MATH 465 (Spring 2013) **Topics in Advanced Mathematical Modeling**

Instructor: Professor Erin Bodine
Email: bodinee@rhodes.edu
Office: Ohlendorf 422

Office Hours: MWF 1-3 pm, and by appointment
If not in office check the MSC
Course website: This course has a Moodle website.

Section 465-01 meets MW 11:00 – 11:50 in Ohlendorf 225, F 11:00 – 11:50 in Barrett 035 (Computer Lab)

Course Objectives: This course has two primary objectives and several secondary objectives. The primary objectives are:

- Explore a variety of epidemic models with the aim of constructing a few models to simulate the zombie apocalypse experiment of last semester.
- Organize and run a second zombie apocalypse experiment and compare the two sets of data with the aid of the model.

The secondary objectives are

- Learn mathematical modeling techniques not covered in Math 315.
- Provide a basis for sophomores and juniors to begin their senior thesis work.
- Developing skills to read applied mathematics literature and distill the information into its most essential components.
- Practice presenting (orally) mathematical detail and biological background to a group of peers.

Course Materials:

- *Text*: *Modelling Disease Ecology with Mathematics* by Robert Smith? (ISBN: 978-1601330048).
- *Text*: *Braaaiiinnnsss!: From Academics to Zombies* by Robert Smith? (ISBN: 978-0776607702).
- *Supplemental materials*: You are responsible for all handouts given in class and materials posted on Moodle.
- *Software*: To get started in Matlab or LaTeX see https://sites.google.com/site/profbodine/tutorials.
  - *Matlab*: This software is installed on all lab computers in the library and on the computers in the Math Library in Ohlendorf. Note, on Fridays we will meet in the computer lab Barrett 035 during which time we will utilize this software.
  - *LaTeX*: You will be required format all written work using LaTeX.
  - *PowerPoint*: Over the course of the semester each student will give several presentations on the material we are covering. These presentations will be given via PowerPoint (or Beamer in LaTeX if you choose to do so).
  - *Mathematica*: There may be occasions where we will utilize Mathematica. This software is also installed on all lab computers in the library and on the computers in the Math Library in Ohlendorf.

Course Grading:

Component	% of Grade
Lab Write-ups	20 %
Reading Assignments	20 %
In Class Presentations	30 %
Modeling Assignment	30 %

Final letter grades are determined as follows:

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 %

"Learning is experience. Everything else is just information." – Albert Einstein

A full list of course assignments is found at https://www.dropbox.com/s/j3z0q1uonutayzf/CourseAssignments_S2013.pdf.

Lab Write-ups: Each Friday will be spent in the lab during which you will work on lab assignments. Each following Monday, a lab report is due. The lab report must be written up in LaTeX. It will contain two sections:

- A *Background Information section* where the problem and any analytical results are described. This section may contain subsections if you deem it necessary.
- An *Answers to Exercises section* where the answers to the exercise questions are asked. Each question should be given its own subsection with a subsubsection restating the question, and a second subsubsection answering the question. The subsubsections containing answers should contain any and all graphs created to answer the questions.

Lab reports should be printed and stapled when turned in. If color is necessary to understand the results displayed in a graph, please print those pages in color.

Reading Assignments: Throughout the semester there will be many reading assignments. For each reading assignment you will be given a set of questions to answer. The answers to these questions should be written up in LaTeX and turned in the day the reading assignment is due. Reading assignments should be printed and stapled when turned in.

In Class Presentations: In some ways this class will be run as a graduate level seminar. In many graduate level seminars each student in the course is assigned a certain section of material to present the class. We will be doing much the same here, though the material you will be asked to cover will be broken into smaller chunks than if you were in a graduate level seminar course. Presentations will range from 10-30 minutes depending on the material needing to be covered. Everyone in the in class will have read through the assigned material, it will be your job to distill the most important points of the material and present them in a clear and concise manner. The material for each presentation should be presented via slides created in PowerPoint or Beamer (a LaTeX package).

Each presentation will be graded by both your fellow classmates and your instructor based on the rubric given on the next page. Of your class presentation grade

- 30% will be based on participating in grading/reviewing your peers' presentations. The lowest two grades in this category will be dropped.
- 40% will be based on the instructor's grading of your in class presentations (you must give at least two).
- 20% will be based on the average of your peer's grading of your in class presentations.
- 10% will be based on class participation, e.g. asking insightful/helpful questions during in class presentations, helping organize this semester's zombie apocalypse experiment, etc.

Modeling Assignment: Approximately half-way through the course, the class will be divided into groups. Each group will construct a mathematical model intended to simulate the zombie apocalypse experiment data collected last semester and this semester. Using the mathematical model, each group will attempt to simulate the data collected. Descriptions of the experiment, the data, the model, and any simulated results will be written up in the style of a scientific journal article. Additionally, each group is required to present their model and results at URCAS in either poster or oral presentation format.

Of your modeling assignment grade

- 30% will be based on a draft of the written assignment.
- 40% will be based on the final version of the written assignment.
- 20% will be based on group-peer grading (each member of your group will assign you a grade based on the amount of work you contributed to the project as a whole).
- 10% will be based on participation in URCAS.

	Excellent (5 points)	Good (4 points)	Fair (2 points)	Poor (0 points)
Introduction	Introduction gives a clear indication of the topic, explains any necessary background material, and is engaging.	Introduction gives a clear indication of the topic, and explains any necessary background material.	Introduction gives a clear indication of the topic.	Introduction does not clearly identify the topic, does not provide any background information, and is not engaging.
Information	Student presented all the information that was required, and went above and beyond what was required.	Student presented all the information that was required.	Student presented the majority of the material but not all.	Student did not even present the majority of the material.
Content	All the material presented was correct.	There were one or two minor flaws in the material presented.	There were more than two minor flaws in the material presented.	There was one or more major flaw in the material presented.
Organization	Thoughts are clearly organized, developed, and supported to achieve the purpose. Transitions are effectively utilized to create a smooth and logical flow from point to point.	Ideas flow smooth from introduction to conclusion. Transitions are generally effective.	Logical progression of thoughts, but transitions are awkward. An attempt at structure is present, but can be illogical or inconsistent.	There appears to be no clear structure of thoughts. Ideas lack direction. Transitions are awkward and/or non-existent.
Examples	The examples were clearly and correctly worked out. The steps are well explained. Examples other than those in the reading were included.	The examples were clearly and correctly worked out. The steps were adequately explained.	The examples were difficult to understand and not clearly and/or correctly worked out.	There were no examples
Slide Layout	The slides were neatly laid out, well organized, and easy to read.	The slides were neatly laid out and easy to read, though there were elements that were either too dull or too distracting.	The slides were easy to read, however they were not neatly laid out, e.g. too much information per slide.	The slides were challenging to read, not neatly laid out, and either altogether too dull or distracting.
Effective Use of Time	Speaker ended on time (± 1 min) and moved through the material at a comfortable pace. Speaker paused at various points to ask for questions.	Speaker ended on time (± 1 min) but moved through the material either too quickly or too slowly. Speaker paused at various points to ask for questions.	Speaker ended on time (± 1 min) but moved through the material either too quickly or too slowly. Speaker did not stop at any point to ask for questions.	Speaker either went well over or well under the allotted time.

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.
See http://www.rhodes.edu/disabilityservices/default.asp for details.

Classroom Etiquette:
Please be considerate of the instructor and your classmates around you. Come to class on time and stay the entire period. Turn off cell phones or any beeping/ringing devices during class (this means no sending text messages during class).

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

The note that this syllabus is a guide and not a contract, and thus is subject to change at the discretion of the instructor.