Eastern Oklahoma State College Course Syllabus

MATH 2235
Calculus I

Course Description: *Prerequisite: MATH 1513 and MATH 1613 or instructor's approval.* The differentiation and integration of elementary algebraic and transcendental functions with various physical and geometric properties. This course provides definitions of limits, differentiation and integration of elementary algebraic and transcendental functions with various physical and geometric properties. This course is intended for the student who plans a career in mathematics, engineering, or the physical sciences. (Cr. 5)

Objectives: Upon completion of the course, the student will demonstrate proficiency in analyzing limits, both analytically and graphically; differentiation, both analytically and numerically, and a knowledge of applications of differentiation; integration, both analytically and numerically, and a knowledge of applications of integration; and an understanding of solution methods for first-order linear differential equations.
(A complete listing of section by section objectives is provided at the end of this course syllabus.)

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Text and Materials: Calculus (8th Edition) by Larson, Hostetler, and Edwards, Houghton Mifflin Publishing Company. A graphing calculator will be needed, preferably with differentiation and integration capabilities. *(The instructor will use a Texas Instruments TI-84, TI-86, or TI-89 graphing calculator for classroom demonstrations.)*

Assignments, Grading and Make-up Policies: Your final grade will be based on total points possible. Tests, homework and quizzes will all be counted together. Therefore it is just as important for you to attend class and work all assignments as well as doing "fair" or better on tests.

- **Homework:** There will be a great deal of homework assigned for this course and a great deal of time should be spent doing the homework. Due to this fact, we feel that you should be rewarded for doing the assignments. Homework will be assigned for each section covered and will be due the second class period following the completion of the section of the text in class. Problems that require graphing should be completed on graph paper. Homework assignments will be worth 20 points per section. Late homework will be penalized 25% and no homework will be accepted after a test has been given over the material. It is recommended that students form small study groups when working homework problems. (Organized homework study sessions may be scheduled outside of regular class meetings, depending upon scheduling an available room, student interest and the instructor's discretion.) Credit will not be given for answers only. You must show your work to receive credit.
- **Quizzes:** Quizzes will be given throughout the semester over the homework material assigned. Quizzes will be worth at most 20 points and will count as part of the homework average. Quizzes are open notes. Ten percent of the quizzes will be dropped from the final grade. There will be no make-up quizzes without absence justification and instructor approval.
- **Make-up work:** Make-up work for absences for college-related activities must be arranged in advance. Make-up quizzes for documented illness will be taken during an arranged time outside of the regularly scheduled class time or during the scheduled final examination time.
- **Exams:** Exams will be given after each chapter. One exam score may be dropped and replaced with a retest (scheduled and administered at the instructor's discretion). A final comprehensive exam worth 200 points will be given; the final exam cannot be retaken.

Assignments, Grading and Make-up Policies: *(cont.)*

- **Grades:** The final grade in this course will be assigned based on the following scale. The averages that receive a specific letter grade may be adjusted lower at the instructor's discretion but will not be raised.

  90% or higher--A
  80% - 89%------B
  70% - 79%------C
  60% - 69%------D
  less than 60% --F

Attendance: The key to being successful in this class is attending class, keeping up with your work, and asking for help when you need it. If you know you will be absent from class, you should contact the instructor as soon as possible to determine what material you will miss. The instructor will record student's daily attendance. The student must be present in class to take quizzes and exams. If a student knows prior to a class that he or she will be absent, arrangements to complete any missed work should be made prior to the class meeting. An exam cannot be made-up after the exam has been administered in the regular class meeting. Students are expected to attend class, on time, and prepared for class work. AW's (Administrative Withdrawals) are not given except in extreme circumstances. It is the student's responsibility to come to class and to follow the withdrawal procedures if he or she has too many absences. Students who fail to attend class regularly may be administratively withdrawn from the class according to Eastern Oklahoma State College procedures. Failure of a student to attend class for two consecutive weeks or being absent from class six hundred (600) minutes during the semester without justification – equivalent to twelve (12) fifty-minute class periods – may result in the instructor initiating administrative withdrawal procedures against the student.

Academic Integrity: Eastern's student conduct code, found in the Student Handbook, specifically prohibits "cheating, plagiarism, or other forms of academic dishonesty." Students are expected to do their own assignments and to discourage the sharing/cheating of work. Cheating on tests is not tolerated and could result in serious consequences, including possible dismissal from the class or from the college. Plagiarism (the use of another's work and claiming it as one's own) is not tolerated and could also result in serious consequences. Consequences and procedures are outlined in the Student Handbook.

Accommodations for Students with Disabilities: The faculty, staff, and administration at Eastern Oklahoma State College will adhere to the policies as set in the Americans With Disabilities Act (ADA) and are committed to making all reasonable accommodations for all qualified students with disabilities. It is, however, the student's responsibility to turn in all proper documentation to the Dean of Students Office outlining needs. This documentation must be established before any accommodations can be done by the instructor or made in the classroom. Please refer to the Student Handbook for more details or call the Dean of Students.

Additional Information:

- If you find that you need additional help with homework problems or have questions that were not addressed in class, the instructor is available to assist you during his scheduled office hours (posted on the door of his office) and there are tutors available in Student Support Services to assist you with the course.
- The instructor expects students turn off their cell phones when class begins. Cell phone use of any kind during a quiz or exam will result in a grade of 0 (zero) for that assignment.

Section Objectives from Calculus, 8th Edition by Larson, Hostetler and Edwards

Chapter1

1.1
- Understand what calculus is and how it compares with precalculus.
- Understand that the tangent line problem is basic to calculus.
- Understand that the area problem is also basic to calculus.

1.2
- Estimate a limit using a numerical or graphical approach.
- Learn different ways that a limit can fail to exist.
- Study and use a formal definition of limit.

1.3
- Evaluate a limit using properties of limits.
- Develop and use a strategy for finding limits.
- Evaluate a limit using dividing out and rationalizing techniques.
- Evaluate a limit using the Squeeze Theorem.

1.4
- Determine continuity at a point on an open interval.
- Determine one-sided limits and continuity on a closed interval.
- Use properties of continuity.
- Understand and use the Intermediate Value Theorem.

1.5
- Determine infinite limits from the left and from the right.
- Find and sketch the vertical asymptotes of the graph of a function.

Chapter 2

2.1
- Find the slope of the tangent line to a curve at a point.
- Use the limit definition to find the derivative of a function.
- Understand the relationship between differentiability and continuity.

2.2
- Find the derivative of a function using the Constant Rule.
- Find the derivative of a function using the Power Rule.
- Find the derivative of a function using the Constant Multiple Rule.
- Find the derivative of a function using the Sum and Difference Rules.
- Find the derivatives of the sine and of the cosine function.
- Use the derivatives to fine rates of change.

2.3
- Find the derivative of a function using the Product Rule.
- Find the derivative of a function using the Quotient Rule.
- Find the derivative of a trigonometric function.
- Find a higher-order derivative of a function.

2.4
- Find the derivative of a composite function using the Chain Rule.
- Find the derivative of a function using the General Power Rule.
- Simplify the derivative of a function using algebra.
- Find the derivative of a trigonometric function using the Chain Rule.

2.5
- Distinguish between functions written in implicit form and explicit form.
- Use implicit differentiation to find the derivative of a function.

2.6
- Find a related rate.
- Use related rates to solve real-life problems.

Chapter 3

3.1
- Understand the definition of extrema of a function on an interval.
- Understand the definition of a relative extrema of a function on an open interval.
- Find extrema on a closed interval.

3.2
- Understand and use Rolle's Theorem.
- Understand and use the Mean Value Theorem.

3.3
- Determine intervals in which a function is increasing or decreasing.
- Apply the First Derivative Test to find relative extrema of a function.

3.4
- Determine intervals on which a function is concave upward or concave downward.
- Find any points of inflection of the graph of a function.
- Apply the Second Derivative Test to find relative extrema of a function.

3.5
- Determine (finite) limits at infinity.
- Determine the horizontal asymptotes, if any, of the graph of a function.
- Determine infinite limits at infinity.

3.6
- Analyze and sketch the graph of a function.

3.7
- Solve applied minimum and maximum problems.

3.8
- Approximate a zero of a function using Newton's Method.

3.9
- Understand the concept of a tangent line approximation.
- Compare the value of the differential, $d\gamma$, with the actual change in γ, $\Delta\gamma$.
- Estimate a propagated error using a differential.
- Find the differential of a function using differentiation formulas.

Chapter 4

4.1
- Write the general solution of a differential equation.
- Use indefinite integral notation for antiderivatives.
- Use basic integration rules to find antiderivatives.
- Find a particular solution of a differential equation.

4.2
- Use sigma notation to write and evaluate a sum.
- Understand the concept or area.
- Approximate the area of a plane region.
- Find the area of a plane region using limits.

4.3
- Understand the definition of a Riemann sum.
- Evaluate a definite integral using limits.
- Evaluate a definite integral using properties of definite integrals.

4.4
- Evaluate a definite integral using the Fundamental Theorem of Calculus.
- Understand and use the Mean Value Theorem for Integrals.
- Find the average value of a function over a closed interval.
- Understand and use the Second Fundamental Theorem of Calculus.

4.5
- Use pattern recognition to find an indefinite integral.
- Use a change of variables to find and indefinite integral.
- Use the General Power Rule for Integrals to find and indefinite integral.
- Use a change of variables to evaluate a definite integral.
- Evaluate a definite integral involving an even or odd function.

4.6
- Approximate a definite integral using the Trapezoidal Rule.
- Approximate a definite integral using Simpson's Rule.
- Analyze the approximate errors in the Trapezoidal Rule and Simpson's Rule.

Chapter 5

5.1
- Develop and use properties of the natural logarithmic function.
- Understand the definition of the number e.
- Find derivatives of functions involving the natural logarithmic function.

5.2
- Use the Log Rule for Integration to integrate a rational function.
- Integrate trigonometric functions.

5.3
- Verify that one function is the inverse function of another function.
- Determine whether a function has an inverse function.
- Find the derivative of an inverse function.

5.4
- Develop properties of the natural exponential function.
- Differentiate natural functions.
- Integrate natural exponential functions.

5.5
- Define exponential functions that have bases other than e.
- Differentiate and integrate exponential functions that have bases other than e.
- Use exponential functions to model compound interest and exponential growth.

5.6
- Develop properties of the six inverse trigonometric functions.
- Differentiate an inverse trigonometric function.
- Review the basic differentiation rules for elementary functions.

5.7
- Integrate functions whose antiderivatives involve inverse trigonometric functions.
- Use the method of completing the square to integrate a function.
- Review the basic integration rules involving elementary functions.

5.8
- Develop properties of hyperbolic functions.
- Differentiate and integrate hyperbolic functions.
- Develop properties of inverse hyperbolic functions.
- Differentiate and integrate functions involving inverse hyperbolic functions.

Chapter 6

6.1

- Use initial conditions to find particular solutions of differential equations.
- Use slope fields to approximate solutions of differential equations.
- Use Euler's Method to approximate solutions of differential equations.

6.2

- Use separation of variables to solve a simple differential equation.
- Use exponential functions to model growth and decay in applied problems.

6.3

- Recognize and solve differential equations that can be solved by separation of variables.
- Recognize and solve homogeneous differential equations.
- Use differential equations to model and solve applied problems.
- Solve and analyze logistic differential equations.

6.4

- Solve a first-order linear differential equation.
- Solve a Bernoulli differential equation.
- Use linear differential equations to solve applied problems.