

Math 735 –Math Modeling Section U015 (3 CR)
The University of South Dakota
Spring 2009
TTh 5:30-6:45 P.M. (A&S 107)

CONTACT INFORMATION:

José D. Flores, Ph.D.
329 Dakota Hall
Office Hours: MTTh&F 2:00-2:50 p.m., and by appointment
677-5262 (math department)
e_mail: jflores@usd.edu

INSTRUCTIONAL METHOD: Lecture/Discussion/Computer lab sessions/

COURSE REQUIREMENTS:

- **TEXTBOOK:** *Mathematical Models in Biology and Epidemiology* by Fred Brauer and Carlos Castillo-Chavez. Spriger-Verlag.
- **Software:** MAPLE and MATLAB.

EVALUATION PROCEDURES:

HOMEWORK/PROJECTS/TESTS: Homework will be assigned each day for your practice in mastering the material. There will be weekly homework, two examinations, two modeling project and a comprehensive final exam. There is no make-up for missed work, please do not ask.

EXAMS: Attendance is required at all exams. **The final exam is comprehensive and it is scheduled for Tuesday, May 5, 2009**

GRADING:

Category	Weight		Scale	
Homework	20 %		90 % -100%	A
Exams /projects	60 %		80 % - 89%	B
Final Exam	20 %		70 % - 79 %	C
			60 % - 69 %	D
			BELOW 60 %	F

IMPORTANT DATES:

- **FRIDAY, JANUARY 23, 2009** is the last day to drop a class without paying in full for the course and nothing showing on your transcript.
- **MONDAY, APRIL 6, 2009** is the last day to withdraw from a class with a “W” showing on your transcript.

FREEDOM IN LEARNING:

Students are responsible for learning the content of any course of study in which they are enrolled. Under Board of Regents and University policy, student academic performance shall be evaluated solely on an academic basis and students should feel free to take reasoned exception to the data or views offered in any course of study. Students who believe that an academic evaluation is unrelated to academic standards but is related instead to judgment of their personal opinion or conduct should contact the dean of the college which offers the class to initiate a review of the evaluation.

CHEATING/PLAGIARISM (the official College of Arts and Sciences policy follows):

The College of Arts and Sciences considers plagiarism, cheating, and other forms of academic dishonesty inimical to the objectives of higher education. The College supports the imposition of penalties on students who engage in academic dishonesty, as defined in the "Conduct" section of The University of South Dakota Student Handbook.

No credit can be given for a dishonest assignment. At the discretion of the instructor, a student caught engaging in any form of academic dishonesty may be:

- a. Given a zero for that assignment.*
- b. Allowed to rewrite and resubmit the assignment for credit.*
- c. Assigned a reduced grade for the course.*
- d. Dropped from the course.*
- e. Failed in the course.*

DISABILITY SERVICES STATEMENT:

Any student who feels s/he may need academic accommodations or access accommodations based on the impact of a documented disability should contact and register with Disability Services during the first week of class. Disability Services is the official office to assist students through the process of disability verification and coordination of appropriate and reasonable accommodations. Students currently registered with Disability Services must obtain a new accommodation memo each semester. Ernetta L. Fox, Director, Disability Services, Room 119 Service Center (605) 677-6389, Web Site: www.usd.edu/ds; E-mail: dservices@usd.edu.

Tentative Course Outline/Schedule:

Basics Content

1. Continuous Population Models (chapter 1)
 1. Exponential Growth
 2. The Logistic Population Model
 3. The Logistic Equation in Epidemiology
 4. Quantitative Analysis
 5. Harvesting in Population Models
2. Discrete Population Models (chapter 2)
 1. Linear Models
 2. Graphical Solutions of Difference Equations
 3. Equilibrium Analysis
 4. Period-Doubling and Chaotic Behavior
 5. Discrete Time Metered Models
 6. Systems of Two difference Equations
3. Introduction and Mathematical Preliminaries (chapter 4)
 1. The Lotka-Volterra Equations
 2. The Chemostat
 3. Equilibria and Linearization
 4. Qualitative behavior of Solutions of Linear Systems
 5. Periodic Solutions and Limit Cycles
4. Continuous Model for Two Interacting Populations (chapter 5)
 1. Species in Competition
 2. Predator-prey Systems
 3. Kolmogorov Models
 4. Mutualism
 5. The Community Matrix
 6. The Nature of Interactions Between Species
 7. Invading Species and Coexistence
5. Harvesting in two-species models (chapter 6)
 1. Harvesting of species in competition
 2. Harvesting of Predator-Prey Systems
 3. Some Economic Aspect of Harvesting
 4. Optimization of Harvesting Returns

The time spend in each topic is variable. There are many factors that can impact what material is discussed in a class session.

Day	Date	Session No.	Material
Thursday	Jan. 15	1	Section 1.1 -1.2
Tuesday	Jan. 20	2	Section 1.3-1.4
Thursday	Jan. 22	3	Section 1.4
Tuesday	Jan. 27	4	Section 1.5
Thursday	Jan 29	5	*
Tuesday	Feb 3	6	Section 2.1-2.2
Thursday	Feb 5	7	Section 2.3-2.4
Tuesday	Feb 10	8	Section 2.4-2.5
Thursday	Feb 12	9	Section 2.6
Tuesday	Feb 17	10	Section 2.7
Thursday	Feb 19	11	Project 1
Tuesday	Feb 24	12	*
Thursday	Feb 26	13	*
Tuesday	March 3	14	Test I
Thursday	March 5	15	Section 4.1
Tuesday	March 10	No class	
Thursday	March 12	No class	
Tuesday	March 17	16	Section 4.2- 4.3
Thursday	March 19	17	Section 4.3-4.4
Tuesday	March 24	18	Section 4.4
Thursday	March 26	19	Section 4.5
Tuesday	March 31	20	*
Thursday	April 2	21	Section 5.1
Tuesday	April 7	22	Section 5.2/5.4
Thursday	April 9	No class	Easter break
Tuesday	April 14	23	Section 5.5/
Thursday	April 16	24	Section 5.7/5.8
Tuesday	April 21	25	Section 5.9
Thursday	April 23	26	Test II
Tuesday	April 28	27	Section 6.1-6.2
Thursday	April 30	28	Section 6.3-6.4 (Electronic copy of the project)
Tuesday	May 5	Exam	Tuesday May 6, 2009 5:00-7:00 PM