COURSE: Epidemiological modeling of infectious diseases

VIBS 689-601             Fall Semester – 2012

Lecture: T 11:10am-12:25pm, Computer Lab room 106 FAS Bldg. 1194
Lab: R 11:10am-12:25pm, Computer Lab room 106 FAS Bldg. 1194

INSTRUCTOR: Dr. Renata Ivanek-Miojevic
Office: College of Vet. Med. and Biomedical Sci., Veterinary Teaching Hospital, Room #8.
Office phone: (979) 862-4819, Mailbox: in VMA Bldg., Rm. 107.
E-mail: rivanek@cvm.tamu.edu;
Office hours: After class or by appointment

Teaching Assistant: TBD
Office hours: After class or by appointment

CREDIT HOURS: 3 Hours

COURSE DESCRIPTION: The goal of this course is to introduce students from a biological/medical
background (such as biology, epidemiology, medicine, veterinary medicine and public health) with limited
mathematical training to calculus-based epidemiological modeling of infectious diseases.

Course is limited to a maximum of 10 students.

REQUIRED TEXTS AND MATERIALS: Robert Smith?, Modelling Disease Ecology with Mathematics
(American Institute of Mathematical Sciences, 2008)

COURSE REQUIREMENTS: Access to e-Learning and Matlab software is required. e-Learning is an online
Learning Management System that allows the development and delivery of educational courses using the Internet.
It will be your responsibility to check this site regularly for course related announcements. Having access to e-
Learning and Matlab software at home would be a plus; however, all students at Texas A&M have computing
resources available to them through the Virtual Open Access Lab (https://voal.tamu.edu/ ) and on campus.

ADDITIONAL RESOURCES:
E-Learning orientation for students: http://elearning.tamu.edu/elearning-orientation/

LEARNING OUTCOMES: The course is intended to serve as an introduction to infectious disease modeling
and will provide an overview of the concepts and underlying assumptions, as well as the importance and utility of
mathematical modeling of infectious diseases. You will learn general information on the steps and methods for
setting up and analysis of models. Models that have been employed in the past to understand the natural history of
infectious diseases and in their control will be demonstrated. At the end of the course, you should be able to (i)
explain the basic concepts and steps in modeling of infectious diseases, (ii) develop and analyze simple models
using differential equations in standard software, and (iii) appreciate the value of modeling in the epidemiology of
infectious diseases.

I am looking forward to getting to know each of you and to working with you as we accomplish these learning
outcomes.
GRADING POLICY: Your grade for this course will be based on the in-class quizzes, homework, and final project.

In-class quizzes: Prior to coming to the lecture/lab each week you will be expected to read pertinent text from the course textbook. The assigned reading will be tested by the in-class quizzes. In-class quizzes will be open-notes. If you have done the reading the questions should pose you no difficulty. For any missed in-class quiz, you will write a page long essay about the assigned reading; there will be no make-up quizzes except if absence was University Excused (http://student-rules.tamu.edu/rule07).

Homework: Assigned homework will be due a week from the day of assignment. Late homework will be marked down except if due to a University Excused Absence (http://student-rules.tamu.edu/rule07). Homework may involve writing a short essay, modeling and analysis by hand or using Matlab software and/or preparing a Powerpoint presentation.

Final project: For the final project, you will develop and analyze a model of an infectious disease of your choice. By mid semester, you should indicate your choice of a model and the rationale for your choice in a page long proposal. You will receive feedback on the proposal and will be consulted during model development and analysis. The final project will be due at the end of the semester. It will be in the form of a conference-like Powerpoint presentation describing objectives, methods, results and conclusions drawn from the performed modeling work.

Grading:
- In-class quizzes = 30%
- Homework = 35%
- Final project = 35%

Grading scale:
90-100% = A
80-89% = B
70-79% = C
60-69% = D
Below 60% = F

COURSE SCHEDULE*:

<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1</td>
<td>Steps in the development and use of mathematical models of infectious diseases</td>
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<td>2</td>
<td>Simple epidemic models</td>
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<td>3-4</td>
<td>Calculating R0</td>
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<td>5</td>
<td>A vector-borne disease with lifelong immunity</td>
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<td>6</td>
<td>A vector-borne disease with temporal immunity</td>
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<td>7</td>
<td>What can we learn from the spread of measles</td>
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<td>8</td>
<td>Fall Break</td>
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<td>9</td>
<td>Force of infection</td>
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<td>10</td>
<td>Introduction to stochastic modeling</td>
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<td>11</td>
<td>Heterogeneous mixing in spread of infectious diseases</td>
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<td>12</td>
<td>Fitting curves to data</td>
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<tr>
<td>13</td>
<td>Bifurcations/Guest lecture</td>
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<tr>
<td>13</td>
<td>Partial differential equations/Guest lecture</td>
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<td>14</td>
<td>Revision</td>
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<td>15</td>
<td>Final project presentations</td>
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* Subject to change to accommodate students’ learning process
ATTENDANCE POLICY: Attendance to lectures and laboratories is expected (http://student-rules.tamu.edu/rule07).


ADA POLICY STATEMENT: The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights protection for persons with disabilities. Among other things, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact Disability Services, in Cain Hall, Room B118, or call 845-1637. For additional information visit http://disability.tamu.edu.