Syllabus

1. Course Information

Course Name: Life Science Calculus I
Course Number: MAC 2241
Number of Credits: 4
Students cannot receive credit for both this course and Methods of Calculus (MAC 2233)

2. Course Prerequisites

MAC 1105 with minimum grade of C

3. Course Logistics

a. Term - Fall 2020
b. Class Time: 4 lecture hours per week in a 15-week semester
c. Class Location: TBA

4. Instructor

Name: Xiao-Dong Zhang, Office SE 274
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5. Course Description

This course is an introduction to the methods and applications of differential and integral calculus. Topics include limits, continuity, derivatives of basic functions in mathematics, differentiation rules, optimization problems, the definite integral and area under a curve, basic theory of differential equations, and modeling with differential equations. **This is a General Education course and counts toward the Gordon Rule computational requirement**. The course is taught in a classroom and 4 lecture hours per week in a 15-week semester. All topics will be presented within the context of applications, and reinforced through extensive examples in lecture and homework assignments.

6. Intellectual Foundation (General Education) Program Outcomes

This course partially fulfills the course requirements for the Quantitative Reasoning Foundation area in the FAU general education program. Mathematics is a peculiarly human endeavor that attempts to organize our experience in a quantitative fashion. It aids and supplements our intuitions about the physical universe and about human behavior. The Mathematics and Quantitative Reasoning requirement at FAU is intended to give students an appreciation of mathematics and to prepare them to think precisely and critically about quantitative problems. Students who satisfy the Mathematics and Quantitative Reasoning courses will be able to:

(a) Identify and explain mathematical theories and their applications.

(b) Determine and apply appropriate mathematical and /or computational models and methods in problem solving.

(c) Display quantitative literacy.

7. Course Objectives

Students will be introduced to the basic methods of differential and integral calculus, together with illustrations and applications to the life sciences. Upon successful completion of the course students will be able to

master and use the basic skills of calculus in future courses where calculus is required such as: (1) Compute limits, (2) Compute derivatives, (3) solve problems in related rates, and interpret results, (3) Determine the relative and absolute extreme values of a function and solve applied optimization word problems and interpret the results, (4) Sketch and graph curves: determining where a function is increasing or decreasing, concave up or down, (5) Compute anti-derivatives, (6) Find the area under a simple curve, and (7) Solve basic differential equations.

8. Learning Outcomes

Learning outcome #1: Students will demonstrate an understanding of mathematical theories and their applications. Teaching-learning experiences include lectures, homework and chapter specific exams that involve calculus such as limits, continuity, derivatives of basic functions in mathematics, differentiation rules, optimization problems, the definite integral and area under a curve, basic theory of differential equations, and modeling with differential equations. Students will be assessed on this outcome through constructed-response items embedded in the cumulative final exam. Items will be used to create a score for each student specific for this learning outcome.

Learning outcome #2: Students will be able to identify and apply mathematical concepts most appropriate to solving quantitative problems. Lectures, chapter specific homework and exams will be used to help students develop basic calculus thinking and problem-solving skills. These involve applications requiring multiple techniques and course modules including optimization problems, area under a curve, and modeling with differential equations. Students will be assessed on this outcome through constructed-response items embedded in the cumulative final exam. Items will be used to create a score for each student specific for this learning outcome.

Learning outcome #3: Students will display quantitative literacy. Lectures, and chapter specific homework assignments and exams will be used to meet this learning outcome. Students will be required to demonstrate the ability of formulating a physical problem in mathematical terms and obtaining a meaningful solution. These skills are widely reinforced throughout all modules in this course. Students will be assessed on this outcome through constructed-response items embedded in the cumulative final exam. Items will be used to create a score for each student specific for this learning outcome.

9. Course Evaluation Method

The course grade will be based on the following weights: 10% Class participation, 20% Homework, 20% Midterm 1, 20% Midterm 2, and 30% Final exam.

10. Course Grading Scale

Cumulative Performance	Grade
90%–100%	A
88%–89%	A-
85%–87%	B+
80%–84%	B
78%–79%	B-
75%–77%	C+
70%–74%	C
65%–69%	C-
60%–64%	D
0%–59%	F

11. Policy on Makeup Tests, Late work, and Incompletes

Make-up exams will be given only under exceptional circumstance, and written, verifiable excuses must be provided in advance of the scheduled exams. No late work will be accepted. Grades of Incomplete ("I") are reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances. A grade of "I" will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student must show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate.

12. Classroom Etiquette Policy

University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions."

13. Disability Policy Statement

In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Service (SAS) —in Boca Raton, SU 133 (561-297-3880); in Davie, LA 203 (954-236-1222); or in Jupiter, SR 110 (561-799-8585)–and follow all SAS procedures.

14. Honor Code Policy Statement

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001 at http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf

15. Required Texts/Readings

Biocalculus: Calculus, Probability, and Statistics for the Life Sciences, by James Stewart and Troy Day, ISBN-13: 978-1-305-11403-6, Cengage Learning, 2016

16. Exams and Assignments

There will be two midterm exams and one comprehensive final exam on the scheduled dates. All exams are closed books and notes. Homework will be assigned frequently and should be handed in on the due dates. Late assignments will not be accepted.

16. Tentative Weekly Schedule

Week	Topics
1	Linear, Power, and Exponential Functions
2	Inverse Functions and Logarithms
3	Limits, Continuity, Asymptotes, and Infinity
4	Rates of Change, Tangent Lines, and Derivatives
5	Derivatives as Functions, Sequences and Their Limits
6	Differentiation Rules, Derivatives of Polynomials and Exponential Functions
7	Trigonometric Functions and Their Derivatives, Linear Approximation
8	Higher Order Derivatives, Related Rates, and L'Hopital's Rule
9	Graphing Using Calculus, Optimization Problems
10	Recursions: Equilibria and Stability, Antiderivatives
11	Accumulated Change and Area under a Curve, The Definite Integral, and The Fundamental Theorem of Calculus
12	Integration Techniques and Numerical Integration
13	Modeling with Differential Equations, Linear Equations and Separable Equations
14	Models for Population Growth, Linear Models in Biology
15	The Michaelis-Menten Equation