# MATH 2413 - Calculus I MATH2413.401 Course Syllabus

**Description**
Limits and continuity; the Fundamental Theorem of Calculus; definition of the derivative of a function and techniques of differentiation; applications of the derivative to maximizing or minimizing a function; the chain rule, mean value theorem and rate of change problems; curve sketching; definite and indefinite integration of algebraic, trigonometric and transcendental functions, with an application to calculation of areas.
**Prerequisites** MATH 2412 or equivalent preparation

**Semester Offered**
Fall
Spring
Summer 1
**Credits** 4
**Lecture Hours** 3
**Lab Hours** 3
**Extended Hours** 0
**Contact Hours** 96
**State Approval Code** 27.0101.59 19
**Instructor Name** Chasity Klingler
**Semester/Year** Spring 2025

**Meeting Time and Location**
MATH 2412.401 Online—students are expected to spend at least 3-4 hours per week reading, reviewing, and participating in assigned activities for successful completion of this course.

**Alternate Operations During Campus Closure**
In the event of an emergency or announced campus closure due to a natural disaster or pandemic, it may be necessary for Panola College to move to altered operations. During this time, Panola College may opt to continue delivery of instruction through methods that include, but are not limited to: online learning management system (CANVAS), online conferencing, email messaging, and/or an alternate schedule. It is the responsibility of the student to monitor Panola College's website (www.panola.edu) for instructions about continuing courses remotely, CANVAS for each class for course-specific communication, and Panola College email for important general information.

**Student Basic Needs**
Unexpected circumstances may arise, but Panola College offers various resources to support students. If you need mental health services or are facing challenges with transportation, affording class materials and supplies, or accessing food regularly—issues that may impact your class performance—please visit panola.edu/resources.

**Class Attendance**
Regular and punctual attendance of classes and laboratories is required of all students. When a student has been ill or absent from class for approved extracurricular activities, he or she should be allowed, as far as possible, to make up for the missed work. If a student has not actively participated by the census date, they will be dropped by the instructor for non-attendance. This policy applies to courses that are in-person, online, hybrid, and hyflex.

Attendance in online courses is determined by submission of an assignment or participation in an activity. According to federal guidelines, simply logging into a distance learning course without participating in an academic assignment does not constitute attendance. Distance learning is defined as when a majority (more than 50%) of instruction occurs when the instructor and students are in separate physical locations. Students must engage in an academic activity prior to the course census date.

When an instructor feels that a student has been absent to such a degree as to invalidate the learning experience, the instructor may recommend to the Vice President of Instruction that the student be withdrawn from the course. Instructors may seek to withdraw students for non-attendance after they have accumulated the following number of absences:

Fall or spring semesters:

3 or more class meeting times per week - 5 absences

2 class meeting times per week - 3 absences

1 class meeting per week - 2 absences

The student is responsible for seeing that he or she has been officially withdrawn from a class. A student who stops attendance in a class without officially withdrawing from that class will be given a failing grade; consequently, the student must follow official withdrawal procedures in the Admissions/Records Office.

Please note: Health Science and Cosmetology courses may require more stringent attendance policies based on their accreditation agencies. Please see the addendum and/or program handbook for further information concerning attendance.

**Pregnant/Parenting Policy**

Panola College welcomes pregnant and parenting students as a part of the student body. This institution is committed to providing support and adaptations for a successful educational experience for pregnant and parenting students. Students experiencing a need for accommodations related to pregnancy or parenting will find a Pregnancy and Parenting Accommodations Request form in the Student Handbook or may request the form from the course instructor.

**Artificial Intelligence (AI) Course Policy**

There are situations throughout the course where you may be permitted to use artificial intelligence (AI) tools to aide in further understanding of mathematical concepts. However, AI tools may not be used for any graded assignments including but not limited to exams, quizzes, and projects. Use of any AI-generated content in this course without the instructor's consent qualifies as academic dishonesty and violates Panola College's standards of academic integrity.

**Student Learning Outcomes**

**Critical Thinking Skills – to include creative thinking, innovation, inquiry and analysis, evaluation and syntheses of information**

- CT2: Gather and assess information relevant to a question
- CT3: Analyze, evaluate, and synthesize information

**Communication Skills – to include effective development, interpretation, and expression of ideas through written, oral, and visual communication**

- CS1: Develop, interpret, and express ideas through written communication

**Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions**

- EQS1: Manipulate and analyze numerical data and arrive at an informed conclusion

**Instructional Goals and Purposes**

Upon completion of MATH 2413, the student will be able to demonstrate:

1. Competence in solving problems related to lines.
2. Competence in solving problems related to limits and continuity

3. Competence in determining the derivatives of various functions and using derivatives to solve problems in maxima and minima, curvature, graphics, velocity and acceleration.
4. Competence in finding the integral of various functions and using integration to solve problems in area, volume, work, fluid, pressure, mass, moments, centroids, moment of inertia, growth and decay.

**Learning Outcomes**

Upon successful completion of this course, students will:

1. Develop solutions for tangent and area problems using the concepts of limits, derivatives, and integrals.
2. Draw graphs of algebraic and transcendental functions considering limits, continuity, and differentiability at a point.
3. Determine whether a function is continuous and/or differentiable at a point using limits.
4. Use differentiation rules to differentiate algebraic and transcendental functions.
5. Identify appropriate calculus concepts and techniques to provide mathematical models of realworld situations and determine solutions to applied problems.
6. Evaluate definite integrals using the Fundamental Theorem of Calculus.
7. Articulate the relationship between derivatives and integrals using the Fundamental Theorem of Calculus.

**Course Content**

A general description of lecture/discussion topics included in this course are listed in the Learning Objectives / Specific Course Objectives sections of this syllabus.

After studying the material presented in the text(s), lecture, laboratory, computer tutorials, and other resources, the student should be able to complete all behavioral/learning objectives listed below with a minimum competency of 70%.

Upon completion of this section, the student will be able to correctly

1. Solve linear, quadratic, rational, radical and absolute value equations and inequalities, using appropriate interval notation to state answer.
2. Write the equations of circles given pertinent information.
3. Identify the center and radius of a circle whose equation is given in standard form or general form.
4. Find the midpoint of a segment, and find the distance between two points in the Cartesian plane.
5. Write the equation of a line given the slope and a point, or two points.
6. Define and identify a function, its domain and range.
7. Evaluate and graph functions, including piecewise and step functions.
8. Perform basic operations with functions, including composition of functions.
9. Given a basic graph of a function, transform it by shifting, reflecting or stretching it.
10. Find the limits of functions using tables and graphing calculators.
11. Find the limits of functions using the strategies for finding limits.
12. Apply the rules of differentiation to find the derivative of a function: the constant rule, power rule have constant multiple rule, sum and difference rules, product and quotient rules, chain rule, and general power rule.
13. Determine whether a function is continuous or discontinuous; determine whether the discontinuities are removable or non-removable.
14. Apply the properties of infinite limits when determining the limit of functions.
15. State and apply the definition of limit.
16. Find the derivative of a function using the definition of derivative (the 4-step limit process).
17. Find the average rate of change, the instantaneous rate of change and the acceleration of the position function.
18. Differentiate a function using implicit differentiation.
19. Solve problems involving related rates.
20. Define extrema and critical number and use the Mean Value Theorem to find the extrema on [a,b].
21. State and apply Rolle's Theorem and the Mean Value Theorem.
22. Define increasing and decreasing functions and use the first derivative test to find relative extrema.

23. Define concavity and point of inflection and use the second derivative test to find the relative extrema and points of inflection.
24. Find the limits of functions as x approaches infinity.
25. Define horizontal asymptote and determine the horizontal asymptotes of a function.
26. Sketch the graph of a function given the first or second derivative; sketch the graph of the first or second derivative given a function.
27. Solve optimization problems by applying unit theorems and definitions regarding extrema.
28. Define anti-derivative and apply basic integration rules to evaluate indefinite integrals.
29. Use sigma notation to write the sum of a finite sequence.
30. Find the area of a region using the limit of the upper and lower sums.
31. Evaluate definite integrals applying appropriate properties.
32. Sketch the region whose area is indicated by a given definite integral.
33. State and apply the first and second Fundamental Theorems of Calculus and the Mean Value Theorem for integrals.
34. Use the Trapezoidal Rule and Simpson's Rule to approximate definite integrals.
35. Find the area of a region between two plane curves.
36. Find the volume of a solid of revolution using the disc and shell methods (and washer method).
37. Find the arc length of a function on a closed interval.
38. Find the area of the surface of revolution.
39. Calculate the work done by a constant and a variable force.
40. Find the moment(s) and center of mass of a linear system and a two-dimensional system.
41. Find the moments and centroid of a planar lamina.

# Extended Hours:

For each concept course content listed about, 30 minutes of lecture/activity will be required outside of classroom instruction.

**Methods of Instruction/Course Format/Delivery**

Methods of Instruction/Course Format/Delivery: Methods employed will include Lecture/demonstration have discussion, problem solving, analysis, and reading assignments. Homework will be assigned. Faculty may choose from, but are not limited to, the following methods of instruction:

1. Lecture
2. Discussion
3. Internet
4. Video
5. Television
6. Demonstrations
7. Field trips
8. Collaboration
9. Readings

**Major Assignments/Assessments**

The following items are assigned and assessed during the semester and used to calculate the student's final grade.

**Assignments**

Faculty may assign both in- and out-of-class activities to evaluate students' knowledge and abilities. Faculty may choose from – but are not limited to -- the following methods attendance, class preparedness and participation. Collaborative learning projects, exams/tests/quizzes, homework, internet, library assignments, readings, research papers, scientific observations, student-teacher conferences, and written assignments.

The Mathematics Department will not accept late work.

**Assessments**

**Assessment(s):**

1. Exam per Chapter
2. Comprehensive Final Exam

**Course Grade**

**Assignment Weights**

- Daily Grades 25%
- Major Exams 50%
- Comprehensive Final Exam 25%

**Letter Grades for the Course will be assigned as follows:**

A: 90 < Average < 100

B: 80 < Average < 90

C: 70 < Average < 80

D: 60 < Average < 70

F: 00 < Average < 60

**Texts Materials, and Supplies**

- Textbook: Contemporary Calculus by Dale Hoffman (No Purchase Necessary)
- Lumen OHM (No Purchase Necessary)
- Canvas Access

**Addendum**

Each student will adhere to the instructor's course handout presented in the Canvas Course. See link for details.

Link to Class Handout

**Other**

- Courses conducted via video conferencing may be recorded and shared for instructional purposes by the instructor.
- For current texts and materials, use the following link to access bookstore listings: https://www.panolacollegestore.com.
- For testing services, use the following link: https://www.panola.edu/student-services/studentsupport/academic-testing-center.
- If any student in this class has special classroom or testing needs because of a physical learning or emotional condition, please contact the ADA Student Coordinator in Support Services located in the Charles C. Matthews Student Center or go to https://www.panola.edu/studentservices/student-support/disability-support-services for more information.
- Withdrawing from a course is the student's responsibility. Students who do not attend class and who do not withdraw will receive the grade earned for the course.
- Student Handbook: https://www.panola.edu/ (located on at the bottom under student)