MATH-C2220: CALCULUS II: EARLY TRANSCENDENTALS

Effective Term
Fall 2026

CC Approval
11/07/2025

AS Approval
11/13/2025

BOT Approval
11/20/2025

COCI Approval
12/10/2025

SECTION A - Course Data Elements

CB04 Credit Status
Credit - Degree Applicable

Discipline

Minimum Qualifications	And/Or
Mathematics (Master's Degree)	

Subject Code
MATH - Mathematics

Course Number
C2220

Department
Mathematics

Division
Mathematics (MATH)

Full Course Title
Calculus II: Early Transcendentals

Short Title
Calculus II: Early Transcenden

CB03 TOP Code
1701.00 - Mathematics, General

CB08 Basic Skills Status
NBS - Not Basic Skills

CB09 SAM Code
E - Non-Occupational

Rationale
Updating to align with Common Course Numbering template.

SECTION B - Course Description

Catalog Course Description
A second course in differential and integral calculus of a single variable. Topics include applications of integration, techniques of integration, infinite sequences and series, and the calculus of parametric and polar equations. This course is primarily intended for Science, Technology, Engineering, and Mathematics (STEM) majors.

SECTION C - Conditions on Enrollment

Open Entry/Open Exit
No

Repeatability
Not Repeatable

Grading Options
Letter Grade Only

Allow Audit
Yes

Requisites

Prerequisite(s)
Calculus I: Early Transcendentals (MATH-C2210), or equivalent, or placement as determined by the college's multiple measures assessment process.

Requisite Justification

Requisite Description
Course in a Sequence

Subject
MATH
Course #
C2210

Level of Scrutiny
Required by 4-Year Institution

Explanation
This course is the 2nd semester of calculus. The CID for this class is Math 220 and lists "Required Prerequisites or Co-Requisites.

Prerequisite: Single Variable Calculus I Early Transcendentals (Math 210, CAN 18)," which is our Math C2210.

SECTION D - Course Standards

Is this course variable unit?
No

Units
5.00000

Lecture Hours
90.00

Outside of Class Hours
180

Total Contact Hours
90

Total Student Hours
270

Distance Education Approval

Is this course offered through Distance Education?
Yes

Online Delivery Methods

DE Modalities	Permanent or Emergency Only?
Entirely Online	Permanent
Hybrid	Permanent
Online with Proctored Exams	Permanent

SECTION E - Course Content

Student Learning Outcomes

	Upon satisfactory completion of the course, students will be able to:
1.	Evaluate integrals using a variety of methods.
2.	Solve applications involving integrals.
3.	Apply convergence tests and represent functions as power series.
4.	Write mathematical proofs.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1.	Apply integration to find areas and volumes.
2.	Evaluate definite and indefinite integrals using a variety of integration formulas and techniques.
3.	Use integration to solve applications such as work or length of a curve.
4.	Evaluate improper integrals.
5.	Determine convergence of sequences and series.
6.	Represent functions as power series.
7.	Graph, differentiate, and integrate functions in polar and parametric form.

Course Content

1. Applications of integration to areas between curves and volumes, including volumes of solids of revolution
2. Techniques of integration, including integration by parts, trigonometric substitution, and partial fraction decomposition
3. Numerical integration, including trapezoidal and Simpson's rules
4. Improper integrals
5. Additional applications of integration, such as work, arc length, area of a surface of revolution, moments and centers of mass, separable differential equations, growth and decay
6. Introduction to sequences and series
7. Multiple tests for convergence of sequences and series
8. Power series, radius of convergence, interval of convergence
9. Differentiation and integration of power series
10. Taylor series expansion of functions
11. Parametric equations and calculus with parametric curves
12. Polar curves and calculus in polar coordinates

Methods of Instruction

Methods of Instruction

Types	Examples of learning activities
Lecture	Lecture on real-world applications of integration techniques, including calculating arc length and surface area in engineering design, determining work done by variable forces in physics, and modeling fluid pressure and force on submerged surfaces.

Discussion	Discussion on the convergence of infinite series, comparing different convergence tests, and exploring how series are used to approximate complex functions and solve real-world problems such as estimating error in numerical methods or modeling oscillations in physics.
Activity	Activity exploring applications of integration by having students use definite integrals to compute the volume of solids of revolution. Students work in groups to model real-world shapes (such as bottles or bowls), generate cross-sections, and calculate volumes using both the disk/washer and shell methods.

Online Adaptation

Types	Examples of learning activities
Lecture	Lecture on Zoom on real-world applications of integration techniques, including calculating arc length and surface area in engineering design, determining work done by variable forces in physics, and modeling fluid pressure and force on submerged surfaces.
Discussion	Students use the discussion board to discuss the convergence of infinite series, comparing different convergence tests, and exploring how series are used to approximate complex functions and solve real-world problems such as estimating error in numerical methods or modeling oscillations in physics.
Other	Activity exploring applications of integration through digital modeling. Students use DESMOS to create solids of revolution from given functions.

Instructor-Initiated Online Contact Types

Announcements/Bulletin Boards
Discussion Boards
E-mail Communication
Video or Teleconferencing

Student-Initiated Online Contact Types

Discussions
Group Work

Course design is accessible

Yes

Methods of Evaluation

Methods of Evaluation

Types	Examples of classroom assessments
Other	Students should demonstrate their mastery of the learning objectives and their ability to devise, organize, and present complete solutions to problems. Examples of potential methods of evaluation include, but are not limited to, exams, quizzes, homework, classwork, technology-based activities, laboratory work, projects, and research demonstrations. Methods of evaluation are at the discretion of local faculty.
Exams/Tests	Traditional exams including a final exam. Exams could include methods of integration (integration by parts, trigonometric integrals, trigonometric substitution, partial fraction decomposition). Exams could include determining convergence of infinite series (geometric, divergence, p-series, integral, comparison, limit comparison, ratio, root, alternating series).
Quizzes	Quiz assessing student understanding of integration techniques through short, focused problems. Students may be asked to evaluate definite and indefinite integrals using substitution or integration by parts, identify when to apply each method, and interpret the meaning of their results in applied contexts.

Projects	Project applying integration and series concepts to model a real-world situation. Students select a context such as designing a container, analyzing population growth, or modeling motion, and use calculus tools to develop mathematical models. The project includes a written report explaining the problem setup, calculus techniques used (e.g., integration, Taylor series approximation), interpretation of results, and real-world implications. Students may also present their findings through a brief video or poster presentation.
Homework	Students complete selected textbook and online problems involving symbolic and numerical integration and determine convergence of series using appropriate tests.
Other	The Mathematics Department maintains a commitment to diverse teaching methods in courses emphasizing vital quantitative skills and qualitative reasoning ability. To that end, it is expected that sufficient formative assessments will be given to students that in frequency, length and rigor adequately assess both quantitative skills and qualitative reasoning.

Assignments

Reading Assignments

Read sections from the textbook, for example:

1. Read section on arc length.
2. Read section on improper integrals.

Writing Assignments

Daily homework exercises from the text, for example:

1. Find the work required to pump all the water out of a cylindrical tank with height = 5 feet, radius = 2 feet.
2. Find the Maclaurin series for f(x) = sin(2x).

Outside-of-Class Assignments

Other assignments such as research into applications or group projects assigned at instructors' discretion.

SECTION F - Textbooks and Instructional Materials

Material Type

Textbook

Author

Stewart

Title

Calculus: Early Transcendentals

Edition/Version

9th

Publisher

Cengage

Year

2021

ISBN #

9780357537299

Material Type

Open Educational Resource (OER)

Author

Strang, G., Herman, E., et al

Title
Calculus Volume 2

Publisher
OpenStax

Year
2025

ISBN #
https://openstax.org/details/books/calculus-volume-2/

Material Type
Textbook

Author
Briggs, W., et al.

Title
Calculus: Early Transcendentals

Edition/Version
3rd

Publisher
Pearson

Year
2019

Rationale
CCN recommended text from template.

ISBN #
9780136880677

Material Type
Textbook

Author
Hass, J., et al

Title
Thomas' Calculus: Early Transcendentals

Edition/Version
15th

Publisher
Pearson

Year
2023

Rationale
CCN recommended textbook from template.

ISBN #
9780137559824

SECTION G - Diversity, Equity and Inclusivity

How does your course and/or course outline of record reflect strategies for accommodating and engaging diverse student populations, advancing equitable outcomes, and fostering inclusion for all students?

This course supports diverse student populations through the use of multiple representations of concepts, varied applications, and technology. Strategies may also include collaborative learning, transparent assessment practices, low-cost resources, and opportunities for students to connect course material to their own experiences, fostering equitable outcomes and an inclusive classroom environment.

Course Codes (Admin Only)

CB00 State ID

CCC000522977

CB10 Cooperative Work Experience Status

N - Is Not Part of a Cooperative Work Experience Education Program

CB11 Course Classification Status

Y - Credit Course

CB13 Special Class Status

N - The Course is Not an Approved Special Class

CB23 Funding Agency Category

Y - Not Applicable (Funding Not Used)

CB24 Program Course Status

Program Applicable

Allow Pass/No Pass

No

Only Pass/No Pass

No