COURSE: **Mathematical Evolutionary Theory**
Math 583 section #001
EEB 585 section #001

TIME & PLACE: 1:25-2:15 MWF *Spring 2008*
Ayres 209A

INSTRUCTOR: Sergey Gavrilets
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OFFICE HOURS: by appointment, at my office

TEXT: S. H. Rice "Evolutionary theory. Mathematical and conceptual foundations" 2004, Sinauer Assoc. You will also be supplied with lecture notes. Futuyma' *Evolutionary Biology* is strongly recommended for those who desire to get better understanding of the biological background. Several books on the mathematical aspects of evolutionary biology will be suggested.

COURSE GRADING: There will be a variety of problem assignments throughout the semester and a project which will be graded.

COMMENTS:

Homework assignments will be generally given once a week and are due in one week after they are given.

Your project will be to formulate and study (analytically and/or numerically) an evolutionary model. This could be based on something we did in class, or something you read about, or something you are interested in. You should discuss with me the topic of your project not later than March 7. The project is due April 21.

Computer algebra package *Maple* will be extensively used in class. UT has a campus-wide license which allows you (I believe) to get a copy of *Maple* for a nominal fee. *Maple* notebooks designed for this course will be available.

There is an enormous variety of different mathematical and statistical models, methods and approaches used in evolutionary biology.

- We will consider *populations* of biological organisms (rather than individual organisms, organs, cells, or molecules).
- A major emphasis will be on *dynamical* aspects of evolution (rather than static, statistical, etc.). This implies that we will be mainly using the methods from dynamical systems theory, ordinary differential equations, partial differential equations, recurrence equations, stochastic equations.

- We will consider *simple* models (where the word "simple" refers to the model's description and formulation and not necessarily to its analysis).
- We will focus on models that can be used for answering *biological* questions (rather than pure mathematical), that can provide biological insights, that can train our intuition about complex evolutionary phenomena, can provide a framework for studying such phenomena, and to identify key components of complex biological systems.
- We will be most interested in models that allow for *analytical* investigation (rather than pure numerical).
- We will consider both *classical* models and some *very recent* approaches.

General outline of the course:

- January
  - 9 (Wed) Chapter 1
  - 11 (Fri) -"-
  - 14 (Mon) -"-
  - 16 (Wed) -"-
  - 18 (Fri) Chapter 2
  - **21 (Mon) no classes (MLK)**
  - 23 (Wed) -"-
  - 25 (Fri) -"-
  - 28 (Mon) -"-
  - 30 (Wed) Chapter 3
- February
  - 1 (Fri) -"-
  - 4 (Mon) -"-
  - 6 (Wed) -"-
  - 8 (Fri) Chapter 4
  - 11 (Mon) -"-
  - 13 (Wed) Chapter 5
  - 15 (Fri) -"-
  - 18 (Mon) -"-
  - 20 (Wed) -"-
  - 22 (Fri) Chapter 6

- 25 (Mon) -”-
- 27 (Wed) Chapter 7
- 29 (Fri) -”-

- March
  - 2 (Mon) -”-
  - 5 (Wed) Chapter 8
  - 7 (Fri) -”-
  - *10 (Mon) Guest lecture*
  - *12 (Wed) Guest lecture*
  - **14 (Fri) no classes (Spring break)**
  - **17 (Mon) no classes (Spring break)**
  - **19 (Wed) no classes (Spring break)**
  - **21 (Fri) no classes (Spring break)**
  - 24 (Mon) Chapter 8
  - 26 (Wed) Chapter 9
  - 28 (Fri) -”-
  - 31 (Mon) -”-
- April
  - 2 (Wed) -”-
  - 4 (Fri) Chapter 10
  - *7 (Mon) Guest lecture*
  - 9 (Wed) Chapter 10
  - 11 (Fri) -”-
  - *14 (Mon) Guest lecture*
  - *16 (Wed) Guest lecture*
  - *18 (Fri) Guest lecture*
  - 21 (Mon) Speciation and related issues
  - 23 (Wed) -”-
  - 25 (Fri) -”-