Math 1910 Course Syllabus

Course Title:
Calculus I

Course Description:
An introduction to calculus with an emphasis of functions, multidisciplinary applications of calculus, and theoretical understanding of differentiation and integration. Topics include the definition of the derivative, differentiation techniques, and applications of the derivative. Calculus topics related to trigonometric, exponential, and logarithmic functions also included. Course concludes with the fundamental theorem of calculus; the definition of anti-differentiation and the definite integral; basic applications of integrations; and introductory techniques of integration.

Course Prerequisites:
This course requires a grade of C or better in Math 1730 or its equivalent. Familiarity with graphing calculators (TI-83, 84, etc) is required. You may not use graphing calculators with symbolic manipulation software (DERIVE, MAPLE, etc.) on exams.

Instructor Information:

Instructor:

Office:

E-mail/Phone:

Office Hours:

Webpage:

Required Materials:

ALEKS PPL: There is a lot of background material that you will need to remember in order to be successful in Calculus I. To help you succeed, the College of Basic and Applied Sciences (CBAS) is providing you with free access to ALEKS Placement, Preparation, and Learning (PPL). ALEKS PPL is a nationally normed assessment which identifies areas of algebra and trigonometry that you need help with in order to get ready for Calculus I. The Department of Mathematics is requiring that you take the ALEKS Initial Assessment in your first week of Calculus I in order to create your personalized Learning Module. Your Learning Module will then help you quickly
review key algebra and trigonometry concepts. You must complete your Learning Module by mid-term.

ALEKS Assessments are scored on a 0 – 100 point scale; ALEKS interprets a score of 76 or higher as indicating preparation for Calculus I. Your class grade from ALEKS PPL will therefore reflect how close you ultimately come to that goal. As you work through your Learning Module, you may retake your Assessment up to four times in order to improve your score.

For much more information and the link you will use to get started in ALEKS, please click on ALEKS for CALCULUS.

**Course Purpose:**
This is a course on differential calculus with an introduction to integral calculus. It is the first in a sequence of three courses designed to provide the computational tools necessary for continued work in physics, engineering, and more advanced mathematics. All three must be completed to gain thorough exposure to all the standard calculus topics.

**Learning Outcomes:**
Upon completion of this course with a passing grade, the student will have:

1. Interpret a function from an algebraic, numerical, graphical and verbal perspective and extract information relevant to the phenomenon modeled by the function.
2. Verify the value of the limit of a function at a point using the definition of the limit.
3. Calculate the limit of a function at a point numerically and algebraically, using appropriate techniques including l’Hospital’s rule.
4. Find points of discontinuity for functions and classify them.
5. Understand the consequences of the intermediate value theorem for continuous functions.
6. Interpret the derivative of a function at a point as the instantaneous rate of change in the quantity modeled and state its units.
7. Interpret the derivative of a function at a point as the slope of the tangent line and estimate its value from the graph of a function.
8. Sketch the graph of the derivative from the given graph of a function.
9. Given a table of function values, approximate the value of the derivative at a point using the forward difference quotient and the centered difference quotient.
10. Compute the value of the derivative at a point algebraically using the (limit) definition.
11. Derive the expression for the derivative of elementary functions from the (limit) definition.
12. Be able to show whether a function is differentiable at a point.
13. Compute the expression for the line tangent to a function at a point.
14. Interpret the tangent line geometrically as the local linearization of a function.
15. Compute the expression for the derivative of a function using the rules of differentiation including the power rule, product rule, and quotient rule and chain rule.
16. Compute the expression for the derivative of a composite function using the chain rule of differentiation.
17. Differentiate a relation implicitly and compute the line tangent to its graph at a point.
18. Differentiate exponential, logarithmic, and trigonometric and inverse trigonometric functions.
19. Obtain expressions for higher order derivatives of a function using the rules of differentiation.
20. Interpret the value of the first and second derivative as measures of increase and concavity of a function.
21. Compute the critical points of a function on an interval.
22. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
23. Use the differential to determine the error of approximations.
24. Understand the consequences of Rolle’s Theorem and the Mean Value theorem for differentiable functions.
25. Find the anti-derivative of elementary polynomials, exponential, logarithmic and trigonometric functions.
26. Interpret the definite integral geometrically as the area under a curve.
27. Construct a definite integral as the limit of a Riemann sum.
28. Approximate a definite integral using left sum, right sum, midpoint and trapezoidal rules.
29. Interpret the indefinite integral as a definite integral with variable limit(s).
30. Interpret differentiation and anti-differentiation as inverse operations (Fundamental Theorem of Calculus, part 1).
31. Interpret the anti-derivative as a definite integral with variable limit and implement this expression on graphing platforms.
32. Evaluate a definite integral using an anti-derivative (Fundamental Theorem of Calculus, part 2).
33. Use substitution to find the anti-derivative of a composite function.
34. Apply basic optimization techniques to selected problems arising in various fields, such as physical modeling, economics and population dynamics.

General Education Mathematics Goal and Learning Outcomes:

Goal:
The goal of mathematics is to expand students’ understanding of mathematics beyond the entry-level requirements for college and to extend their knowledge of mathematics through relevant mathematical modeling with applications, problem solving, critical thinking skills, and the use of appropriate technologies.
Learning Outcomes:
Upon completion of this course, students will demonstrate the ability to:

- Use mathematics to solve problems and determine if the solutions are reasonable.
- Use mathematics to model real world behaviors and apply mathematical concepts to the solution of real-life problems.
- Make meaningful connections between mathematics and other disciplines.
- Use technology for mathematical reasoning and problem solving.
- Apply mathematical and/or basic statistical reasoning to analyze data and graphs.

Course Requirements:
In order to complete this course successfully, the learner is required to:

- Attend class lectures
- Participate in class activities
- Read and study class assignments
- Solve assigned problem sets
- Successfully complete quizzes and tests
- Use technology where appropriate

Sections To Be Covered:

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<thead>
<tr>
<th>Chapter</th>
<th>Sections Covered</th>
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<tbody>
<tr>
<td>2</td>
<td>2.1 – 2.8</td>
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<td>3</td>
<td>3.1 – 3.9</td>
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<td>4</td>
<td>4.1 – 4.5, 4.7, 4.9</td>
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<td>5</td>
<td>5.1 – 5.5</td>
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Course Evaluation:
Grading Scale:

<table>
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<th>Percentage</th>
<th>Grade</th>
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<tbody>
<tr>
<td>90 – 100</td>
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<td>80 – 89</td>
<td>B</td>
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<td>70 – 79</td>
<td>C</td>
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<td>60 – 69</td>
<td>D</td>
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<tr>
<td>Below 60</td>
<td>F</td>
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Important Dates:
Last Day to drop without a grade:

Last Day to drop with a W:

Final exam Time and Date:

Drop/Withdrawal Policy and Dates:
Please note the Drop Policy and Withdrawal procedures as they are stated in the Current Registration Guide. A grade of “I” will be given only in accordance with University Policy. No grade of “W” will be assigned after the official drop date except in situations involving extreme extenuating circumstances beyond the student’s control. In particular, a “W” will not be granted merely because the student is failing. Students should be aware that missing the official drop date and thereby receiving an “F” can have ramifications on financial aid.

Lottery Scholarship Policy:
Do you have a lottery scholarship? To retain the Tennessee Education Lottery Scholarship eligibility, you must earn a cumulative TELS GPA of 2.75 after 24 and 48 attempted hours and a cumulative TELS GPA of 3.0 thereafter. A grade of C, D, F, FA or I in this class may negatively impact TELS eligibility.

If you drop this class, withdraw, or if you stop attending this class, you may lose eligibility for your lottery scholarship, and you will not be able to regain eligibility at a later time.

For additional Lottery rules, please refer to your Lottery Statement of Understanding form or contact your MT One Stop Enrollment Counselor.

Reasonable Accommodations for Students with Disabilities:
Reasonable Accommodations for Students with Disabilities: Middle Tennessee State University is committed to campus access in accordance with the Title II of the Americans with Disabilities Act and Section 504 of the Vocational Rehabilitation Act of 1973. Any student interested in reasonable accommodations can consult the Disability & Access Center (DAC) website and/or contact the DAC for assistance at 615-898-2783 or email.

Free Tutoring:
Math tutoring for this course is available as a free service to MTSU students in KOM 252. Tutoring is fundamental to your success as a student. At every level of your academic journey, you will discover that tutoring assists your understanding, recollection, and application of what was presented in the classroom.

Take advantage of our FREE tutoring service and learn how to study, get help with understanding difficult course material, receive better test grades, or simply improve your grade point average. Tutoring is available in study skills and learning strategies that includes
sessions on time management, notetaking, when and where to study, and memory principles. Tutoring is also available in over 200 courses including biology, history, computer information systems, physics, math, psychology, chemistry, economics, recording industry and many more. The central location for tutoring is the Tutoring Spot, located in Walker Library, but also conducted at various other campus sites. For available tutoring opportunities, visit the Student Success website. For questions, call the tutoring spot at 615-904-8014.