevant to you in future classes.

Course Code: STT 224, Section 1, 2, 3, 4

Prerequisites: MTH 103 or MTH 116 or (MTH 124 or concurrently) or (MTH 132 or concurrently) or (MTH 152H or concurrently) or (LB 118 or concurrently)

Time: Lecture MW 12:40 - 1:30 Room 1415 Biomed Phy Sci Bldg
Lab section 001 M 3:00 – 4:50 Room 1210 Anthony Hall
Lab section 002 T 3:00 – 4:50 Room 218 Natural Resources
Lab section 003 F 12:40 – 2:30 Room 218 Natural Resources
Lab section 004 T 12:40 – 2:30 Room 218 Natural Resources

Office Hours: Wednesdays 1:30-2:30 (can access me after class in the lecture room, or shortly after class in my office.)

Number of Credits: 3

Instructor: Thomas Luhring
Room 22 Natural Resources Building
(517)353-0731
tomluhring@gmail.com

Teaching Assistant: Yi-Chen Zhang
zhang318@stt.msu.edu
Office hours TBA

Recommended Text: Introductory Biological Statistics, 2nd edition. Raymond E. Hampton and John E. Havel. Waveland Press, Inc. 2006.

Web access to course materials:

Copies of class Powerpoint slides can be found at the course web site. Laboratory assignments will generally be supplied through LON-CAPA.

Grading:

| | % of Grade |
|------------------------|-------------------|
| Exam 1 | 17.5% |
| Exam 2 | 17.5% |
| Final Exam | 30% |
| Laboratory Assignments | 35% |
| TOTAL | 100% |

| Grade | Letter | % | Grade | Letter | % |
|--------------|---------|---------|--------------|---------|--------|
| 4.0 | A | 93-100% | 2.0 | C | 73-77% |
| 3.5 | A- / B+ | 88-92% | 1.5 | C- / D+ | 68-72% |
| 3.0 | B | 83-87% | 1.0 | D | 63-67% |
| 2.5 | B- / C+ | 78-82% | 0.0 | F | < 63% |

In addition to these grading criteria, I reserve the right to fail any student who achieves a 60% or less on the cumulative final exam.

Another critical note is that we will use Angel to record your grades, and to allow you to check to see if we have received materials and recorded grades accurately, BUT, Angel does not compute the final weighted average correctly, so DO NOT rely on Angel to provide you with your overall average.

Attendance and assignment policies:

Attendance is not taken in this class. If you are unable to attend class or are not interested in attending class on a particular day it is your responsibility to make up the work missed. **Before seeing me** about what you missed for the day, obtain a copy of the Powerpoint slides for the day and speak with another student in the class about getting any additional notes for the class. If you are still unclear about what was covered in class you should visit me in office hours to clarify any confusing issues. I will not provide you with the entire lecture; rather, I will help you work through those areas you do not understand or need additional examples.

Assignments are due on the date listed unless you have made specific arrangements with me **ahead of time**. Assignments turned in late may be docked points according to the following schedule:

| | |
|---|----------------------------|
| Open LON-CAPA for 1 additional week | Minus 20 percentage points |
| Open LON-CAPA until last week of semester | Minus 50 percentage points |

Please e-mail me if you need an extension. I want to emphasize that if you have fallen far behind in class, for whatever reason, I would prefer you to hand in work and learn the material rather than give up. Handing in work more than 10 days late means that you will receive a 50% at best for that assignment (which is failing), but this is far better than receiving a 0% and not learning the material at all. **One limitation to the late turn-in policy is that I will not accept homework during finals week unless you have made prior arrangements with me - this is unfair to the grader and me as this is a crunch time for us as well.**

All students are expected to write exams on the date listed on the syllabus. Failure to attend the scheduled exam period will result in a zero for the exam. If circumstances arise where you are unable to take an exam on the specified date (e.g., conflict with scientific conference), please see me as early as possible to make other arrangements. Students arriving late for an exam will not be given extra time to complete the exam. All exams are closed book, closed note, and closed neighbor.

Academic dishonesty:

Academic honesty is fundamental to the activities and principles of a university. All members of the academic community must be confident that each person's work has been responsibly and honorably acquired, developed, and presented. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. The academic community regards academic dishonesty as an extremely serious manner, with serious consequences that range from probation to expulsion. When in doubt about plagiarism, paraphrasing, quoting, or collaboration consult me for guidance. Cases of obvious and serious academic dishonesty are sufficient to warrant an automatic 0.0 for the assignment or even the course as a whole.

Course Outline

Part I. Probability

- Probability Rules
- Combinations
- Permutations
- Binomial Distribution

Part II. Descriptive statistics and sampling

- Descriptive statistics
- Sampling
- Presenting data - tables
- Presenting data - graphs

Part III. Inferential Statistics

- One sample t-test
- Two sample t-test
- Two sample paired t-test
- Chi-square
- Regression
- Analysis of Variance

Note: topics will not be covered in above order

Tentative Lecture Schedule

Note: this is likely to change, and should only be used for rough guidance

| <u>Date</u> | <u>Topic/Activity</u> |
|-------------------|---|
| Mon Jan 12 | Course Introduction |
| Wed Jan 14 | Probability Rules |
| Mon Jan 19 | NO CLASS - Martin Luther King, Jr. Day |
| Wed Jan 21 | Probability Rules – Permutations |
| Mon Jan 26 | Combinatorials |
| Wed Jan 28 | Binomial |
| Mon Feb 2 | Descriptive statistics |
| Wed Feb 4 | Descriptive statistics and sampling |
| Mon Feb 9 | Sampling |
| Wed Feb 11 | Sampling |
| Mon Feb 16 | Review |
| Wed Feb 18 | 1st exam |
| Mon Feb 23 | Review 1 st exam |
| Wed Feb 25 | Sampling |
| Mon Mar 2 | Sampling |
| Wed Mar 4 | Inference |
| Mar 9-13 | <u>Spring Break</u> |
| Mon Mar 16 | Inference |
| Wed Mar 18 | Inference |
| Mon Mar 23 | ANOVA |
| Wed Mar 25 | Graphical principles |
| Mon Mar 30 | review for exam |
| Wed Apr 1 | 2nd exam |
| Mon Apr 6 | Correlation and Regression |
| Wed Apr 8 | Correlation and Regression |
| Mon Apr 13 | Chi-square |
| Wed Apr 15 | Catch up |
| Mon Apr 20 | Examples from Literature |
| Wed Apr 22 | Examples from Literature |
| Mon Apr 27 | Statistical Analysis using SAS and R |
| Wed Apr 29 | Review |

Final Exam Thursday May 7 12:45 – 2:45 p.m.

Approximate Lab Schedule

Note: We will make up the Jan 19 lab (MLK Day) the following week for the Monday lab section

| Week | Date | Topic | Due Date |
|------|--------|--------------------------------------|---------------------|
| 1 | Jan 12 | NO LAB This Week | |
| 2 | Jan 19 | Probability I | Jan 31 |
| 3 | Jan 26 | Probability II | Feb 7 |
| 4 | Feb 2 | Descriptive statistics | Feb 14 |
| 5 | Feb 9 | Descriptive statistics | Feb 21 |
| 6 | Feb 16 | Excel Basics | Attendance in class |
| 7 | Feb 23 | Sampling I | Mar 7 |
| 8 | Mar 2 | Sampling II | Mar 21 |
| 9 | Mar 9 | NO LAB this Week Spring Break | |
| 10 | Mar 16 | Inference | Mar 28 |
| 11 | Mar 23 | ANOVA | Apr 4 |
| 12 | Mar 30 | Presenting Data | Attendance in class |
| 13 | Apr 6 | Regression | Apr 18 |
| 14 | Apr 13 | Chi-square | Apr 25 |
| 15 | Apr 20 | Applications | May 2 |
| 16 | Apr 27 | TBA | Attendance in class |