Continuous Mathematical Modeling & Scientific Writing

MATH 315 (CRN 18500) — Time 9:30–10:45 AM, Room Barret 033

Prof Erin N. Bodine (bodinee@rhodes.edu)
Course Website: This course has a Moodle site
Office Location: Ohlendorf 316
Office Hours: TBA and by appointment

Please note that this syllabus is a guide and not a contract. Thus it is subject to change at the discretion of the instructor.

Course Description: Mathematical modeling is central to how the power of mathematics is harnessed to help generate new scientific knowledge. In this course students will work in teams to model the dynamics of the spread of infectious diseases using systems of differential equations. Each group will model the spread of a different pathogen. Through this course you will learn to conduct literature searchers, pose and refine research questions, use standard mathematical models, identify which models are applicable to a research question, modify a standard model to a novel situation, communicate each of these effectively in writing, and work effectively in a team. A final project will require students to combine their previous work with that of their peers to create a final, polished research article presenting their models. Writing is a fundamental part of the process of developing models and communicating results. A significant portion of this course will focus on developing fluency in scientific writing.

Prerequisites: Calculus I & II (Math 121-122) and Differential Equations (Math 251). Please note you are NOT required to have taken Multivariable Calculus (Math 223).

Foundations Credits: This courses has been approved to fulfill an F2i Foundation Requirement ("Develop excellence in written communication"; writing intensive).

Time Commitment: This course will require you to do a lot of reading, writing, and coding. In addition to the time spent in class (150 minutes/week), you should expect to spend between **9 - 12 hours** outside of class engaged in homework and group research activities.

Learning is experience. Everything else is just information.

– Albert Einstein

Course Materials:

- *Text:* There is NO TEXTBOOK for this course, but several journal articles will be given out over the course of the semester. All articles will be posted on Moodle.
- *Online Tutorials:* Some material in this course will be explored through online tutorials found at https://sites.google.com/site/profbodine/tutorials.
- *Lab Computers & Software:* During this semester you will become familiar with the software packages Mathematica and TeXStudio. All the software is available for use on campus lab computers. The software package TeXStudio, along with a distribution of LaTeX are available for free download. Students are **highly encouraged** to download TeXStudio and a distribution of LaTeX onto their personal computers.
  - First, download and install MikTeX (for PCs) or MacTeX (for Macs); Mac users may already have MacTeX installed on their computers. What you are downloading is a set of files which will compile and beautifully typeset text and mathematics using code that you will write. These installs can take quite a bit of time (possibly on the order of hours). http://miktex.org/download http://tug.org/mactex/

  - Next, download and install TeXStudio. This the programming environment where you will write your LaTeX code. http://texstudio.sourceforge.net/

- *Filesharing:* Many of the assignments in this course are completed by groups of students. To facilitate the sharing of documents between group members and the instructor, we will use the file sharing/storing service Box, box.rhodes.edu, provided by Rhodes College. BoxSync allows you to have a shared folder located locally on your personal computer. Each student will have one folder which they share exclusively with the instructor, and one folder which they share with both their research group and the instructor. These folders will be set up for you. Additionally, when you submit assignments, you will submit them to a Box folder whose contents can only be viewed by the instructor.

Attendance Policy: During the class time of this course rubrics will be developed, group research will be conducted, and key ideas will be developed and discussed. Missing even one class period can significantly disadvantage your ability to complete homework and group assignments. **If you miss 3 classes, you will be removed from the course.**

Late Submission Policy: The timely submission of assignments in this course is critically important to the peer-review process. **Any assignment which is submitted past the given deadline will automatically be docked 25% of the available points for that assignment.** A late assignment must be submitted within 24 hours of its given deadline to receive a grade above 0.

Course Grading:

% of Course Grade	Component
20%	Peer-Reviews
26%	Group Assignments
30%	Individual Assignments
	◦ 15% Math/Computing
	◦ 15% Reading/Writing/Editing
24%	Research Papers ($2 \times 12\%$ each)

Please note:

- 50% of your course grade is based on group work, the other 50% is based on individual work
- 80% of your course grade is based on writing activities (Peer-Reviews, Group Writing/Editing Assignments, Individual Reading/Writing Assignments, and the Final Papers)
- The peer-review process necessitates very rigid deadlines, and thus 25% of ALL assignment grades are awarded for submitting the assignment on time. For each day an assignment is late 5% will be docked from the assignment grade.

Individual & Group Assignments with Peer-Review Process:

- The class will develop a rubric (set of criteria) for evaluating writing at each stage. You will use these rubrics to as a guideline for reviewing the work of your peers.
- The peer-review process will take place in class.
- As you review the work of your peers, you will provide comments electronically as PDF comments and markups. You will submit your review of a peer's work to your Box folder. Your peer-review will be graded by your instructor and/or the student teaching assistant, and then delivered to the peer's or group's Box folder.
- On assignments that are peer-reviewed, you will also receive a review from the student teaching assistant.
- Individual and group assignments which do not undergo peer-review are graded exclusively by the instructor.

Grading of Research Papers: There will be two research papers that each group will turn in over the course of the semester. The individual grade for each member of the research group (for each paper) will be comprised of the following components:

- 25% for turning the project in on time
- 10% for research paper reflection writing (see below)
- 25% determined by members of the group (each group member will be asked to grade each other group member in various categories after the reflection writings have been completed)
- 40% determined by instructor (same grade given to each member of the group)

Research Paper Reflection Writing: Along with each of the research paper, each member of the group will turn in a reflection writing which answers the following questions:

1. For each member of your group, what actions/skills contributed to the progress of this project?
2. For each member of your group, what actions/skills hindered progress on this project?
3. In light of your answer to the second question, what could you have done to help each group member overcome their weaknesses?
4. Which of your actions/skills contributed to the progress of this project?
5. Which of your actions/skills hindered progress of this project?
6. In light of you answer to the previous question, what could your group members have done to help you overcome your weaknesses? What could you have done to help yourself overcome your weaknesses?
7. What conflicts arose within your group? How did the group as a whole address these conflicts? How did you, individually address these conflicts? Are the conflicts currently resolved? If so, what action could be taken to resolve these continuing conflicts?

The answers to these questions will only be read by the instructor. The instructor expects to read insightful and meaningful reflections about the group dynamics of each research group. Simply writing something along the lines of "Everything is peachy keen, and every group member is awesome and perfect in every way!" will not going to cut it, and points will be deducted for shallow assessments of group dynamics and individual contributions. The length of a reflection writing should be about 0.5-1.0 page per group member.

Note, these questions are included in the syllabus so that each student can keep them in mind as they work with their group on their research project.

Civil Discourse during Classroom Discussion: This course does not contain a large lecture portion, but instead will involve ample class discussion. Please keep the following guidelines in mind during class discussions:

- Allow whoever is speaking to finish talking before speaking yourself.
- When critiquing another student's work, critique the idea not the person.
- There will be time when each team conducts a discussion soley among the team members. During this time, many individuals in the room will be speaking at once. Please keep discussions on topic, and the general volume moderate.

Course Letter Grades: Grades for all assignments will be maintained on Moodle. Course letter grades will be determined at the midterm and end of semester, as follows, according to the current course score calculated on Moodle.

A	93 - 100%	C	73 - 76.9%
A-	90 - 92.9%	C-	70 - 72.9%
B+	87 - 89.9%	D+	67 - 69.9%
B	83 - 86.9%	D	63 - 66.9%
B-	80 - 82.9%	D-	60 - 62.9%
C+	77 - 79.9%	F	0 - 59.9%

Disability Services: If you need course adaptations or accommodations due to a documented disability, please contact the Office of Disability Services at Burrow Student Center, Fourth Floor, 901-843-3885. Hours, M-F, 8:30 AM - 5:00 PM.

Honors Statement: You are expected to conduct yourself within the guidelines of the College's Honor Code. If you have any question about what is or is not allowed, please ask.