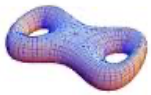
MATH 115: Quantitative Biology
Spring 2025

Contact Me	Meet with Me	Class Info
		
Name: Dr. Maggie **Pronouns:** She/Her/Hers **Email:** rahmoeller@roanoke.edu	**Office:** Trexler 270B **Student Hours:** Tues 2:00-3:30PM Thurs 9:30-11:00AM	**Location:** Trexler 374 **Days:** MWF **Time:** 10:50 – 11:50AM

Student Hours Comments:

- The given times above will be consistently available unless emergencies arise
- These are opportunities for you to ask me questions about material and/or class, including celebrations and concerns. **Please come prepared to ask your questions!**
- It's always ok to pop by and say, "HI!" – I love getting to know you and chatting with you! But, these have to be short, fun visits ☺ Sadly, none of us have time to sit back and chill anymore. But – please pop by any time for a short 5-10 minute hello. And – never be afraid to come by if you need help ☺

Course Description: This course is focused for students intending to pursue a degree in the biological sciences. The course builds upon statistics knowledge gained in INQ 240 and offers an introduction to mathematical modeling - both continuous and discrete. Students will learn how to apply appropriate models and statistical tests to a variety of situations.

Intended Learning Outcomes: By the end of this course, you will be able to:

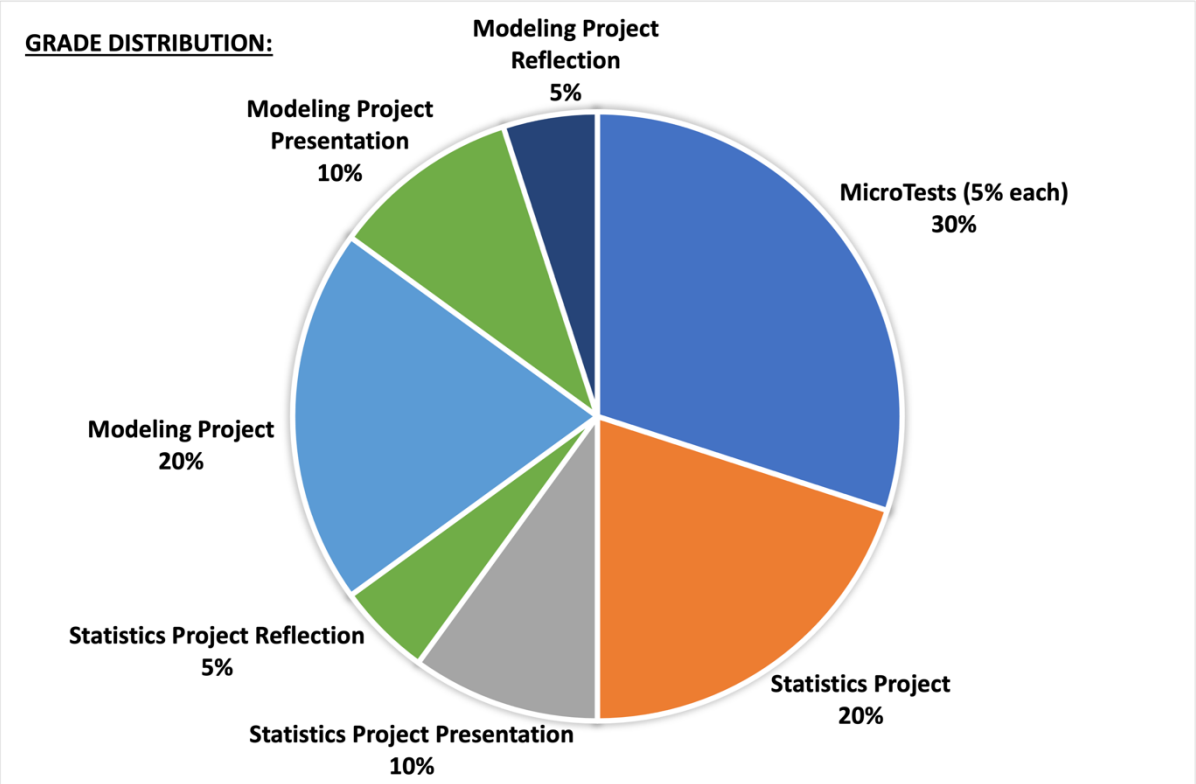
- Given a research question or data set, choose an appropriate statistical test to use.
- Research, find, and utilize additional statistical tests outside of those found in INQ 240 or this course.
- Understand the concepts of a derivative and its importance in mathematical modeling.
- Understand the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

Your success in this class is important to me! We all learn differently and bring a variety of strengths and needs to the class. If there are aspects of the course that prevent you from learning or that make you feel excluded, please let me know as soon as possible. Together we'll develop strategies to meet both your needs and the requirements of the course.

Required Materials:

- *Handbook of Biological Statistics*, McDonald (http://www.biostathandbook.com/)
- *Supplemental Readings*, found on Inquire
- **STRONGLY RECOMMENDED:** Laptop Computer (not an iPad or tablet, etc.)

Commitment Hours: This course expects you to spend at least 12 hours of work a week inside and outside of class.



A:	93-100	B:	83-87	C:	73-77	D:	63-67
A-:	90-93	B-:	80-83	C-:	70-73	D-:	60-63
B+:	87-90	C+:	77-80	D+:	67-70	F:	Below 60

COURSE EXPECTATIONS

Classroom Environment: You are expected to treat all students in the class and me with courtesy and respect. Your comments to others should be factual, constructive, and free from harassing statements. You are encouraged to disagree with other students, but such disagreements need to be based upon facts and documentation (rather than prejudices and personalities). My goal is to promote an atmosphere of mutual respect in the classroom. Please let me know if you have suggestions for improving the classroom environment. (Source: Iowa State University)

Diversity and Inclusivity

I consider this classroom to be a place where you will be treated with respect, and I welcome individuals of all ages, backgrounds, beliefs, ethnicities, genders, gender identities, gender expressions, national origins, religious affiliations, sexual orientations, ability – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful, welcoming and inclusive environment for every other member of the class.

Attendance Policy: Our course's success depends on you attending class! If you miss class, you will miss community building, engaging conversations, and information that I deem worthy of your time! Plus, we will miss you!

However, life happens! You may get sick, have a game scheduled, or have something else come up. It will not be the end of the world if you miss a class *very occasionally*. At some point, though, missing class can be detrimental to success. So, do your best to be in class! Strive for perfect attendance!

Communication is key. Let me know as soon as you know you will miss class.

****I WANT YOU TO SUCCEED IN MY CLASS****

I am willing to put in as much effort to help you in my class as you put into my class. So, do the work, come to office hours, attend subject tutoring, ask questions, and do a little MATH 115 every day.

Late Work: Whether or not to accept late work is always a tough decision. Life happens – and occasionally we need more time to complete tasks! But, sometimes turning in an assignment late causes more complications than benefits.

- **Should you miss a presentation, you will be given a make-up assignment to complete on your own…and have to present by yourself on that assignment. /**

- **Should you need an extension on a component of a partner project (there are 2), I reserve the right to dock points for it being late. At most, you would lose 10 percentage points a day. Note – submitting project components late means late feedback from me, which might result in you rushing to be ready to submit the next component.**

- **The project reflections cannot be turned in late – they need to be in by the time projects are presented.**

- **Except for emergencies, I will only allow a make-up MicroTest if you reach out to me ahead of time with your legitimate excuse and I give an ok.**

****In summary, the best thing you can do is *communicate* with me.** Let me know if you have concerns about turning in an assignment on time – I will do my best to work with you.**

Academic Integrity: Students are expected to adhere to the Academic Integrity policies of Roanoke College (https://www.roanoke.edu/inside/a-z_index/academic_integrity). All work submitted for a grade is to be your own work! **No collaboration is allowed on MicroTests.**

You may use software from class (e.g., RStudio, Mathematica, NetLogo) for help with project work (project components and presentation). You may also look at solutions to problems we have done in class, problems that are worked through in the textbook for the course, and class notes. **But using unauthorized sources is a violation of Academic Integrity**. This includes (but is not limited to) solutions posted online (not on Inquire), "homework help" sites, and (Generative) Artificial Intelligence Tools. Uploading our course assignments to these sites is also a violation of Academic Integrity.

WHY? You spend a lot of money attending Roanoke College working toward a (or several) degree(s). Don't you want that degree to mean something? If RC students are only getting degrees by cheating, then does that degree actually mean anything? If we were to get a reputation for a "cheating" school…do you think you'd get a job after Roanoke College?

Besides, I like to be helpful. Ask me for help ☺ I'm only an email away!

COURSE ASSIGNMENTS

Practice Assignments: These will not be graded but are intended to provide you opportunities to practice applying the concepts discussed in class. Sometimes they will involve computation, other times coding, and other time reading and interpreting. **It is in your best interest to complete each and every one of these assignments – doing so provides you with the best chance of succeeding in my course.**

Projects: There will be two projects for this course. The first project will assess your understanding of statistical analysis. The second project will assess your understanding of modeling a scenario based on assumptions about scientific principles that underlie the phenomena being modeled. For each project, you will work with a partner (different partner for each project). Both projects culminate in presentations, write-ups, and reflections. Detailed information will be covered in class and posted on Inquire.

MicroTests: There will be six MicroTests this semester. The first 3 emphasize concepts about statistics, and the last 3 emphasize both concepts about modeling and computation for modeling. You may need your laptops to complete these MicroTests. What is a MicroTest? It's more than what we typically mean by *quiz* but less than what we typically mean by *test* – shorter than a test but should be treated more importantly than many of us treat quizzes. I expect them to last about half a class period – the rest of class will go toward material.

I know that testing can evoke stress for many students. Testing is very different from most other assignments in typical classes – you have no idea what is going to be on the tests, you know you only have a certain amount of time to work on the problems, and commonly, they are a one-and-done situation. It makes sense that these are stressful! MicroTests are shorter and hence cover less material – this helps with the first issue mentioned. Since there are 6 of them, each is worth 5% of your final grade…not enough to make or break your grade. And I'm always open to ideas to make them less stressful for you – so talk to me!!

MCSP Tea Time

Tuesdays, 2:20 – 3:20PM
Trexler 271

A chance to chill with peeps while munching on cookies and sipping tea! Often cards make an appearance – or other games! Take an opportunity to relax, have fun, and hang with other students and professors!

RESOURCES

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 Dustin Persinger, 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 Dustin Persinger at your earliest convenience to schedule an appointment and/or obtain your accommodation letter for the current semester.

Subject Tutoring, located on the lower level of Fintel Library (Room 5), is open 4-9 PM, Sunday-Thursday. Subject Tutors are highly trained, current students who offer free, one-on-one (and small group) tutorials in over 80 courses taught at Roanoke College, including: Business, Economics, Mathematics, INQ 240, Modern Languages, Lab Sciences, and Social Sciences. Check out all available subjects and schedule 30- or 60-minute appointments at www.roanoke.edu/tutoring. If you have a question, feel free to stop by, or contact us at subject_tutoring@roanoke.edu or 540-375-2590. See you soon!

Student Health & Counseling Services supports students through in-person health appointments, in-person counseling, 24/7 telehealth (TimelyCare), Therapy Assistance Online, as well as resources related to general wellness, LGBTQ+, sexual assault, substance abuse, and suicide prevention. Unmet health needs can negatively impact your performance in this course. Student Health & Counseling Services can help. Please see https://www.roanoke.edu/shcs for more information and to access services.

TENTATIVE COURSE SCHEDULE

Day	Date	Topic	Practice Assignments & **Graded Assignments**
Mon	Jan 13	Data	Find Dataset
Wed	Jan 15	Datasets	Explore Dataset
Fri	Jan 17	Posing Questions	Pose Questions Study
Mon	Jan 20	**No Class!**	Study
Wed	Jan 22	**No In-Person Class – watch videos & do assignments out of class** Project Intro	Project – Choose Chronic Health Condition + 2 Qualitative Variables Study!
Fri	Jan 24	**MicroTest 1** / Project – Partner + Question	**Project (Part 1)** – Partner, Question, Variables (due by midnight)
Mon	3-Feb	Chi Square Test (qualitative)	Chi Square Worksheet
Wed	Jan 29	Project Work-Day – Chi Square	**Project (Part 2)** – Chi Square Write-Up (due Mon, Jan 27)
Wed	5-Feb	2 Sample T Test (means)	2-Sample T Test
Mon	Jan 27	ANOVA Intro	ANOVA recap & Study
Wed	Jan 29	ANOVA w/ R	ANOVA & Study
Fri	Jan 31	**MicroTest 2** / Other Mean Tests	
Mon	Feb 10	Logistic Regression	**Project (Part 3)** – Logistic Regression Variables (due by midnight)
Wed	Feb 12	Logistic Regression	Logistic Regression
Fri	Feb 14	Project Work-Day – Logistic Regression	**Project (Part 4)** – Start Log Reg Write-Up (due Wed Feb 19)
Mon	Feb 17	Log Reg Recap + Project Work-Day	**Project (Part 4)** – Continue Log Reg Write-Up (due Wed Feb 19)
Wed	Feb 19	Regression Exploration	Regression Study **Project (Part 4)** – due by midnight
Fri	Feb 21	Regression Exploration	Regression Study **Stat** – due
Mon	Feb 24	**MicroTest 3** / Project Work-Day	Finalize Project!
Wed	Feb 26	Presentation Day 1	
Fri	Feb 28	Presentation Day 2	
SPRING BREAK!!			

Mon	Mar 10	Intro to Modeling	
Wed	Mar 12	Intro to Modeling Project	Set up a plan to work with your partner on the project **Project (Part 1) –** start working on, due 3/21
Fri	Mar 14	M&M Part I – Data -> Model	Review Class – How does this concept relate to other scenarios?
Mon	Mar 17	M&M Part II – Data -> Model	Review Class – How does this concept relate to other scenarios?
Wed	Mar 19	Dynamic Equations	Dynamic Equations
Fri	Mar 21	Exponential Growth / Decay	Logs + Exponents Study! **Project (Part 1)** due by midnight
Mon	Mar 24	Double / Half Life	Double / Half Life Study! **Project (Part 2) –** start working on, due 3/31
Wed	Mar 26	Limitations & Graphs	Study!
Fri	Mar 28	**MicroTest 4**	
Mon	Mar 31	Other Equations & Model Assumptions	Dynamic Equations: Word Problems <-> Equations **Project (Part 2)** – due by midnight
Wed	Apr 2	Discrete Dynamical Systems	Matrices **Project (Part 3)** – start working on, due 4/9
Fri	Apr 4	Discrete Dynamical Systems	Discrete Systems Study!
Mon	Apr 7	Rates of Change	Rates of Change
Wed	Apr 9	**MicroTest 5**	**Project (Part 3)** – due by midnight
Fri	Apr 11	**NO CLASS!**	**Project (Part 4)** – start working on, due 4/21
Mon	Apr 14	Rates of Change & Instantaneous Rates of Change	Rates of Change
Wed	Apr 16	Instantaneous Rates of Change	Rates of Change
Fri	Apr 18	**NO CLASS!**	
Mon	Apr 21	Continuous Dynamic Equations	Continuous Dynamic Equations **Project (Part 4)** – due by midnight
Tue	Apr 22	**MicroTest 6**	
Fri	April 25	Modeling Project Presentations 8:30 – 11:30 AM	**Presentation & Reflection due by 8:30AM**