

BRONX COMMUNITY COLLEGE
of the City University of New York
DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

MTH 37 -- ELEMENTS of CALCULUS and STATISTICS for Biology Students
4 credits, 4 hours per week

COURSE SYLLABUS

PREREQUISITE: MTH 31 with grade C or higher or placement by the department

TEXT: *Mathematical Methods for the Life Sciences*, by E.H. Grossman, City College of New York, customized edition.

Additional Text: *An Introduction to the Mathematics of Biology*, by Yeagers, Shonkwiler, Herod, Birkhäuser, 1996.

CALCULATORS: TI-83/83+ (or equivalent) is required. Some classes will meet in a computer lab

Course Grading Policy:

1. Each of two (2) *Class Exams* (tentatively, during the second week of October and the fourth week of November) is worth 15% of your final course grade.
2. Home assignments are worth 15% of your final grade. Attendance will be taken at every class during the first minute of the class.
3. Written team project, due during the first week of December, is worth 15% of your final grade.
4. The Final Exam is worth 40% of your final course grade **IF** the Final has been passed by achieving a 60 or higher. Failing the Final Exam implies failing the course.

Course Objectives:

Learn basic concepts and results that form the background of Ordinary Differential Equations and Statistics and their applications, such as models of exponential growth and logistical models, steady-state solutions and the stability of solutions of simplest ordinary elementary differential equations and systems of equations, probability rules, data classification, graphical presentation of statistical data, measures of central tendency, regression analysis, examples of discrete (binomial) and continuous (normal) distributions, introduction to construction of confidence intervals and hypothesis testing. Learn more advanced topics such as the Law of Large Numbers and the Central Limit Theorem that require some calculus background. All theoretical material will be preceded by model problems and will be illustrated, accompanied, and followed by solution of many problems. At the end of this course, the students are supposed not only to know certain definitions, theorems, etc., but also to be able to apply these to specific statistical projects. MS Excel spreadsheets are used to illustrate some of the mathematical and especially statistical topics. The students will become acquainted with the statistical software in Excel.

General Remarks:

Students should study, **at the very least**, THREE hours at home after each hour in the classroom. At home you should look through your class notes, read the assigned sections from the text, and only after that (not before!) start to solve problems. At the beginning of every class some time is devoted to answering the students' questions. Prepare your questions **BEFORE** the class, not after the class started.

Punctuality. As a matter of common courtesy, **arrive in class on time** (if you are not early, you are late).

Integrity. The BCC Academic Integrity Policy is the governing policy document. Every student is responsible for knowing its implications and observing them. No cheating is tolerated.

COURSE OUTLINE

Section	Topic	Home Work	Time (in hours)
1.1-1.2	Review of Calculus. Derivatives and antiderivatives of exponential and logarithmic functions		4
Appendix A	Intro. to Excel		1
2.1-2.2	Intro. To ODEs, separable ODEs		3
2.3	Exponential growth		1
3.1-3.2	Euler's method		2
4.2	Steady state solutions		1
4.3	Geometric analysis		2
4.4	Stability		1
5.1-5.2	Malthus model, harvesting		2
5.3	Logistic model		1
6.1-6.2	Systems of ODEs		2
6.3	Steady states, Phase plots		1
6.4-6.5	Stability; application to epidemics		2
7.1-7.2	Histograms		1
7.3-7.4	Measures of central symmetry and spread		2
7.5-7.6	Box plots, five-point summary, estimation		1
8.1-8.3	Correlation coefficient		2
9.1-9.3	Method of least squares; prediction		2
9.4-9.5	More on regression		Time permitting
10.1-10.2	Intro. to probability		1
10.3-10.4	Counting		2
10.5	Probability rules		2
11.1-11.3	Mutually disjoint and independent events. Conditional probability and Bayes' theorem		2
12.1-12.4	Genetics; Hardy-Weinberg theorem		Time permitting
13.1-13.2	Discrete random variables		2
13.3	Binomial distribution		2
13.4	Poisson distribution		1
14.1-14.2	Continuous random variables; uniform distribution		1
14.3-14.4	Normal distribution		3
14.5	Normal approximation to binomial distribution		2
15.1-15.3	Inferential statistics; confidence intervals (large samples)		3
15.4	Small samples (t distribution)		1
			Total: 53

3 hours left for reviews, tests, etc.

A. Kheyfits: 03/22/2009; Revised 04/10/2011