

STUDENT LEARNING OUTCOMES

Dynamical Systems in Biology

MATH / BIOL 3350-001

HONR-SC 3304-003

Spring 2010

MoWe 1:00 – 2:20 PM

Pickard Hall, Room 111

Instructors: Dr. Hristo Kojouharov (hristo@uta.edu , 817-272-5763, Pickard Hall 441)
Dr. James P. Grover (grover@uta.edu, 817-272-2405, Life Sciences 468)

Office Hours: Dr. Kojouharov Monday and Wednesday 11:00 AM – 12:00 PM or by appointment
Dr. Grover Monday 2:00-5:00 PM, Thursday 1:00-3:00 PM or by appointment

Description of Course Content: An introductory course in the existence and properties of solutions of differential and difference equations, qualitative analysis methods, and numerical solution of differential equations using finite-difference methods. Laboratory work will include use of Matlab in solving biologically motivated mathematical problems.

Student Learning Outcomes: Students will become competent in analyzing and deriving predictions from discrete-time and continuous-time models in ecology and epidemiology. Students will become familiar with some of the mathematical and computational tools for determining the equilibria and their stability properties of difference and differential equations, and for obtaining analytical and numerical solutions to single- and multiple-variable models.

Course Prerequisites: C or better in BIOL/MATH 2350, or permission of the instructors.

Required Textbook: Otto, S.P. and Day, T. 2007. *A Biologist's Guide to Mathematical Modeling in Ecology and Evolution*. Princeton University Press, Princeton, New Jersey.

Other Requirements: Students will need access to a computer with the program MATLAB installed. The Mathematics Department provides a computing facility for this purpose and others may be available on campus. Students will need access to a computer with an Internet connection and web browser to obtain various course materials.

Supplementary Material: Instructors will make additional readings available to students as needed.

Course web page: <http://www.uta.edu/math/utter/course3350/>

Grading Policy: Grades are based on weekly homework problems, and on course mini-projects. There are no exams. There is no extra credit.

Homework problems	50%
Mini-Projects	50%

Attendance Policy: Regular attendance is required.

Homework Policy: Homework assignments will usually be assigned weekly on Wednesdays, and written reports will be due the following Wednesday. Homework will be an important part of the learning experience in this course, providing a basis for discussions in class. Therefore, all assignments should be completed and brought to class on the due date. Teamwork is encouraged, but each student should prepare their own written report to bring to class when the assignment is due.

Mini-Projects: Mini-projects will be assigned regularly throughout the semester and you will have two weeks to complete them. They will involve examining and analyzing a biological situation, identifying variables that form the basis of a mathematical model of the biological situation, explaining relationships among the variables, analyzing the model, and clearly stating the findings and conclusions of the analyses. Students will work in groups of 4 to complete the mini-projects and will be required to provide written reports.

Late Work: Written reports for homework assignments and mini-projects should be brought to class on the date assigned. The assignment should be completed to the greatest extent possible. For this class, students are allowed to bring a partially completed problem to class to discuss with instructors and other students. Homework assignments will be scored according to three criteria: (1) the thoroughness and correctness of mathematical analysis; (2) the thoroughness, clarity, and accuracy of verbal descriptions of mathematical

analysis and biological context; (3) the extent to which the written report brought to class prepares the student for discussions that take place during class.

Grade disputes: The instructors are willing to review the scoring of homework assignments and mini-projects, but requests to do so must be made *within two weeks of the date that graded work is distributed in class*.

Drop policy: Withdrawal from the course must follow all pertinent University and Departmental regulations and deadline dates. Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. April 2 is the last day that a course may be dropped. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information. Students who are supported by scholarships from the UTTER Program are expected to make satisfactory progress in this class to maintain their scholarship support. Any student experiencing difficulties leading them to consider dropping the course should talk to the instructors to obtain their advice and help in avoiding any negative consequences.

Students will not be automatically dropped for non-attendance. Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. Contact the Financial Aid Office for more information. All university and departmental policies governing course withdrawal will be applied. Students should be aware of relevant regulations regarding withdrawal and deadline dates.

Drop Date for Non-Payment of Tuition and Fees: Jan. 13, 2010.

Incomplete grades: A grade of incomplete will only be assigned for students who are physically unable to complete the course due to serious illness or injury. Students facing difficulty completing the course should consult the instructor at the earliest opportunity.

Other issues: This course requires you to be an *active* participant. Class participation is an important aspect of this course, so be considerate of other students and arrive on time. Turn off cell phones and pagers. It is expected that you attend class and do your homework. It will help you to read the sections in the book *before* attending lectures.

Schedule of Lecture Topics

We will try to cover these topics during the semester. However, we will be flexible and will emphasize the topics covered in Chapters 4-8 of the textbook, doing the remainder as time allows.

Topic	Reading
Numerical and graphical analysis of models	Chapter 4
Equilibria and Stability Analyses--One-Variable Models	Chapter 5
General Solutions and Transformations--One-Variable Models	Chapter 6
Linear Algebra	Primer 2
Equilibria and Stability Analyses--Linear Models with Multiple Variables	Chapter 7
Equilibria and Stability Analyses--Nonlinear Models with Multiple Variables	Chapter 8
General Solutions and Tranformations--Models with Multiple Variables	Chapter 9

Important University Policies:

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies

for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Academic Integrity: It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University. According to the UT System Regents' Rule 50101, §2.2, "Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts."

Student Support Services Available: The University of Texas at Arlington has established a variety of programs to help students meet the challenges of college life. Support to students includes advising, counseling, mentoring, tutoring, supplemental instruction, and writing assistance. For a complete list of academic support services, visit the Academic Assistance resource page of the Office of Student Success Programs, www.uta.edu/uac/studentssuccess/academic-assistance. To help students address personal, academic and career concerns, individual counseling is also available. For more information, students are encouraged to contact Counseling Services www.counseling.uta.edu at (817) 272-3671 or visit a counselor in 216 Davis Hall.

Electronic Communication Policy: The University of Texas at Arlington has adopted the University "MavMail" address as the sole official means of communication with students. MavMail is used to remind students of important deadlines, advertise events and activities, and permit the University to conduct official transactions exclusively by electronic means. For example, important information concerning registration, financial aid, payment of bills, and graduation are now sent to students through the MavMail system. All students are assigned a MavMail account. *Students are responsible for checking their MavMail regularly.* Information about activating and using MavMail is available at <http://www.uta.edu/oit/email/>. There is no additional charge to students for using this account, and it remains active even after they graduate from UT Arlington.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week unless specified in the class syllabus. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. Classes are held as scheduled during this week and lectures and presentations may be given.

Grade Grievance Policy: Grade grievance procedures will follow those in the Undergraduate Catalog.

After Hours Safety Escort: The Sam Mav Escort service provides a service to assist students, faculty, staff and campus visitors to reach their destinations after regular business hours. The hours of service are 7:00 p.m. to 1:00 a.m., Sunday through Saturday. 817-272-3381.