

Math 151 – Mathematics for the Life Sciences

Time: 12:40 pm – 1:55 pm TR Section: 003 Location: Ayres 320 Labs: Ayres 15
Course website: <http://www.math.utk.edu/~dilling/math151/>

Instructor: Rick Dilling Email: dilling@math.utk.edu
Office: Ayres 107F Hours: Tuesday/Thursday, 12:00 pm – 12:30 pm and 2:00 pm – 2:30 pm
Mailbox: Ayres 121 (Department of Mathematics Main Office)

Text: *Mathematics for the Biosciences* by Michael Cullen.

Supplement: includes additional material not covered in the text, as well as projects and sample exams; available from Graphic Creations (1809 Lake Ave., behind Wendy's on Cumberland Avenue) for approximately \$4.

Course Overview: This course provides an introduction to a variety of mathematical topics of use in analyzing problems arising in the biological sciences. It is designed for students in biology, agriculture, forestry, wildlife, pre-medicine and other pre-health professions. Students who desire a strong mathematical grounding, enabling them to take most advanced math courses, should consider taking the sequence Math 141-2 instead. Math 151 is the first of a two course sequence, and depending upon your curriculum, will partially satisfy graduation requirements for your major. The general aim of the sequence is to show how mathematical and analytical tools may be used to explore and explain a wide variety of biological phenomena that are not easily understood with verbal reasoning alone.

Prerequisites: Two years of high school algebra; one year of geometry; half a year of trigonometry.

This course includes a laboratory component, which makes use of computer facilities in the Math Department. No prior background in the use of the main software package for the course (Matlab) is expected, though students are expected to have familiarity with standard word-processing and graphing (e.g. spreadsheet) tools. Although there is a textbook, we will not be following it very closely at times, and we will be covering topics not in the text on occasion. As we will not be following the text for part of the course, students should plan to attend all class sessions.

Course Goals:

- Develop your ability to quantitatively analyze problems arising in the biological areas of interest to you.
- Illustrate the great utility of mathematical models to provide answers to key biological problems.
- Develop your appreciation of the diversity of mathematical approaches potentially useful in the life sciences.
- Provide experience using computer software to analyze data, investigate mathematical models and provide some exposure to programming.

Course Grading:

Weighting:		Scale:	
Quizzes (best 8):	20%	A	90 – 100
Projects:	20%	B+	85 – 89
Exams (best 2):	30%	B	80 – 84
Final Exam:	30%	C+	75 – 79
		C	70 – 74
		D	60 – 69
		F	below 60

Quizzes: These will usually be given in class every Thursday when an exam is not scheduled (for a maximum of 11). They will be over the topics covered in class since the last quiz/exam and will generally be very similar to problems from the homework. Only your best 8 quiz scores will be included in the calculation of your overall grade. (Your lowest scores will be dropped.) There are no makeup quizzes.

Projects: There will be 4 projects assigned during the semester (each weighted the same: 5% of the overall grade), some of which will be based on the use of the computer to analyze particular sets of data or problems. Project 1 will be due in class on Tuesday, January 17, 2006. You may work on projects 2, 3, and 4 within small groups (2 – 3 persons) as long as you clearly note who participated and each person

writes and hands in her/his own results. Projects 2, 3, and 4 will be due the class meetings after exams 1, 2, and 3, respectively. (Project 1 will be due the class meeting after exam 1, etc.) (Also, I am planning to have several optional tutorial sessions in the Ayres computer lab to go over how to use Matlab for the projects. Because of this, it is greatly to your advantage to attend those sessions, which will be announced in advance.)

Exams: There will be three in-class exams during the semester, tentatively scheduled for Thursday, February 9; Thursday, March 16; and Thursday, April 20. Only your best 2 exam scores will be included in the calculation of your overall grade. (Your lowest score will be dropped.) There are no makeup exams.

Final Exam: The final is comprehensive and will include all topics covered in class during the semester. The final is scheduled for Tuesday, May 9, from 2:45 pm – 4:45 pm in Ayres 320.

Homework: Homework problems will be assigned on a regular basis to allow you to practice the topics that we cover in class. They will not be collected or graded, but it is greatly to your advantage to work on the homework problems since problems on the quizzes and exams will generally be very similar to problems from the homework. As time permits, we will go over some of the homework problems in class. (Also, I am planning to have an optional, one hour, weekly meeting to go over homework problems.)

Course Outline: (The pace of the material covered will be adjusted as necessary.)

Descriptive statistics – analysis of tabular data, means, variances, histograms, linear regression
Exponentials and logarithms, non-linear scalings, allometry, log-log and semi-log plots, Sections 5 and 15

Exam 1 – Thursday, 2/9/06

Sequences, Limits, and Difference equations – Sections 47 and 48 with supplementary material
Matrix algebra – Sections 55 and 56 with supplementary material – matrix models in population biology, eigenvalues and eigenvectors

Exam 2 – Thursday, 3/16/06

Discrete probability – Sections 57 to 61 with supplementary material

Exam 3 – Thursday, 4/20/06

Final Exam – Tuesday, 5/9/06, 2:45 pm – 4:45 pm

Other Important Dates:

Friday, 1/20/06	Last day to drop without a W
Tuesday, 2/21/06	Last day to drop with a W
Tuesday, 4/4/06	Last day to drop with a WP/WF

Classroom Etiquette: Be on time. Turn off cell-phones and beepers during class. Do not read the newspaper or do other work during our class. Do not talk to classmates at inappropriate times.

Academic Standards of Conduct: All students are expected to abide by the University Honor Statement. In mathematics classes, violations of the honor statement include copying another person's work on any graded assignment or test, collaboration on a graded assignment without instructor's approval, using unauthorized "cheat sheets" or technical devices such as calculators, cell phones or computers for graded tests or quizzes, or other infractions listed in "Hilltopics". These violations are serious offenses, subject to disciplinary action that may include failure in a course and/or dismissal from the University. See "Hilltopics" for more complete information.

Disability Services: If you need course adaptations or accommodations because of a documented disability or if you have emergency information to share, please contact the Office of Disability Services at 2227 Dunford Hall at 974-6087.

Math Tutorial Center: The Math Tutorial Center is located in Ayres 322. It provides **free tutoring**. Hours of operation are posted at <http://www.math.utk.edu/MTC/>. **Please make use of this free service.**