Glendale College

Course Outline of Record Report

Course ID 010736

Created - November 2024

MATH113 : Calculus for Life Sciences I

General Information

Author:	• Suzanne Palermo • Demirchyan, Gevork
Course Code (CB01) :	MATH113
Course Title (CB02) :	Calculus for Life Sciences I
Department:	MATH
Proposal Start:	Fall 2025
TOP Code (CB03) :	(1701.00) Mathematics, General
CIP Code:	(27.0101) Mathematics, General.
SAM Code (CB09) :	Non-Occupational
Distance Education Approved:	No
Will this course be taught asynchronously?:	No
Course Control Number (CB00) :	CCC000651645
Curriculum Committee Approval Date:	11/27/2024
Board of Trustees Approval Date:	01/21/2025
Last Cyclical Review Date:	11/27/2024
Course Description and Course Note:	MATH 113 is the first semester of an applied course in calculus for biological and other life sciences. The course introduces students to functions of one variable, graphs, limits, continuity, derivatives, techniques for finding maxima/minima, integration, fundamental theorem of calculus, and integration by substitution. Students also learn support topics such as algebra, limits, derivatives, and integrals.
Justification:	New Course Creating a life science calculus course at our college is a strategic move to stay competitive and meet the growing demand for such programs. Nearby colleges, including LA Mission College, Pasadena City College, and many others, already offer these courses. By introducing our own, we ensure that our students have access to similar opportunities without needing to look elsewhere. Additionally, this course will articulate to many University of California (UC) campuses, including UCLA, and many California State University (CSU) campuses, such as Northridge and LA. Following AB1705, these courses offer a more targeted and less intensive option for students who don't require the STEM calculus sequence. This alignment not only enhances our curriculum but also supports our students' academic and career aspirations by facilitating their transfer to top-tier universities.
Academic Career:	• Credit
Mode of Delivery:	• In-Person • Remote • Hybrid • Proctored Online
Author:	• Demirchyan, Gevork
Course Family:	No value

Academic Senate Discipline

Primary Discipline: • Mathematics

Alternate Discipline: No value

Alternate Discipline: No value

Course Development

Basic Skill Status (CB08)

Course is not a basic skills course.

☐ Allow Students to Gain Credit by Exam/Challenge

Course Special Class Status (CB13)

Course is not a special class.

Pre-Collegiate Level (CB21)

No value

Grading Basis

• Grade with Pass / No-Pass Option

Course Support Course Status (CB26)

Course is not a support course

General Education and C-ID

General Education Status (CB25)

GE Status (CSU) B4, (UC) 2

Transferability

Transferable to both UC and CSU

Transferability Status

Pending

Cal-GETC	Area	Status	Approval Date	Comparable Course
Area 2: Mathematical Concepts and Quantitative Reasoning	Mathematical Concepts and Quantitative Reasoning	Pending	No value	No Comparable Course defined.

GCC General Education Requirements	Area	Status	Approval Date	Comparable Course
Area 2:	Mathematical Concepts and Quantitative Reasoning	Pending	No value	No Comparable Course defined.

Units and Hours

Summary

Minimum Credit Units (CB07) 3.5

Maximum Credit Units (CB06) 3.5

Total Course In-Class (Contact) Hours	90
Total Course Out-of-Class Hours	108
Total Student Learning Hours	198

Credit / Non-Credit Options

Course Type (CB04)

Credit - Degree Applicable

Noncredit Course Category (CB22)

Credit Course.

Noncredit Special Characteristics

No Value

Course Classification Code (CB11)

Credit Course.

Funding Agency Category (CB23)

Not Applicable.

☐ Cooperative Work Experience Education Status (CB10)

☐ Variable Credit Course

Weekly Student Hours

	In Class	Out of Class
Lecture Hours	3	6
Laboratory Hours	2	0
Studio Hours	0	0

Course Student Hours

Course Duration (Weeks)	18
Hours per unit divisor	54
Course In-Class (Contact) Hours	
Lecture	54
Laboratory	36
Studio	0
Total	90
Course Out-of-Class Hours	
Lecture	108
Laboratory	0
Studio	0
Total	108

Time Commitment Notes for Students

No value

Units and Hours - Weekly Specialty Hours

Activity Name	Type	In Class	Out of Class
No Value	No Value	No Value	No Value

Prerequisites, Corequisites, Recommended Corequisites, and Recommended Preparation

Prerequisite

Placement is based on academic background or satisfactory completion of MATH 110, 110B, or 101E.

OR

Prerequisite

MATH110 - Precalculus

Objectives

- Solve equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic.
- Solve linear, non-linear, and absolute value inequalities.
- Graph the following types of functions and relations: polynomial, rational, exponential, logarithm, and conic section.
- Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.
- Solve exponential and logarithmic equations.
- Apply the Fundamental Theorem of Algebra and related theorems to find the roots of a polynomial.
- Prove various trigonometric identities.
- Solve trigonometric equations.
- Apply the basic definitions of trigonometry to solve right triangle application problems.
- Apply the laws of sines and cosines to solve application problems.
- Graph both polar and parametric equations.

OR

Prerequisite

MATH110B - Precalculus II

Objectives

- Solve algebraic equations.
- Solve linear, non-linear, and absolute value inequalities.
- Graph the following types of functions and relations: polynomial, rational, exponential, logarithm, conic section, and trigonometric.
- Solve exponential and logarithmic equations.
- Apply the Fundamental Theorem of Algebra and related theorems to find the roots of a polynomial.
- Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.
- Prove various trigonometric identities.
- Solve trigonometric equations.
- Apply the basic definitions of trigonometry to solve right triangle application problems.
- Apply the laws of sines and cosines to solve application problems.
- Graph both polar and parametric equations.

OR

Prerequisite

MATH101E - Algebra and Trigonometry for Calculus

Objectives

- Solve equations including rational, linear, polynomial, exponential, absolute value, radical, and logarithmic.
- Solve linear, non-linear, and absolute value inequalities.
- Graph the following types of functions and relations: polynomial, rational, exponential, and logarithm.
- Graph the basic trigonometric functions and apply changes in period, phase and amplitude to generate new graphs.
- Solve exponential and logarithmic equations.
- Solve trigonometric equations.

Entry Standards

Entry Standards	Description
No value	No value

Course Limitations

Cross Listed or Equivalent Course	Description
No value	No value

Specifications

Methods of Instruction

Methods of Instruction	Lecture
Methods of Instruction	Laboratory
Methods of Instruction	Discussion
Methods of Instruction	Multimedia
Methods of Instruction	Tutorial
Methods of Instruction	Collaborative Learning
Methods of Instruction	Demonstrations
Methods of Instruction	Guest Speakers

Methods of Instruction	Presentations

Out of Class Assignments

- Homework (e.g. problem sets related to course content)
- Assignments and/or projects (e.g. group projects to solve a “challenging” application problem from the textbook)

Methods of Evaluation	Rationale
Exam/Quiz/Test	Quizzes
Exam/Quiz/Test	Four or more chapter examinations are required
Exam/Quiz/Test	A comprehensive final examination

Textbook Rationale

The Biocalculus text is the most recent version that contains all necessary concepts to be taught in the course.

Textbooks

Author	Title	Publisher	Date	ISBN
James Stewart, Troy Day	Biocalculus: Calculus, Probability, and Statistics for the Life Sciences	Cengage Learning	2015	9781305114036

Other Instructional Materials (i.e. OER, handouts)

Description	Openstax Precalculus
Author	Jay Abramson
Citation	ISBN: 9781711493992
Online Resource(s)	No value

Learning Outcomes

Course Objectives

Perform mathematical modeling with sequences and linear, exponential, logarithmic, periodic, and inverse functions.

Analyze and evaluate limits using numerical, graphical, and algebraic approaches.

Study continuity of a function at a given real number.

Calculate derivatives using the limit definition as well as using the rules of differentiation for algebraic and transcendental functions.

Interpret the derivative as a rate of change and as a slope of the tangent line.

Solve related rates problems.

Apply the first and second derivative tests to graph functions and locate extrema.

Solve optimization problems.

Evaluate limits of indeterminate forms using L'Hôpital's Rule.

Calculate areas and definite integrals.

Apply the Fundamental Theorem of Calculus to evaluate integrals.

Use the substitution rule to compute integrals.

SLOs

Represent, understand and explain mathematical information symbolically, graphically, numerically and verbally. Expected Outcome Performance: 70.0

Develop mathematical models of real-world situations and explain the assumptions and limitations of those models. Expected Outcome Performance: 70.0

Use models to make predictions, draw conclusions, check whether the results are reasonable, and find optimal results using technology when necessary and appropriate. Expected Outcome Performance: 70.0

Additional SLO Information

Does this proposal include revisions that might improve student attainment of course learning outcomes?

No

Is this proposal submitted in response to learning outcomes assessment data?

No

If yes was selected in either of the above questions for learning outcomes, explain and attach evidence of discussions about learning outcomes.

No Value

SLO Evidence

No Value

Course Content

Lecture Content

Mathematical Review Content (9 hours)

- Functions and their Representation
- Inverse functions
- Exponential Functions
- Logarithmic functions
- Trigonometric functions
- Inverses of functions

Limits (9 hours)

- The Idea of Limits
- Definitions of Limits
- Techniques for Computing Limits
- Limits Involving Infinity
- Continuity
- Precise Definition of Limits

Derivatives (9 hours)

- Introducing the Derivative
- Working with Derivatives
- Constants and Powers Rules
- The Product and Quotient Rules
- Derivatives of Trigonometric Functions
- Derivatives as Rates of Change
- The Chain Rule
- Implicit Differentiation
- Derivatives of Logarithmic and Exponential Functions
- Derivatives of Inverse Functions
- Related Rates

Working with Derivatives (9 hours)

- Maxima and Minima
- What Derivatives Tell Us
- Graphing Functions
- Optimization Problems
- Applications
- Linear Approximation and Differentials
- Mean Value Theorem
- L'Hôpital's Rule
- Newton's Method
- Antiderivatives

Integration (9 hours)

- Approximating Areas under Curves
- Net Change
- Life Science Applications
- Definite Integrals
- Fundamental Theorem of Calculus
- Working with Integrals
- Substitution Rule.

More Integration (9 hours)

- Velocity and Net Change
- Regions Between Curves
- Volume by Slicing and by Shells
- Physical Applications

Total hours: 54

Laboratory/Studio Content

Mathematical Review Content (6 hours)
- Functions and their representation
- Inverse functions
- Exponential functions
- Logarithmic functions
- Trigonometric functions
- Inverses of functions

Limits (6 hours)
- The idea oflLimits
- Definitions of limits
- Techniques for computing limits
- Limits involving infinity
- Continuity
- Precise definition of limits

Derivatives (6 hours)
- Introducing the derivative
- Working with derivatives
- Constants and powers rules
- The product and quotient rules
- Derivatives of trigonometric functions
- Derivatives as rates of change
- The chain rule
- Implicit differentiation
- Derivatives of logarithmic and exponential functions
- Derivatives of inverse functions
- Related rates

Working with Derivatives (6 hours)
- Maxima and minima
- What derivatives tell us
- Graphing functions
- Optimization problems
- Applications
- Linear approximation and differentials
- Mean value theorem
- L'Hôpital's rule
- Newton's method
- Antiderivatives

Integration (6 hours)
- Approximating areas under curves
- Net change
- Life science applications
- Definite integrals
- Fundamental theorem of calculus
- Working with integrals
- Substitution rule.

More Integration (6 hours)
- Velocity and net change
- Regions between curves
- Volume by slicing and by shells
- Physical applications

Total hours: 36

Additional Information

Repeatability

Not Repeatable

Justification (if repeatable was chosen above)

No Value

Is it possible this course will have a material fee?

No Value

I have contacted my library liaison (https://campusguides.glendale.edu/faculty/liaisons):

No Value

What term(s) will this course be offered?

No Value

Will any additional resources be needed for this course? (Click all that apply)

No Value

If additional resources are needed, add a brief description and cost in the box provided.

No Value

Resources

Did you contact your departmental library liaison?

No

If yes, who is your departmental library liason?

No Value

Did you contact the DEIA liaison?

No

Were there any DEIA changes made to this outline?

No

If yes, in what areas were these changes made:

No Value

Will any additional resources be needed for this course? (Click all that apply)

- No

If additional resources are needed, add a brief description and cost in the box provided.

No Value