MATH 115, Spring 2019: Quantitative Biology

Instructors	Dr. Maggie Rahmoeller Trexler Hall 270J *Email:* rahmoeller@roanoke.edu
Class Meetings	Mondays, Wednesdays, Fridays: 10:50 AM - 11:50 AM in Trexler 263
Office Hours	Mon, Wed, Thurs, Fri: 2:00PM - 4:30PM By appointment only through `https://drmaggie.youcanbook.me/` NOTE: You can book up to 3 days in advance but have to book at least 2 hours before the time slot. Email me if none of those times work.

Course Information

This course provides a continuation of the statistics knowledge gained in INQ 240, focused for students intending to pursue a degree in the biological sciences, along with an introduction to calculus and mathematical modeling. Students will learn how to apply appropriate models and statistical tests to a variety of situations and will learn how to research other modes and tests out there to apply to their own research in the future. A focus of the course is using real data from the past work done by the biology faculty and students and on reading and understanding the models and statistics found in biological journals.

Intended Learning Outcomes

By the end of this course, successful students will be able to:

- Given a research question or data set, choose an appropriate statistical test to use.
- Research, find, and utilize additional statistical tests outside of those found in INQ 240 or this course
- Understand the concepts of a derivative and its importance in mathematical modeling.
- Understand the terms that appear in mathematical models relevant to biology and apply those models in appropriate ways
- Understand the mathematics and statistics present in biology research papers.

Required Materials

Textbook 1: Mathematics for the Life Sciences; Bodine, Lenhart, and Gross
Textbook 2: Handbook of Biological Statistics; McDonald, http://www.biostathandbook.com/
Calculator: TI-83 Calculator, or similar (with graphing capabilities)
Laptop: We will use the statistical software R for this class. Instructions on Inquire.

Course Grades

The following table lists the weights for the various forms of assessment for this class.

Assignments	25%
Project	25%
CaseStudies/Tests	50%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

		B+	87-89	C+	77-79	D+	67-69		
A	93-100	B	83-86	C	73-76	D	63-66	F	0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62		

Participation and Make-Up Work	Students are expected to attend every class. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. Unexcused absences may result in the lowering of the final grade (for example, a B to a B-). When absent, excused or unexcused, you are responsible for all material covered in class. **You will not be allowed to make up any work missed due to an unexcused absence.**
Commitment Hours	This course expects you to spend at least 12 hours of work each week inside and outside of class.
Assignments	Homework will be assigned regularly in this class (virtually every class period) and may take several forms. Typically, it will be due at the start of the class period immediately following the assigning of the homework. Homework will be graded partly on effort and partly on correctness. Late homework is not accepted. If you miss class, get a friend to turn in your homework for you.
	You will read research articles that use topics discussed in class, and answer specific reflective questions on the article. The aim of these assignments is to allow you to see how researchers utilize the methods discussed in class to learn about the world around them.
Project	There will be one semester-long project that will be divided into two parts. The first part will assess your understanding of experimental design and statistical analysis. The second part will assess your understanding of modeling a scenario based on assumptions about scientific principles that underlie the phenomena being modeled.
Case Studies/Tests	The tests in this course will mostly consist of case studies. They will take different forms - individual, group, etc. All will require a laptop with the software we will be using in class.
Final Exam	The final exam for this class is held during the scheduled time for the final exam for Block 3, i.e. **Monday, April 29 from 8:30-11:30AM.** This time will be used for the term project presentations and discussion.
MCSP Conversations	The MCSP Department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions will engage the community to think about ongoing research, novel applications, and other issues that face our discipline. You are invited to be involved with all of these meetings; however, participation in **at least one** of these sessions is mandatory. After attending, students will submit a one-page paper to Inquire reflecting on the discussion. This should **NOT** be a regurgitation of the content, but rather a personal contemplation of the experience. These reflections will be part of your participation grade.
Study Room	The MCSP Study Room, Trexler 271, is a great place for you and your friends to meet in order to work on homework together or prepare for tests. It is open virtually 24 hours a day, 7 days a week (very occasionally there are meetings in that room). Your student ID card should grant you access to Trexler Hall at any time of day if the doors happen to be locked (use the card access point located by the first floor entrance facing the parking lot). Take advantage of this area and time, especially during weekdays when other faculty who are teaching calculus and statistics are around!
Academic Integrity	Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No electronic devices other than calculators can be taken out during any class or testing period (this includes cell phones) unless written consent is given by the professor (e.g. R or Excel or Mathematica may be allowed for some tests). Note that looking at or using your cell phone during a test or

| Accessible Education Services | Accessible Education Services (AES) is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. AES provides reasonable accommodations to students with documented disabilities. To register for services, students must self-identify to AES, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact Laura Leonard, Assistant Director of Academic Services for Accessible Education, at 540-375-2247 or by e-mail at aes@roanoke.edu to schedule an appointment. If you have registered with AES in the past and would like to receive academic accommodations for this semester, please contact Laura Leonard at your earliest convenience to schedule an appointment. |