

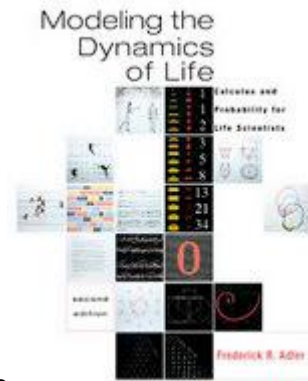
MAT 1194/ Calculus for the Bioscience / Spring 2010

Class:

Instructor:

Office hours:

Prerequisite: MAT 1093 (Precalculus), or an equivalent course, or placement.



Text: F. Adler, Modeling the Dynamics of Life, 2e, Brooks Cole, 0534404863

Supplemental Materials: Class materials, including homeworks and class notes will be available online via WebCT.

Transfer: This course can be transferred to other state supported universities in Texas as MATH 2413 in accordance with the Texas Common Course Numbering [TCCN] system.

Description: This is the first course in a two-part math sequence for students majoring in the life sciences. Emphasis is placed on the development of mathematical models of dynamical systems that are central to the study of biology (for example, growth, diffusion and selection). In this course we will focus on deterministic processes that can be described by discrete-time dynamical systems and differential equations. The study of discrete-time dynamical systems leads naturally to the concept of instantaneous rate of change (the derivative), as well as the notion of limits. Dynamical models of biological processes provide an array of functions for which differentiation is more than an abstract algebraic exercise. Integration is introduced via its most important application, the solution of differential equations. Specific topics to be covered are limits, continuity, rules for differentiation, stability, maximization, Newton's method, the second derivative, antiderivatives, definite and indefinite integrals, Riemann integration, the Fundamental Theorem of Calculus, two-dimensional differential equations, and the phase-plane.

Course perspective: This is NOT a typical math class. Many math classes have a 'cookbook' feel, where the goal is to learn to solve a restricted set of problem types. Accordingly, most students approach the material hoping to learn by repeatedly being exposed to examples of these problems and then reproducing them on the test with little thought. While there will be some rote

learning, this course emphasizes the translation of understanding amongst formulas, graphs and biological applications. As such, much of the material will focus on word problems of varying formats, rather than specific problem types.

Reading: Given the emphasis on conceptual learning, it is important to read the text carefully before a given section is covered in class. Check the syllabus to determine which section will be covered. Read a section all the way through once and then come back to points of interest. You will not be able to just skim back through the chapter to search for example problems to model solutions on. You will be asked questions about the text on the quizzes.

Writing: All written work that you will submit, including homeworks, quizzes and exams, must be legible, grammatically clear and complete, logically put together, and accompanied by appropriate sketches. You must convince the grader that you know why you are doing each step – correct answers alone will not get full credit. To do this, include brief explanations of your work, in words, and finish with brief conclusions, in words, based on your calculations.

Class Participation: Daily attendance will not be taken. However, in class quizzes will be given during most class sessions, and these will start with a floor of 50% (see below) so class attendance will be reflected in quiz scores to some degree. Also, class attendance and participation may be used to assign grades in borderline cases.

Evaluation

Quizzes: There will be 5 minute reading quizzes on most class days. There will be no quizzes during exam weeks and the last week of classes. There will be no make-ups and no excuses, but at least the 4 lowest quiz scores will be dropped for every student.

Homework: There will be short weekly homework sets assigned online. Homeworks will be due in class on Thursdays. You are encouraged to work together, but each student shall remain individually responsible for turning in their homework sets on time and for understanding the solutions. No late homeworks accepted and no excuses. But at least 2 lowest homework scores will be dropped for each student.

Exams: There will be 3 midterm exams and a final. The exams are closed book, but a formula sheet will be provided with the exam. This sheet distributed before the exam to study from, and students will be given the opportunity to request the formulas to be included. Final decision for what is on the formula sheet rests with Dr. Troyer. Calculators will be allowed on exams, but exams will be designed to rely only basic calculation. Exams must be taken at the scheduled time.

Make-ups will only be given under extreme circumstances and only when accompanied by written support documentation. If circumstances arise before the exam, notification must happen as soon as reasonably possible (e.g. by phone or e-mail) – later notification will not be accepted.

Final Exam: This will be a comprehensive exam over all the course material, and can be used to replace the lowest mid-term exam grade.

Grading policy: The total course score will be based on homework (25%) and quizzes (9%) and exams (66%). Grades for each exam and for the total homework and quiz score will be expressed as a percentage of 'target score', usually the average of the top three scores in the class. For example, if the average of the top three scores on an exam was 78 and you got a 65, your percentage for that exam would be $65/78 = 83.33\%$. The total exam score will be based on the top three scores from among the three midterms and the final. The letter grade for the course will be derived from a histogram of course scores.