MATH-C2210: CALCULUS I: EARLY TRANSCENDENTALS

Also listed as: MATH-C2210H

Effective Term
Fall 2026

BOT Approval Date
12/11/2025

Discipline
MATH - Mathematics

Course Number
C2210

Course Title
Calculus I: Early Transcendentals

Short Title
Calculus I

Credit Status (CB 04)
D - Credit - Degree applicable

Units

Lecture Units
4.00

Total Units
4.00

Hours

Lecture Contact Hours
64-72

Out of Class Hours Lecture
128-144

Total Contact Hours
64 - 72

Total Out of Class Hours
128 - 144

Total Student Learning Hours
192 - 216

Distance Education
Yes

Distance Education

Distance Education Type
Hybrid Only

Does the DE also apply to the Honors section?
No

Are you using publisher content?

No

Regular Substantive Interaction

Instructor-to-student, student-to-student, and student-to-content contact shall be distributed in a manner that will ensure regular substantive interaction (RSI) is maintained not only weekly but also for the duration of the course. Instructor interactions should be equivalent in time, quality and consistency to the engagement students would receive in a face-to-face course—for example, through announcements, discussion participation, personalized feedback, video messages, or other instructional communications. Instructors are expected to be responsive to student inquiries within a 24-72 hour time frame excluding holidays. RSI will be maintained through a variety of methods: • Orientation - Students must be oriented to the online and face-to-face portions at the start of the course. • Announcements - Announcements using the course management system must be posted at least weekly to keep students current on course events, due dates, materials, etc. • Discussion Forums - Content-related discussion forums within the designated CMS will include appropriate instructor participation and will be initiated and maintained, with timely feedback provided. Instructors are required to monitor the discussions and related activities to provide guidance and direction. Open-ended discussion boards may be used to further learning and interaction. • MSJC Communication – Instructor will use MSJC-administered communication tools (such as email or the designated CMS communication tools) to regularly communicate with and provide ease of access to students. • Timely Feedback - Timely feedback on student work will be provided by the instructor, which may include comments and/or rubrics, within the Grades area of the designated CMS. • Scheduled Meetings – Hybrid and synchronous courses will meet at regularly scheduled times. ADA Compliance - All course interactions and content must be designed with accessibility in mind and meet ADA requirements.

Honors / Non-honors

MATH-C2210H

C-ID (Admin Only)

CB 00

CCC000610100

Course Title

Calculus I: Early Transcendentals - Honors

Approved Cal-GETC Area

AREA-2

Approved Second Cal-GETC Area

Approved Third Cal-GETC Area

C-ID (Admin Only)

C-ID MATH 211

Catalog Description

A first course in differential and integral calculus of a single variable. Topics include limits and continuity of functions, techniques and applications of differentiation, an introduction to integration, and the Fundamental Theorem of Calculus. This course is primarily intended for Science, Technology, Engineering, and Mathematics (STEM) majors.

Requisites

Prerequisite(s)

Prerequisite(s) (must be taken before)
Pre-calculus, or college algebra and trigonometry, or equivalent, or placement as determined by the college's multiple measures assessment process.

Codes

TOP Code (CB 03)

1701.00 - Mathematics, General

CIP Code
27.0101 - Mathematics, General.

Repeatability Code
No

Grading Option
Letter grade OR P/NP

Minimum Qualifications

Minimum Qualifications	And/Or
Mathematics (Masters Required)	End

GE Information

Check GE Types Requested
AA/AS G - Math Competency

Cal-GETC Areas

Approved Cal-GETC Area
AREA-2

Learning Objectives

Learning Objectives

Learning Objective
1. Compute the limit of a function and evaluate indeterminate forms using L'Hôpital's Rule.
2. Determine the continuity of a function.
3. Find the derivative of a function as a limit.
4. Find the equation of a tangent line to the graph of a function.
5. Compute derivatives using differentiation formulas.
6. Use differentiation to solve applications such as related rate problems and optimization problems.
7. Use implicit differentiation and find derivatives of transcendental functions.
8. Graph functions using methods of calculus.
9. Evaluate a definite integral as a limit.
10. Evaluate integrals using the Fundamental Theorem of Calculus.
11. Apply integration to find areas.
12. Apply calculus concepts to solve applications involving diverse cultural, historical, and social contexts.

Honors Objectives

1. Apply differential calculus concepts in a more advanced and rigorous manner to theoretical or practical applications.
2. Develop and demonstrate proficiency in proving theorems and writing formal proofs related to differential calculus for students completing the pure option.
3. Utilize advanced techniques of differential calculus to solve challenging applied problems for students completing the applied option.

Learning Outcome Information

Course Learning Outcomes

Learning Outcome
1. Students will analyze the world around them through applications of limits and differentiation.
2. Students will learn how to apply past knowledge to new situations through utilization of various calculus concepts.

3. Students will understand, write, and communicate information symbolically, visually, and numerically with clarity and precision through the use of differentiation techniques.

Content

Course Lecture Content

1. Limits: intuitive and precise definitions; computation using numerical, graphical, and algebraic approaches.
2. Continuity and differentiability of functions.
3. Derivative as a limit.
4. Interpretation of derivatives as slopes of tangent lines and rates of change.
5. Differentiation formulas: constants, power rule, product rule, quotient rule, and chain rule.
6. Derivatives of transcendental functions, including trigonometric, exponential, and logarithmic.
7. Implicit differentiation, differentiation of inverse functions, including inverse trigonometric functions.
8. Applications of differentiation, including related rates and optimization.
9. Higher-order derivatives.
10. Indeterminate forms and L'Hôpital's Rule.
11. Maximum and minimum values, Extreme Value Theorem.
12. Graphing functions using first and second derivatives, concavity, and asymptotes.
13. Mean Value Theorem.
14. Antiderivatives and indefinite integrals.
15. Definite integrals as limits of Riemann sums.
16. Interpretation of the integral as area under a curve and net change.
17. Basic integration rules and properties of integrals.
18. Fundamental Theorem of Calculus
19. Integration by substitution.

CCN Expanded Lecture Content

Additional Course Content:

1. History and evolution of differentiation throughout time and various regions including contributions of mathematicians from underrepresented groups.
2. Related rates and applications involving quantities that represent diverse populations.

Honors Content

By promoting additional critical thinking, emphasizing development of advanced analytical skills and promoting discussion of course content beyond that provided in MATH-C2210, MATH-C2210H provides the student with a broader intellectual experience. The topics covered in MATH-C2210H are the same as those covered in MATH-C2210, however, students in MATH-C2210H will complete a pure or applied option, as mutually agreed upon by the student and instructor. The pure option will emphasize theory and mathematical proofs. This may include proofs such as advanced epsilon-delta proofs and the differentiation rules. The applied option will cover challenging applications from topics such as scientific computing, biology, chemistry, economics, or physics. This may include numerical differentiation, maximizing profit, and rectilinear motion problems

Methods of Instruction

Method

Discussion

Integration

Discussion will be used to reinforce student comprehension of lecture topics, such as how to formulate the equation of the line tangent to the graph of a differentiable function at a point.

DE Adaptations for MOI

Asynchronous discussions can be adopted using the discussion boards in the CMS and synchronous discussions can be done via accessible video conferencing tools. Instructor feedback can be posted in the gradebook comments and/or in the discussions within a timely manner.

Method
Activity

Integration
Various in-class group or individual activities may be employed, as appropriate, to assist students with developing intuition and depth of understanding of concepts, such as understanding applied optimization problems in the real world.

DE Adaptations for MOI
Group activities will be completed using group discussions & group conversations through the CMS. Synchronous group interactions will take place via accessible video conferencing tools that allow for online document sharing.

Method
Lecture

Integration
Presentation of terminology, definitions, and theorems supporting discussion of example problems, such as deducing the derivative of polynomial, rational, radical, and trigonometric functions.

DE Adaptations for MOI
Online lectures will be delivered in accessible written or video format and presented by the instructor in the CMS using course pages and/or synchronously using video conferencing tools.

Method
Observation and Demonstration

Integration
Technology can be used in class to explore, build, and strengthen the connections between concepts. For example, technology can be used to demonstrate the connection between the derivative and the slope of the line tangent to a function.

DE Adaptations for MOI
All demonstrations can be delivered within a course management system (CMS) by embedding applets, providing links to online resources, sharing recorded video or slide presentation. All material will meet accessibility requirements.

Additional Methods of Instruction for Honors
Students will be required to meet regularly with the instructor individually or in groups.
To build rapport and to promote the community of practice it is recommended that the meetings occur regularly and at least monthly with a minimum of three meetings required. The meetings can be used to develop and discuss the progress of the students' projects as well as to improve the understanding of the course content or to introduce new honors content. Students may be required to summarize and present the results of their projects via multimedia demonstration at the end of the term to the instructor, the honors section and/or the entire class.

Presentations will provide honors students the opportunity of presenting their research projects to their honors colleagues or the regular class to facilitate the development of their presentation and communication skills.

Presentations will include a multimedia component or other visual aids. In DE course, the meetings will be held remotely using built-in features of a course management system (CMS).

Methods of Evaluation

Method
Exams/Tests

Integration

Interim and a comprehensive final exams may be used to determine if a student successfully acquired skills, such as applying the derivative to solve maxima and minima problems. Exams will be graded on accuracy, completeness, mathematical correctness, and demonstration of understanding through work done to solve the problems posed.

DE Adaptations for MOE

Tests will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire test can be embedded on CMS. Feedback can be delivered using the comment section or within an accompanying rubric in a timely manner. The instructions and the tests will meet accessibility requirements. Instructors may consider using online and real-time proctoring services approved by the college.

Method

Homework

Integration

Homework will be assigned allowing students, at their own pace, to develop skills necessary for success in the course, such as deducing derivatives of polynomial, rational, radical, and trigonometric functions using properties of derivatives. Homework will be evaluated on accuracy and completeness.

DE Adaptations for MOE

Homework will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire assignment can be embedded on CMS. Feedback will be delivered within a timely manner using the comment section or within an accompanying rubric. The instructions and the assignments will meet accessibility requirements.

Method

Quizzes

Integration

Frequent quizzes may be used to assess the students' skill development throughout the course, such as solving physical applications with derivatives. Quizzes will be evaluated on accuracy, completeness, and correctness.

DE Adaptations for MOE

Quizzes will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire quiz can be embedded on CMS. Feedback can be delivered using the comment section or within an accompanying rubric in a timely manner. The instructions and the quizzes will meet accessibility requirements. Instructors may consider using online and real-time proctoring services approved by the college.

Method

Projects

Integration

The instructor may use a group or individual project(s) to provide targeted feedback to enhance the students' understanding of learning objectives. For example, an instructor may ask students to create an rectangular box (without a lid) of maximal volume using a sheet of paper. Projects will be evaluated in a timely manner based on both correctness and completeness.

DE Adaptations for MOE

Group or individual projects will be assigned and submitted through the course management system (CMS). Students can communicate with peers and the instructor through the discussion boards and inbox of the CMS. Students may be required to present their results through the creation of a slide presentation, a written report, or a live video conference and the presentations will then be made available to the entire class through the CMS. Feedback may be provided either through comments or within an accompanying rubric in a timely manner.

Method

Class Participation

Integration

Class participation in the form of group discussions or in-class activities may be used by the instructor to determine whether students are comprehending the material and to evaluate the students' ability to apply their knowledge of the learning objectives. For example, before introducing antiderivatives, students will discuss the rules of differentiation and explore how to reverse them.

DE Adaptations for MOE

Class participation is tracked through the CMS by keeping records of students' submissions of assignments, posting on discussion boards, and/or completing quizzes and exams. Feedback may be provided either through comments or within an accompanying rubric in a timely manner.

CCN Methods of Evaluation

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.

Evaluation of Honors assignments

Students will be graded first on the regular section requirements.

For the pure option: Proofs will be evaluated based on accuracy, completeness, correct application and demonstration of proof techniques, and creativity. Research papers will be assessed on clarity of argument, supporting evidence, the number and types of references consulted, depth of analysis, and mathematical accuracy.

For the applied option: The submitted problems will be evaluated on accuracy, completeness, and demonstration of understanding through work done to solve the problems posed. The short papers will be assessed on clarity of argument, supporting evidence, the number and types of references consulted, depth of analysis, and mathematical accuracy.

Oral presentations will be evaluated based on clarity, organization, critical thinking, mathematical accuracy, creativity, appropriateness of any visual aids, appropriate length, and polished presentation in front of an audience.

Assignments

Assignment Type

Writing

In-class and/or outside of class

In-class

Formative or Summative

Formative

Assignment

Given the function f(x)= |x-3|/(x-3), use the definition of continuity at a point to show why it is discontinuous at x=3.

How assignment will be adapted in online format

The problem will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire assignment can be embedded on CMS or student may be allowed to submit a scan of their work. The feedback can be delivered using the comment section or within an accompanying rubric through the CMS in a timely manner. The instructions and the assignments will meet accessibility requirements.

Assignment Type
Writing

In-class and/or outside of class
Outside of class

Formative or Summative
Formative

Assignment
Compute the derivative for f(x)=x^2-5x+1 using the limit definition of the derivative.

How assignment will be adapted in online format
The problem will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire assignment can be embedded on CMS or student may be allowed to submit a scan of their work. The feedback can be delivered using the comment section or within an accompanying rubric through the CMS in a timely manner. The instructions and the assignments will meet accessibility requirements.

Assignment Type
Reading

In-class and/or outside of class
Outside of class

Formative or Summative
Formative

Assignment
To understand and appreciate the contributions of diverse mathematicians and cultures to the field of mathematics, while applying precalculus concepts to real-world problems, please do the following: 1. Explore the website, https://www.biography.com/famous-mathematicians, and choose a mathematician from a historically underrepresented group (e.g., women, people of color, LGBTQ+ individuals), read their biography, and highlight their contributions to mathematics. 2. Create a slides presentation and share with the class how their work has influenced modern mathematical practices and any challenges they faced due to their identity.

How assignment will be adapted in online format
Create a discussion board where students will be able to submit and share their slides presentation with classmates. The instructions and the assignments will meet accessibility requirements.

Assignment Type
Writing

In-class and/or outside of class
In-class

Formative or Summative
Summative

Assignment
Complete the following quiz:

1. Use L'Hospital's Rule to compute the lim_(x ->oo) x^2sin(1/x).
2. Find the local extrema for the polynomial, f(x)= x^3-3x^2+3x-1.
3. Determine the intervals over which f(x) is concave up and concave down given f(x) above.

How assignment will be adapted in online format
The assignment will be assigned, submitted, and graded through the course management system (CMS). For example, a link to a third-party publisher's content may be provided or the entire assignment can be embedded on CMS or student may be allowed to

submit a scan of their work. The feedback can be delivered using the comment section or within an accompanying rubric through the CMS in a timely manner. The instructions and the assignments will meet accessibility requirements.

Honors Assignments

Assignment

Students in MATH-C2210H are required to complete all of the assignments for the regular MATH-C2210 class. In addition, students (in consultation with their instructor) will select either the pure option or the applied option for the Honors assignments.

Assignment

Pure Option (choose 1 of 2):

(Option 1) After researching different proof techniques (direct, by contradiction, induction, etc.) prove three or four advanced results or theorems used in the course, such as utilizing delta/epsilon arguments for limits and continuity, definition of derivatives, and Riemann sums. Each proof will be submitted to the instructor in writing, generally not exceeding one page in length, for evaluation in accordance with instructor specified deadlines.

(Option 2) Research existing rigorous proofs of two or three advanced results in the course (depending on difficulty), such as continuity of compositions of continuous functions or early methods of finding tangent lines. For each proof present the results ofthe study in classroom or remotely to the instructor and peers in a formal academic setting via a multimedia presentation not to exceed a total of 30 minutes for all chosen proofs.

After completing one of the assigned options, honors students must prepare a typed portfolio that includes all relevant definitions, theorems, and detailed proofs. The portfolio should conclude with a well-written summary and be organized in a clear and logical manner.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement

Justify how the assignment reflects the Academic Rigor and Research Core Value

These assignments are intended to enhance students' comprehension of the methodologies and frameworks involved in applying mathematical principles to real-world contexts. By engaging in these tasks, students develop a deeper appreciation for the role of mathematics in modeling, analyzing, and addressing complex problems across a variety of disciplines.

Justify how the assignment reflects the Engagement Core Value

These assignments are designed to encourage student presenters to actively engage their audience in thoughtful discourse centered on their chosen topic. Through scholarly discussion and critical analysis, students will articulate the significance of their work, defend their methodology, and validate their results within an academic framework.

Assignment

Applied Option (choose 1 of 2):

(Option 1) Solve three or four challenging application problems provided by the instructor such as related rates used in real-life scenarios, optimization problems and approximating areas and volumes using Riemann sum. Problems will be submitted to the instructor in writing, generally not exceeding three pages in length, for evaluation in accordance with instructor specified deadlines.

(Option 2) Choose an instructor-approved topic in STEM that includes applications of calculus concepts, such as the Law of laminar blood flow in veins and arteries or minimizing energy expended during flight for either birds or airplanes. Write a short paper about the topic that you chose, not to exceed three pages in length, according to the instructor specified deadlines and other grading criteria such as number of sources, etc. Present the solution to your honors colleagues or the regular class. The presentation will be 15 to 30 minutes long and will include the research on the chosen topic, the mathematical approach used to solve the problem and, when applicable, a demonstration using replicas made with 3D printers.

After completing one of the assigned options, honors students must prepare a typed portfolio that includes all relevant definitions, theorems, and detailed proofs. The portfolio should conclude with a well-written summary and be organized in a clear and logical manner.

Required or Optional

Required

Honors Core Values

Academic Rigor and Research
Engagement

Justify how the assignment reflects the Academic Rigor and Research Core Value

These assignments are intended to enhance students' comprehension of the methodologies and frameworks involved in applying mathematical principles to real-world contexts. By engaging in these tasks, students develop a deeper appreciation for the role of mathematics in modeling, analyzing, and addressing complex problems across a variety of disciplines.

Justify how the assignment reflects the Engagement Core Value

These assignments are designed to encourage student presenters to actively engage their audience in thoughtful discourse centered on their chosen topic. Through scholarly discussion and critical analysis, students will articulate the significance of their work, defend their methodology, and validate their results within an academic framework.

Course Materials

Textbooks

A college level textbook designed for science, technology, engineering and math majors, and supporting the learning objectives of this course. Representative texts:
• Strang, G., Herman, E., et al. (2016 & Web 2025). Calculus Volume 1. OER: OpenStax.
• https://openstax.org/details/books/calculus-volume-1/
• Stewart, J., et al. (2021). Calculus: Single Variable Calculus Early Transcendentals. 9th ed.: Cengage.
• Briggs, W., et al. (2019). Calculus: Early Transcendentals. 3rd ed.: Pearson.
• Hass, J., et al. (2023). Thomas' Calculus: Early Transcendentals. 15th ed.: Pearson.
Texts used by individual institutions and even individual sections will vary

Open Educational Resources

Strang, G., Herman, E., et al. (2016 & Web 2025). Calculus Volume 1. OER: OpenStax.
https://openstax.org/details/books/calculus-volume-1/

Class Size Information

Class Size

30

Class Size Category

C - Remedial or advanced math 30

Diversity and Inclusion

Course Design and Materials: Course will incorporate diverse perspectives, authors, and examples that reflect a variety of cultures, identities, and lived experiences. Instructional materials will be reviewed regularly to ensure representation, inclusivity, and alignment with equity-minded practices across disciplines.

Inclusive Learning Environment: Instructors will establish classroom norms and policies that promote respect, civil discourse, and belonging in both online and face-to-face classes. Clear expectations for communication and engagement will support a learning space where all students feel valued and heard.

Accessible Instruction: Course content will be delivered using accessible design. Materials will follow accessibility guidelines within the CMS, including captioned media, readable document formats, and multiple means of engagement to support diverse learning.

Equitable Teaching Practices: Instructors will use transparent and grading criteria, varied assessment methods, and timely feedback to promote fairness and student success. Opportunities for revision, reflection, and multiple demonstrations of learning may be incorporated when appropriate to the discipline.

Culturally Responsive Pedagogies: Instructional strategies will encourage critical thinking about diverse perspectives and systems of power relevant to the course content. Faculty will foster opportunities for students to connect course material to real-world contexts.

Ongoing Reflection and Improvement: Faculty will engage in continuous professional development related to IDEAA principles and reflect on course practices using metacognition to identify opportunities for increased equity, inclusion, and accessibility.

Explain how diversity and inclusion(e.g., gender, culture/race, sexuality, etc.) is infused into the course.

The content highlights and discusses the contributions of mathematicians from underrepresented groups such as women, people of color, and people from different cultures, in the history of calculus. Assignments will include readings and discussions around the alternative origins of differential calculus in contrast to the mainstream narrative. The methods of evaluation will provide opportunities for students to explore applications of calculus to fields they are interested in and make connections to their own experiences and cultures. The objectives apply the calculus topics being discussed to examples from different different cultures, generations, and socioeconomic backgrounds.

Describe how assignments, instruction, evaluation, course content, and interactions are contextualized for diverse learners promoting an equitable course.

We have incorporated a variety of assignments that explore the content through the lens of equity and diversity. The instruction includes discussions like "Stories of Resilience" and activities that allow learners to explore the content from unique perspectives. It includes various formats to serve a variety of learning styles. For example, differentiation techniques can be shown using digital tools or physical interpretations. The methods of evaluation have also been redesigned to allow for a variety of formative and summative assessments. For example, the curriculum includes new opportunities for group work and project-based learning to explore optimization. Also, an OER textbook was included which promotes equity by significantly lowering the cost of taking the course and removing additional barriers for learners.

Interactions

Explain how the course will incorporate student-to-student interaction.

Students will interact with each other through in-class discussions on different topics. For example, students could work together in a group to compare and contrast different differentiation techniques to ensure that the solutions are the same. Students will also interact with each other through online discussion boards where they can ask each other questions on specific topics such as the chain rule and answer each other's questions from their diverse perspectives as well as share relevant outside information related to the course.

Explain how the course will incorporate instructor-to-student interaction.

The instructor will introduce material such as the product rule to the students through lecture both in-class and videos online as appropriate. The instructor will also participate as needed in discussion boards to answer questions and address the needs of the students. For example, in a discussion around the origins of differentiation techniques, the instructor will introduce ideas and moderate the discussion to ensure all perspectives are considered. The instructor will also return comments and feedback for projects, exams, and other assignments such as read through the course management system or in-person.

Explain how the course will incorporate student-to-content interaction.

Students will interact with accessible materials such as the textbooks, written lecture materials or transcripts of lectures, illustrative images, charts and graphs, video or audio lectures. In-class exercises and/or at-home assignments will allow students to practice content material such as the graphical, numerical, and algebraic approaches to determining extrema.

Explain how the course will incorporate student-to-self interaction (metacognitive).

This course incorporates metacognition by encouraging students to actively monitor and modify their thought processes. For example, after learning a variety of differentiation techniques like the product rule, quotient rule, and chain rule, students can be asked to think about what strategies they are using to identify when the appropriate technique applies. In scenarios where more than one differentiation technique can be applied, students may be asked to compare methods and identify their preferred procedure.

Key: 2105