

BIOL 4401-A Syllabus

Experimental Design & Statistical Methods

Tue / Thur 1:30 - 2:45pm, Instructional Center 217

Instructor Information

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General Information

This is an introductory course on probability distributions and statistical testing, using techniques commonly applied in biology research. In-class activities will be split between lectures, which will introduce general concepts and outline formal steps for solving statistical problems, and exercises, where you will implement these ideas using either a laptop or tablet.

Homework assignments will require the use of statistical software, but students may choose any software. Options will be suggested later in the course.

Stuff you need

In the classroom you will need:

- Pen or pencil and paper for note-taking. Using electronics to take notes is permitted but discouraged. Taking notes on a device without a stylist will not really be possible.
- A laptop or tablet with internet connectivity.
- Some students find a handheld calculator convenient as well.

Grading

Component	Weight
In-class exercises	20%
Homework assignments	20%
Midterm exams	35%
Final exam	25%

Grading Scale

Most of the final grades for this course will be As and Bs, and your final grade will be determined based on how you place relative to the other students. The number of As and Bs is not pre-determined. Average exam scores can fluctuate significantly from exam to exam and you will not be able to compute your grade by assuming that 90% = A, 80% = B, etc. However, after each exam we will post the class distribution so that you can identify your standing. If you would like to get an A, please see the handout How to Get an A.

Exams

The midterm and final exams will take place in the classroom. You will need only a pen or pencil. In some cases, you may be permitted to also bring a simple, cheapie calculator. However, there will be no complex arithmetic.

Final Exam

The final exam will be held on Monday, April 30 from 2:50pm - 5:40pm. It will be comprehensive, but emphasize the later material. The final will be written to be approximately 50% longer than the midterms and will be written so as to ideally require less than the two hours and 50 minutes provided.

Grade Dispute Policies and Procedures

If you identify a mistake in the grading of a homework assignment or exam, please bring it to our attention immediately. Most importantly, when exams are returned, please tally the points yourself and make sure we have summed your grade correctly. Sometimes errors happen and we want to be as fair as possible. Errors identified more than a week after the document is returned may not be reconsidered.

Course Materials

Course Text

No textbook is required for this course. However, if you would like additional reference materials, please see the handout Textbook Options.

Course Website

This course is managed through T-Square. All documents (syllabus, hand-outs, statistical tables, etc) associated with the course will be available for download here.

Piazza

We will use a forum on piazza.com to post and archive questions during the course. To set up your free account and gain access to our class's page, please go to:

<https://piazza.com/gatech/spring2018/biol4401a>

All questions in this course should be posted in Piazza! Both instructors and students will be able to post answers. You may post anonymously (or not) to other students, but instructors will always be able to see your identity. Students who post helpful responses to others will be noted!

Learning Catalytics

We will use Learning Catalytics extensively in this course, mostly for in-class exercises. Accounts cost \$12 for six months. If you don't already have one, please sign up for an account here:

<https://learningcatalytics.com/>

Course Expectations & Guidelines

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Individuals with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (often referred to as ADAPTS) at (404)89-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Turning in homework assignments

Homework assignments are due at the beginning of class on the day they are due, and should be handed in (paper copy) directly to the TAs. Late assignments that are turned in before the rest are graded will receive a 50% penalty. Late assignments turned in after the rest are graded will not be accepted.

Attendance

We will not take attendance in this class. However, most class days will involve in-class exercises that will comprise 20% of your final grade. There will be no opportunity to make up in-class exercises, so regular attendance is essential.

Collaboration & Group Work

We encourage students to work together at every point in this course, including the in-class exercises, homework assignments and exam practice problems. Three important points:

1. Although we encourage you to study together in preparation, the in-class exams are strictly individual.
2. All assignments are to be completed individually. This means you may collaborate with another student and even compare and change answers. However, each student must complete their own assignment. Further, copying without collaboration is a form of plagiarism and will be referred to the Office of Student Integrity. All assignments will be graded individually.
3. Homework assignments completed in collaboration with other students must list the names of those collaborators at the top of the page.

Re-Scheduled / Missed Exams

Students who miss exams with an excused absence will have the opportunity to reschedule the exam. Unexcused absences are subject to a zero on the missed exam.

Put that cell phone away!

During this course, our classroom will have two activities: lectures and in-class exercises.

Lectures will include a lot of writing on the board, and you need to take notes. Unless you use a device with a stylus, I strongly recommend using pen / pencil and paper to take notes. During this period of the class, it is extremely distracting (to me, working at the board) to see students checking their phones or with their laptops open. Please don't!

However, during the in-class exercises, you will need to use a tablet or laptop.

Student-Faculty Expectations

At Georgia Tech we believe that it is important to continually strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <http://www.catalog.gatech.edu/rules/22/> for an articulation of some basic expectations—that you can have of me, and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech, while in this class.

Course Schedule

Date	Anticipated topic
Tue Jan 9	Introduction to the course
Thu Jan 11	Descriptive statistics
Tue Jan 16	Introduction to probability distributions
Thu Jan 18	Binomial and Poisson distributions
Tue Jan 23	Density functions and introduction to the normal distribution
Thu Jan 25	The normal distribution
Tue Jan 30	The standard normal (z) distribution
Thu Feb 1	Sampling distributions
Tue Feb 6	Probability statements
Thu Feb 8	Midterm 1
Tue Feb 13	Applications of sampling distributions
Thu Feb 15	The central limit theorem
Tue Feb 20	Hypothesis testing
Thu Feb 22	Type I and type II errors
Tue Feb 27	One-sample tests
Thu Mar 1	The sign test and ranked sign test
Tue Mar 6	Two-sample tests
Thu Mar 8	Midterm 2
Tue Mar 13	Two-sample tests continued
Thu Mar 15	Wilcoxon signed-rank and rank sum test
Tue Mar 20	Spring break
Thu Mar 22	Spring break
Tue Mar 27	Goodness of fit and chi-square tests
Thu Mar 29	Tests of multiple samples
Tue Apr 3	Analysis of variance (ANOVA)
Thu Apr 5	Analysis of variance (ANOVA) continued
Tue Apr 10	Introduction to linear regression
Thu Apr 12	Midterm 3
Tue Apr 17	Linear regression
Thu Apr 19	Linear regression with non-parametric applications
Tue Apr 24	Multiple regression
Mon Apr 30	Final exam - This is a comprehensive exam but will emphasize later material.