**MATH 1401: Calculus I**

**Department of Mathematical and Statistical Sciences**

**College of Liberal Arts and Sciences, University of Colorado Denver**

**COURSE SYLLABUS**

Instructor: Heather Killeen

Term: Fall 2018

Office: N208

Phone: 303-982-8761

E-Mail: hkilleen@jeffco.k12.co.us

Class Meeting Days: Mondays, Tuesdays, Wednesdays & Fridays

Class Meeting Times: See Bear Creek High School Bell Schedule for modified block schedule

Location: N208

Office Hours: Tuesday/Thursday Access Periods, every 7th period

COURSE OVERVIEW

**I. Description**

First course of a three-semester sequence (MATH 1401, 2411, 2421) in calculus. Topics covered include limits, derivatives, applications of derivatives, and the definite integral. This course fulfills the university’s undergraduate CORE requirement.

*Note: No co-credit with MATH 1080* **Semester Hours:** 4

**II. Course Prerequisites**

Successful completion of an appropriate Pre-calculus course or College Algebra and College Trigonometry

**III. Required Texts and Materials**

Larson, Hostetler Edwards, Calculus. 9th Edition. Boston, MA: Houghton Mifflin Company, 2010

 TI-83, preferably TI 84

**IV. Colorado Commission on Higher Education Learning Objectives** The Colorado Commission on Higher Education has approved MATH 1401 for inclusion in the Guaranteed Transfer (GT) Pathways program in the GT-MA1 category. For transferring students, successful completion with a minimum grade of C- grade guarantees transfer and application of credit in this GT Pathways category. For more information on the GT Pathways program, go to <http://highered.colorado.gov/academics/transfers/gtpathways/curriculum/html>.

**GT Pathways Mathematics (GT-MA1) Content Criteria:**

a) Demonstrate good problem-solving habits, including:

 • Estimating solutions and recognizing unreasonable results.

 • Considering a variety of approaches to a given problem, and selecting one that is appropriate.

 • Interpreting solutions correctly.

b) Generate and interpret symbolic, graphical, numerical, and verbal (written or oral) representations of mathematical ideas.

c) Communicate mathematical ideas in written and/or oral form using appropriate mathematical language, notation, and style.

d) Apply mathematical concepts, procedures, and techniques appropriate to the course.

e) Recognize and apply patterns or mathematical structure.

f) Utilize and integrate appropriate technology.

**GT Pathways Mathematics (GT-MA1) Competencies:**

**A. Quantitative Literacy**: Competency in quantitative literacy represents a student’s ability to use quantifiable information and mathematical analysis to make connections and draw conclusions. Students with strong quantitative literacy skills understand and can create sophisticated arguments supported by quantitative evidence and can clearly communicate those arguments in a variety of formats (using words, tables, graphs, mathematical equations, etc.).

Students should be able to:

**1. Interpret Information**.

a. Explain information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).

**2. Represent Information**.

a. Convert information into and between various mathematical forms (e.g., equations, graphs, diagrams, tables, words).

**3. Perform Calculations**.

a. Solve problems or equations at the appropriate course level.

b. Use appropriate mathematical notation.

c. Solve a variety of different problem types that involve a multi-step solution and address the validity of the results.

**4. Apply and Analyze Information**

a. Make use of graphical objects (such as graphs of equations in two or three variables, histograms, scatterplots of bivariate data, geometrical figures, etc.) to supplement a solution to a typical problem at the appropriate level.

b. Formulate, organize, and articulate solutions to theoretical and application problems at the appropriate course level.

c. Make judgments based on mathematical analysis appropriate to the course level.

**5. Communicate Using Mathematical Forms.**

a. Express mathematical analysis symbolically, graphically, and in written language that clarifies/justifies/summarizes reasoning (may also include oral communication).

**B. Problem Solving**: Competency in problem solving represents a student’s ability to design, evaluate, and implement a strategy to answer a question or achieve a goal.

Students should be able to:

**1. Define a Problem**.

a. Construct a detailed and comprehensive problem statement or goal.

b. Identify relevant contextual factors.

**2. Propose a Strategy**.

a. Identify reasonable approaches to solving the problem within the given context.

**3. Evaluate Potential Strategies**.

a. Provide an evaluation of the potential strategy(ies) which may include:

 i. the history of the problem,

 ii. the logic behind the potential strategy(ies),

 iii. the feasibility of the proposed strategy(ies), and

 iv. the potential impacts of the proposed strategy(ies).

b. Choose a feasible strategy.

**4. Apply a Strategy**.

a. Implement chosen approach(es).

b. Gauge success of the chosen strategy(ies) and revise as needed.

**V. Course Goals and Learning Objectives**

**CORE Learning Outcomes**

1. ***Calculate***: Accurately and logically manipulate a mathematical representation to attain desired information.

2. ***Represent*:** Able to translate between representations to clearly represent information and gain insight. Representations may be expressed symbolically, graphically, numerically, or verbally.

3. ***Interpret:*** Draw meaningful inferences and communicate insights from mathematical representations.

Mathematical representations may include statistical, graphical, algebraic, geometric, or symbolic.

4. ***Model:*** Develop and/or apply an appropriate mathematical model for a real-world problem. This can be demonstrated by e.g. developing a model, choosing an appropriate model from several, or explaining the primary assumptions needed to use a particular model.

**Course Learning Outcomes**

The following section lists the Learning Outcomes specific to the course (MATH 1401). Each Learning Outcome reflects one or more of the CORE Learning Outcomes.

**1. Idea of Limits**

Students will be able to…

* Calculate average velocity and slope of a secant line segment ***(CORE Learning Outcome #1 – Calculate)***
* Calculate instantaneous velocity and slope of a tangent line segment **(*Calculate)***

**2. Definition of Limits**

Students will be able to…

* Find limits from a graph ***(Interpret)***
* Find limits from a table ***(Interpret)***
* Find one-sided and two-sided limits graphically ***(Interpret)***
* Identify jump discontinuities ***(Interpret)***
* Determine situations where no limit exists ***(Interpret)***

**3. Computing Limits**

Students will be able to…

* Compute limits of linear and rational functions algebraically ***(Calculate)***

**4. Infinite Limits**

Students will be able to…

* Identify when the limit of a function approaches ±$\infty $ graphically ***(Interpret)***
* Identify vertical asymptotes of a function from the equation or graph ***(Interpret)***

**5. Limits at Infinity**

Students will be able to …

* Identify horizontal asymptotes of a function from the equation or graph ***(Interpret)***
* Determine left and right end behaviors of functions, including transcendental ***(Interpret)***

**6. Continuity**

Students will be able to…

* Use the Intermediate Value Theorem to show an equation has a solution over a given interval ***(Interpret)***

**7. Introducing the Derivative**

Students will be able to…

* Use the limit definition of a derivative to find the slope of a tangent line ***(Calculate)***
* Draw the graph of $f^{'}(x)$ given $f(x)$ and vice versa ***(Represent)***

**8. Working with Derivatives**

Students will be able to…

* Work with the graph of the derivative of a function ***(Interpret)***

**9. Rules for Differentiation**

Students will be able to…

* Compute derivatives using the Constant, Power, Constant Multiple, and Sum/Difference Rules ***(Calculate)***
* Compute the derivative of $e^{x}$ ***(Calculate)***
* Compute higher order derivatives ***(Calculate)***

**10. Product & Quotient Rules**

Students will be able to…

* Compute derivatives using the Product Rule, Quotient Rule, and Power Rule to Negative Integers **(Calculate)**

**11. Derivatives of Trigonometric Functions**

Students will be able to…

* Compute derivatives of trigonometric functions ***(Calculate)***

**12. Derivatives as Rates of Change**

Students will be able to …

* Determine average velocity, instantaneous velocity, speed functions, and acceleration ***(Calculate)***

**13. Chain Rule**

Students will be able to…

* Compute derivatives using the Chain Rule ***(Calculate)***

**14. Implicit Differentiation**

Students will be able to…

* Compute derivatives using Implicit Differentiation and the Power Rule for rational exponents ***(Calculate)***

**15. Derivatives of Logarithmic and Exponential Functions**

Students will be able to…

* Compute derivatives using Logarithmic Differentiation ***(Calculate)***

**16. Derivatives of Inverse Trigonometric Functions**

Students will be able to…

* Compute derivatives of Inverse Trigonometric Functions ***(Calculate)***

**17. Related Rates**

Students will be able to…

* Solve Related Rates problems ***(Model)***

**18. Maxima and Minima**

Students will be able to…

* Find Local and Absolute Extrema from a graph or an equation ***(Interpret)***
* Determine Critical Points from a graph or an equation ***(Interpret)***

**19. What Derivatives Tell Us**

Students will be able to…

* Identify open intervals where $f(x)$ increases or decreases ***(Interpret)***
* Use the First Derivative Test to identify local extrema ***(Interpret)***
* Identify Inflection Points and Concavity for a function ***(Interpret)***
* Use the Second Derivative Test to identify local extrema ***(Interpret)***

**20. Graphing Functions (Curve Sketching)**

Students will be able to…

* Graph functions using curve sketching techniques ***(Represent)***

**21. Optimization**

Students will be able to…

* Optimize the value of an objective function subject to the given constraints ***(Model)***

**22. Linear Approximation and Differentials**

Students will be able to…

* Find the linear approximation to $f$ at $x=a$ ***(Calculate)***
* Use linear approximation to estimate function values and change ***(Interpret)***

**23. Mean Value Theorem**

Students will be able to…

* Determine whether Rolle’s Theorem and/or the Mean Value Theorem hold for a function on a given interval ***(Interpret)***

**24. L’Hopital’s Rule**

Students will be able to…

* Identify limits which are of the indeterminate forms: $\frac{0}{0}, \frac{\infty }{\infty }, 1^{\infty }, 0^{0}, \infty ^{0} $***(Interpret)***
* Use L’Hopital’s Rule to calculate limits ***(Calculate)***

**25. Newton’s Method**

Students will be able to…

* Write the formula for Newton’s Method
* Compute the first two approximations

**26. Antiderivatives**

Students will be able to…

* Find antiderivatives of trigonometric functions and inverses and use the Power Rule, Constant Multiple Rule and Sum Rules to evaluate indefinite integrals ***(Calculate)***
* Solve Initial Value problems involving velocity and position functions ***(Calculate)***

**27. Approximating Areas Under Curves**

Students will be able to…

* Find area under a velocity curve and approximate displacement and areas by using Riemann sums ***(Represent)***

**28. Definite Integrals**

Students will be able to…

* Approximate net area using Riemann sums ***(Represent)***
* Reverse limits and evaluate definite integrals using limits in Riemann sums ***(Calculate)***

**29. Fundamental Theorem of Calculus**

Students will be able to…

* Evaluate integrals using the Fundamental Theorem of Calculus ***(Calculate)***

**30. Working With Integrals**

Students will be able to…

* Use symmetry to evaluate definite integrals
* Find the average value of a function

**31. Substitution Rule**

Students will be able to…

* Evaluate integrals using Substitution ***(Calculate)***

**VI. Course Schedule:** I will keep a weekly calendar in our classroom and on my website. If the schedule changes, I will update both in a timely fashion.

**VII. Assignments**

**Exams: Exams/Quizzes:** A student will be allowed to make up a test or quiz if their absence is unexcused. HOWEVER, the student will take the assessment on the next day that they show up to class and a penalty of one letter grade will be deducted from the students score. This is in accordance with the Jefferson County School district policy.

**Homework Assignments:** Assignments will be given daily (with few exceptions) and quizzes may happen without prior notice. Assignments are to be handed in the day they are due. Late work will be accepted in all cases when an absence is excused for full credit if and only if they are turned in within two days of the absence. Late work will be accepted from students due to an unexcused absence for partial credit if and only if the assignment is turned in by the date communicated to the student.

**VIII. Grading Summary** 20% Final

 60% Exams

10% Assignments

 10% Quizzes and Projects

**Grading Scale:**

 90%-100% A

 80%-89% B

 70%-79% C

 60%-69% D

 -- 59% F

**COURSE PROCEDURES**

**IX. Course Policies – Grades Attendance Policy:**  Attendance and participation are required to be successful in this course. The BCHS Attendance policy will be strictly enforced.

**Incomplete Policy**: Incomplete grades (I) are not granted for low academic performance.  To be eligible for an Incomplete grade, students must (1) *successfully* complete at least 75 percent of the course, (2) have special circumstances (verification may be required) that preclude the student from attending class and completing graded assignments, and (3) make arrangements to complete missing assignments with the original instructor using a CLAS Course Completion agreement.

**X. Course Policies – Technology and Media Email/Remind.com –** Students can communicate with me regarding attendance, meeting arrangements, grades, and/or questions regarding the course content, assignments, and due dates.

**Computing Technology –** During the semester, we will explore in this class graphically, numerically, and algebraically. This course will utilize the TI-84 calculator, with graphics capability, to facilitate the study of calculus. This calculator is a requirement, it will be used in class on a daily basis and on some exams, and will help in the learning of calculus.

**XI. Getting Help Instructor Office Hours/By Appointment** See me with questions during any Access period, or during 7th periods.

**XII. Academic Honesty** Students are required to know, understand, and comply with the CU Denver Academic Dishonesty Policy as detailed in the Catalog and on the CLAS website. Academic dishonesty consists of plagiarism, cheating, fabrication and falsification, multiple submission of the same work, misuse of academic materials, and complicity in academic dishonesty. If you are not familiar with the definitions of these offenses, go to
[http://www.ucdenver.edu/academics/colleges/CLAS/faculty-staff/policies/Pages/DefinitionofAcademicDishonesty.aspx](https://webmail.ucdenver.edu/owa/redir.aspx?C=BfBWQwuda0CUVe6g28JkZBZvKxcFx89IJ1lXMnn5FaKv7PlETK7UuHK7os2Vu4AzvjxWF7A5b5g.&URL=http%3a%2f%2fwww.ucdenver.edu%2facademics%2fcolleges%2fCLAS%2ffaculty-staff%2fpolicies%2fPages%2fDefinitionofAcademicDishonesty.aspx).
This course assumes your knowledge of these policies and definitions. Failure to adhere to them can result in possible penalties ranging from failure of this course to dismissal from the University; so, be informed and be careful. If this is unclear to you, ask me. The College of Liberal Arts and Sciences (CLAS) Ethics Bylaws allow the instructor to decide how to respond to an ethics violation, whether by lowering the assignment grade, lowering the course grade, and/or filing charges against the student with the Academic Ethics Committee. Violating the Academic Honor Code can lead to expulsion from the University.

**Definition of Academic Dishonesty** Students are expected to know, understand, and comply with the ethical standards of the University. In addition, students have an obligation to inform the appropriate official of any acts of academic dishonesty by other students of the University. Academic dishonesty is defined as a student's use of unauthorized assistance with intent to deceive an instructor or other such person who may be assigned to evaluate the student’s work in meeting course and degree requirements. Examples of academic dishonesty include, but are not limited to, the following:

**Plagiarism:** Plagiarism is the use of another person’s distinctive ideas or words without acknowledgment. The incorporation of another person’s work into one’s own requires appropriate identification and acknowledgment, regardless of the means of appropriation. The following are considered to be forms of plagiarism when the source is not noted:

1. Word-for-word copying of another person's ideas or words.
2. The mosaic (the interspersing of one’s own words here and there while, in essence, copying another's work).
3. The paraphrase (the rewriting of another’s work, yet still using their fundamental idea or theory).
4. Fabrication of references (inventing or counterfeiting sources).
5. Submission of another’s work as one's own.
6. Neglecting quotation marks on material that is otherwise acknowledged.

Acknowledgment is not necessary when the material used is common knowledge.

**Cheating:** Cheating involves the possession, communication, or use of information, materials, notes, study aids or other devices not authorized by the instructor in an academic exercise, or communication with another person during such an exercise. Examples of cheating are:

1. Copying from another's paper or receiving unauthorized assistance from another during an academic exercise or in the submission of academic material.
2. Using a calculator when its use has been disallowed.
3. Collaborating with another student or students during an academic exercise without the consent of the instructor.

**Fabrication and Falsification:** Fabrication involves inventing or counterfeiting information, i.e., creating results not obtained in a study or laboratory experiment. Falsification, on the other hand, involves deliberately alternating or changing results to suit one’s needs in an experiment or other academic exercise.

**Multiple Submissions:** This is the submission of academic work for which academic credit has already been earned, when such submission is made without instructor authorization.

**Misuse of Academic Materials:** The misuse of academic materials includes, but is not limited to, the following:

1. Stealing or destroying library or reference materials or computer programs.
2. Stealing or destroying another student’s notes or materials, or having such materials in one’s possession without the owner’s permission.
3. Receiving assistance in locating or using sources of information in an assignment when such assistance has been forbidden by the instructor.
4. Illegitimate possession, disposition, or use of examinations or answer keys to examinations.
5. Unauthorized alteration, forgery, or falsification.
6. Unauthorized sale or purchase of examinations, papers, or assignments.

**Complicity in Academic Dishonesty:** Complicity involves knowingly contributing to another’s acts of academic dishonesty.

**Student Code of Conduct:** As members of the University community, students are expected to uphold university standards, which include abiding by state civil and criminal laws and all University policies and standards of conduct. These standards are outlined in the student code of conduct which can be found at:
 <http://www.ucdenver.edu/life/services/standards/students/Pages/default.aspx>

**Fall 2018 Schedule and Deadlines\***

|  |  |
| --- | --- |
| **Monday****08/20/18** | **Registration Opens:**You may begin your application and registration for your Fall 2018 CU Succeed Courses. Please refer to the CU Succeed Website for detailed instructions and links. |
| **Friday****10/05/18** | **Last Day to Apply:**CU Succeed program application must be completed by this day. |
| **Monday****10/08/18** | **Last Day to Register:**Registration must be completed no later than this day. **If you are not registered by this day, you will not receive credit. *There will be no exceptions.*****CU Succeed Parent/Guardian Financial Responsibility Form due:**Turn in Financial Responsibility Form to your teacher by this day. |
| **Friday****10/15/18** | **Last Day to Drop:**Courses dropped by this date will not appear on your CU Academic Record and you will not be responsible for the tuition. **You must drop the course through your CU Student Portal.** |
| **Friday****10/15/18** | **Last Day to Withdraw:**You will be responsible for tuition payment and the course will appear on your CU Academic Record as a ‘W’. |
| **Friday****11/30/18** | **Tuition Due:**Payment instructions are located on the CU Succeed Website. A reminder e-mail will be sent to the e-mail supplied on the application; **bills will not be mailed!** |

**Note: Grades will be recorded on an official CU transcript, and will become a part of the student’s permanent academic record at the University of Colorado. Grades and transcripts will be available by the end of January 2019.**

***Have questions? Contact us!***

CU Succeed Programs

[**www.ucdenver.edu/cusucceed**](http://www.ucdenver.edu/cusucceed)

Campus Box 144, P.O. Box 173364

Denver, CO 80217-3364

Office: (303) 315-7030

Fax: (303) 315-7046

\*The CU Succeed Office holds the right to make extensions and adjustments. Exceptions to deadlines will NOT be honored.