Soochow University

MAT 263 Calculus for Life Science II

Summer 2021

Course Information

Course Credits: 4

Contact Hours: 58 hours

Class Time: 8:30 - 10:20

Instructor: TBA

Course Format: Online

Course Description

Calculus is crucial for all quantitative analysis. In the exploration in to life science, calculus has contributes a lot and will still play significant role in these fields. In this course, instructors will demonstrate the critical topics in calculus in term of application in life science. Topics concluded in this course will cover analysis of autonomous differential equations, probability theory and descriptive statistics, probability models, and statistical reasoning. students are expected to develop basic understanding and proficiency in the application of these concepts and content.

Prerequisite(s)

None

Soochow University

Learning Objectives

Upon completion of this course, students will be able to:

1. Comprehend and apply the significant concepts and method in calculus used in life science;
2. Determine equilibrium points of discrete dynamical systems and determine their stability;
3. Model life science issues with basic functions;
4. Apply concepts like limits, continuity, differentiation, integration, etc. to solve realistic problems in life science.

Methodology

Methodology	Hours	Hours of work During class	Hours of work After class
Online Video	50	88 hours (60%)	
Online Forum Discussion	8		
Assessment	30		
Personal study	30		68 hours (40%)
Tasks	22		
Practical teaching preparation	10		
Bibliographic search	6		
Total	**156**	**88**	**68**

Textbook(s)

Modeling the Dynamics of Life: Calculus and Probability for Life Scientists by Frederick R. Adler, 3rd Edition, Cengage Learning, 2012.

Tasks and Evaluation

Assignments	40% (10% for each)
Midterm	25%
Final exam	35%

Students are required to attend online classes on the scheduled time. Missing classes without permission will lead to decrease in overall grade.

- Missing less than two classes: no penalty.
- Missing more than two classes: 7% will be taken off from the overall grade.

Online forum discussion is required. Students are required to post at least one question and answer at least one question on the forum weekly.

Online Tutorials are mandatory. Students will read and discuss academic articles provided. Students will also discuss the case studies for the week's lectures. Each Tutorial will be 1 hour.

All exams will be held online and the time of each exam will be limited to 1 hour. Exams must also be taken at the scheduled time. There will be no make-up exams.

Rating System:

1. Assessment

ASSESSMENT ITEM	PERCENT OF FINAL GRADE
Assignments	40% (10% for each)
Midterm	25%
Final exam	35%

2. Grading Scale

A+ 96-100	A 90-95	A- 85-89
B+ 82-84	B 78-81	B- 75-77
C+ 71-74	C 66-70	C- 62-65
D 60-61	F < 60	

Course Content

Week	Lecture	Topics	Dues	%
1	1	Review and Introduction		
	2	Analysis of Autonomous Differential Equations		
	3	Basic Differential Equations Equilibria and Display of Autonomous Differential Equations		
	4	Stable and Unstable Equilibria Solving Autonomous Differential Equations		
	5	Two-Dimensional Differential Equations The Phase Plane	Assignment 1	10
2	6	Solutions in the Phase Plane The Dynamics of a Neuron		
	7	Probability Theory and Descriptive Statistics		
	8	Introduction to Probabilistic Models Stochastic Models of Diffusion and Genetics		
	9	Probability Theory Conditional Probability		
	10	Independence and Markov Chains Displaying Probabilities	Assignment 2	10
3	11		Midterm Test	25
	12	Random Variables Descriptive Statistics		

	13	Descriptive Statistics for Spread		
	14	Probability Models		
	15	Joint Distributions Covariance and Correlation	Assignment 3	10
4	16	Sums and Products of Random Variables The Binomial Distribution		
	17	Applications of the Binomial Distribution Waiting Times: Geometric and Exponential Distributions		
	18	The Poisson Distribution The Normal Distribution		
	19	Applying the Normal Approximation	Assignment 4	10
	20	Introduction to Statistical Reasoning Statistics: Estimating Parameters		
5	21	Confidence Limits Estimating the Mean		
	22	Hypothesis Testing Hypothesis Testing: Normal Theory		
	23	Comparing Experiments: Normal Theory Analysis of Contingency Tables and Goodness of Fit		
	24	Hypothesis Testing with the Method of Support Regression		
	25		Final Exam	35

University Regulations and Services

Soochow University highly values the academic integrity and aims to promote the academic fairness, honesty and responsibility. Any academic dishonesty behaviors and any attempts to cheats and plagiarism will be reported to the university administration office. A written warning and the relevant penalties will be imposed. The record might be shown on the official university transcript.

Soochow University also highly respects students' accommodation for disabilities and religions. You might contact the Student Accessibility Office if you have any questions, concerns or if you would like to report any offensive behaviors.

Note:

Please contact the University Administrative Office immediately if you have a learning disability, a medical issue, or any other type of problem that prevents professors from seeing you have learned the course material.