# Syllabus Math 172-002
# Mathematical Modeling for the Life Sciences

**Instructor:** Jack R Dalton
**Email:** jrdalton@math.sc.edu
**Office:** LeConte 317N
**Office Phone:** None
**Office Hours:** Tentatively: MW 1-2, F 11-12
or by Appointment, all BB Collab

**CRN:** 60139
**Section:** 002
**Class Meeting Rooms & Time:**
Blackboard Collaborate MWF 12:00-12:50

## COURSE DESCRIPTION AND OBJECTIVES

**Prerequisites:** C or better in MATH 122 or MATH 141. Welcome to Math 172!

### *Learning Outcomes:*

*Upon successful completion of this course, students will be able to solve problems in the following areas:*

- Biological modeling with differential and difference equations;
- Techniques of model modifcations;
- Analytic, numeric and graphical solution methods;
- Equilibria, stability and long-term system behavior;
- Geometric series;
- Vectors, matrices and eigenvectors;
- Applications to population dynamics and compartment models.

## REQUIRED MATERIALS

- **Textbook:** No required text, notes will be posted regularly.
- **Calculator**: A graphing calculator is allow but no calculators with computer algebra systems are allowed for exams or quizzes.
- **Laptop/Computer With Microphone AND Camera:** No Chromebooks.

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## COURSE POLICIES AND EXPECTATIONS

**Design:** This class meets three times a week for lecture for 50 minutes online via Blackboard Collaborate. Most classes will be split into two parts: lecture and group work. It is **very** important that you study for about an hour outside of class every day. This amounts to 7 hours a week for reading the book, homework, and studying for quizzes and exams.

**Participation:** Participants are expected to attend EVERY online class meeting and to get involved in the discussion. We will learn much more if we explore the mathematics together. All participants are expected to show respect to other students, the instructor, and any guests who may be visiting the class during the year (Golden Rule). If you feel like zoning out and not paying attention, that is fine, however, any behavior that negatively affects the learning of your classmates WILL NOT BE TOLERATED. I have no problem kicking a student out for being disruptive. Out-of-class participation is also expected, so read the text and other materials; get to know the other students in class; exchange phone numbers; work together on assignments; and give each other moral support.

**Attendance:** Attendance is expected and will be taken daily. You are also expected to be punctual. 3 lates will result in one absence. Absence from more than 3 class periods WILL result in the reduction of one letter grade. For excused absences, proper documentation is required before the absence. Your attendance may also be considered in borderline grade cases.

**Academic Integrity:** I expect you to familiarize yourself with the Honor Code found in the current student handbook. Keep in mind that "Any student who violates this Honor Code or who knowingly assists another to violate this Honor Code shall be subject to discipline." Honor Code:
http://www.housing.sc.edu/academicintegrity/honorcode.html

**Students with Disabilities:** Students who would like to request accommodations for disabilities must talk to me as soon as possible. Students must register with the Office of Student Disability Services before I can make any accommodations.

**Make-Up Policy:** Exams and quizzes can be made up **ONLY** in the case of an emergency. It is your responsibility to contact me within a reasonable time to request a make-up exam.

If your excuse is a non-emergency, you may take the quiz/exam with a 50% point penalty.

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## ASSIGNMENTS

**Homework (VITAL FOR THIS CLASS!!):** Homework will be assigned on a regular basis, but not collected. It is your responsibility to work through the homework problems in their entirety in order to gain mastery of the material. Students are encouraged to work together on homework.

**Quizzes**: Quizzes will be weekly, online, and will cover the previous week's material. No quizzes will be dropped BUT quiz rewrites will be allowed to recover half the lost points.

**Exams:** There will be three exams, whose dates will be announced in class at least one week in advance. Calculators will be allowed on exams. Before each exam we will have a review day to help support your understanding.

**Final Exam: The final exam is cumulative.** ***Final Exam, Monday, May 3 from 12:30 PM to 3:00 PM. (On Blackboard)***

Mark your calendars now and make sure you can be at the final exam on:

**May 3, Monday – 12:30 p.m. To 03:00 p.m.** ***(On Blackboard)***

## EVALUATION

Homework Presentations ..... 10%
Quizzes ..... 15%
Exams (3 at 15% each) ..... 45%
Attendance/Participation ..... 10%
Cumulative Final ..... 20%

Final Grades will use the following scale

| A | B+ | B | C+ | C | D+ | D | F |
|---|---|---|---|---|---|---|---|
| 100-90% | 89-87% | 86-80% | 79-77% | 76-70% | 69-67% | 66-60% | 59% and below |

## USEFUL RESOURCES:

- Blackboard Website: https://blackboard.sc.edu
- http://www.wolframalpha.com/ ; https://www.desmos.com/calculator
- https://www.khanacademy.org/
- FREE TUTORING In LC 105 - *Check room, but usually Monday-Thursday 10am-3pm.*
- Student Success Center – Offers FREE tutoring and FREE 1 on 1 ONLINE tutoring. (http://www.sa.sc.edu/ssc/)

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**Important Dates:**

- 01/19/2020 Last day for students to DROP without a grade of "W".
- 03/27/2020 Last day for students to DROP or withdraw without a grade of "WF".
- ***Schedule is tentative and subject to change***

| | | |
|---|---|---|
| Monday, January 11, 2021 | 1 | Intro to Course |
| Wednesday, January 13, 2021 | 2 | Calculus Review |
| Friday, January 15, 2021 | 3 | The Malthusian Model |
| Monday, January 18, 2021 | MLK Day | Martin Luther King Jr. Day NO CLASSES |
| Wednesday, January 20, 2021 | 4 | The Malthusian Model, Continued |
| Friday, January 22, 2021 | 5 | The Malthusian Model and Quiz 1 |
| Monday, January 25, 2021 | 6 | The Logistic Model |
| Wednesday, January 27, 2021 | 7 | The Logistic Model, Continued |
| Friday, January 29, 2021 | 8 | The Logistic Model and Quiz 2 |
| Monday, February 01, 2021 | 9 | The Allee Effect |
| Wednesday, February 03, 2021 | 10 | The Allee Effect, Continued |
| Friday, February 05, 2021 | 11 | The Allee Effect and Quiz 3 |
| Monday, February 08, 2021 | 12 | Review For Exam 1 |
| Wednesday, February 10, 2021 | 13 | Review for Exam 1 |
| Friday, February 12, 2021 | 14 | Exam 1 |
| Monday, February 15, 2021 | NO CLASS | Wellness day |
| Wednesday, February 17, 2021 | 15 | Continuous Dynamical Systems |
| Friday, February 19, 2021 | 16 | Continuous Dynamical Systems and Quiz |
| Monday, February 22, 2021 | 17 | Discrete Dynamical Systems |
| Wednesday, February 24, 2021 | 18 | Discrete Dynamical Systems, Continued |
| Friday, February 26, 2021 | 19 | Discrete Dynamical Systems and Quiz |
| Monday, March 01, 2021 | 20 | Introduction to Matrices |
| Wednesday, March 03, 2021 | 21 | Introduction to Matrices, Continued |
| Friday, March 05, 2021 | 22 | Introduction to Matrices and Quiz |
| Monday, March 08, 2021 | 23 | Structured Populations |
| Wednesday, March 10, 2021 | 24 | Structured Populations and Quiz |
| Friday, March 12, 2021 | NO CLASS | Wellness day |
| Monday, March 15, 2021 | 25 | Review For Exam 2 |
| Wednesday, March 17, 2021 | 26 | Review for Exam 2 |
| Friday, March 19, 2021 | 27 | Exam 2 |
| Monday, March 22, 2021 | 28 | Eigenvectors and Eigenvalues |
| Wednesday, March 24, 2021 | 29 | Eigenvectors and Eigenvalues, Continued |
| Friday, March 26, 2021 | 30 | Eigenvectors and Eigenvalues and Quiz |
| Monday, March 29, 2021 | 31 | Predator-Prey Models |

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|---|---|---|
| Wednesday, March 31, 2021 | 32 | Predator-Prey Models |
| Friday, April 02, 2021 | 33 | Predator-Prey Models and Quiz |
| Monday, April 05, 2021 | 34 | Stability Using the Jacobian |
| Wednesday, April 07, 2021 | 35 | Stability Using the Jacobian, Continued |
| Friday, April 09, 2021 | 36 | Stability Using the Jacobian and Quiz |
| Monday, April 12, 2021 | 37 | Review For Exam 3 |
| Wednesday, April 14, 2021 | 38 | Review For Exam 3 |
| Friday, April 16, 2021 | 39 | Exam 3 |
| Monday, April 19, 2021 | 40 | FT |
| Wednesday, April 21, 2021 | No Class | Wellness day |
| Friday, April 23, 2021 | 41 | Review For Final |
| Monday, April 26, 2021 | 42 | Review For Final |
| | | |
| Monday, May 03, 2021 | Final Exam | FINAL Exam on Blackboard |