Math 399: Mathematical Modeling in Biology

Spring 2022 Course Syllabus
Section 01: 9-11 Friday in RSS 345

This syllabus covers course information and the expectations of the student throughout the course. I will notify the student of any changes.

Professor: Dr. Daniel Poll
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Office: RSS 345

Course Description: Topics in this independent study will include probability, dynamical systems, quantification of intangibles, scientific writing, simulation, and some data fitting as applied to questions in the biological sciences.

Text: (Required) As part of the independent study, the student will be required to read a relevant section or chapter weekly, which will then be discussed with the professor. We will use a few textbooks as the semester progresses:

- *Nonlinear Dynamics and Chaos*, 2nd Ed. by Strogatz (ISBN: 9780813349107)
- *Finite Markov Chains*, by Kemeny & Snell (ISBN: 9780387901923)
- *Handbook of Stochastic Methods*, 3rd Ed. by Gardiner (ISBN: 9783540208822)

(Recommended) Projects will typically be written by the professor. However, some interesting topics and ideas may be taken from *Stochastic Processes in Cell Biology* by Bressloff (ISBN: 9783319084886) during the latter portion of the course. While the book is not required, it is worthwhile to read.

Software: (Required) Computational work and programming exercises will typically be done with Python 3 with the packages NumPy, SciPy, and Matplotlib. We may also use additional packages as needed. However, you are welcome to use alternative software, such as MATLAB.

Student Learning Outcomes: Upon completion of the independent study, the student will be able to:

- use theory from probability, dynamical systems, and stochastic processes to formulate and analyze models of phenomena in the biological sciences;
- utilize software for developing and understanding those mathematical models; and
- write reports and present their findings through course projects

Grade Distribution: Homework assignments will account for 40% and will typically be a few exercises assigned weekly from the relevant book sections. Projects will be given every two to three weeks and will be worth the remaining 60% of the grade, with a portion of the project grade awarded through presentation of the student's work. The project requirements will be split evenly between analysis and programming. The letter grade will be assigned using the following scale:

Letter grade:	A	B+	B	C+	C	D+	D
Minimum score:	90%	85%	80%	75%	68%	63%	58%

Student Accommodations: The College will make reasonable accommodations for persons with documented disabilities. Students should apply for services at the Center for Disability Services/SNAP located on the first floor of the Lightsey Center, Suite 104. Students approved for accommodations are responsible for notifying me as soon as possible and for contacting me one week before accommodation is needed.

Basic Standards of Academic Integrity:
Registration at the College of Charleston requires adherence to the university's standards of academic integrity. These standards may be intuitively understood, and cannot in any case be listed exhaustively. The following examples represent some basic types of behavior that are unacceptable:

1. Cheating: using unauthorized notes, study aids, or information on an examination; altering a graded work after it has been returned, then submitting the work for regrading; **allowing another person to do one's work and submitting that work under one's own name**; submitting identical or similar papers for credit in more than one course without prior permission from the course instructors.

2. Plagiarism: submitting material that in part or whole is not entirely one's own work without attributing those same portions to their correct source.

The full official policy for academic integrity can be found at:

`http://deanofstudents.cofc.edu/honor-system/studenthandbook/`