



CALCULUS 1

MATH 2144

COURSE SYLLABUS

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SECTION 1: COURSE INFORMATION

Format: 15 weeks. Traditional Face-to-Face

Course ID: MATH 2144

Course Title: Calculus 1

College: College of Natural and Health Sciences

Prerequisites: A grade of C or higher in MATH 1413 Precalculus

Credit Hours: 4

Instructors:

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Office Hours:

See MyFire for details.

Course Description

This course involves the study of functions, limits and continuity, derivatives, and applications of derivatives.

Course Overview

Students will acquire knowledge of the fundamental concepts of calculus, and they will develop skills necessary for solving problems and doing exercises involving these concepts.

Course Workload

Time spent on course assignments will vary by student depending on familiarity with course content, reading rate of speed, writing rate of speed, and other individual factors. Based on averages for most students, it is estimated that the course workload estimate for this course is 12 hours per week.

Course Materials

Now, instead of registering for your math classes and then buying your MyMathLab access separately, the required **access** will be ordered for you, and will be combined with your tuition as a course fee. This enables you to know the full cost of your math courses upfront (with no surprises about additional out of pocket costs for required course materials—keep in mind, the print text is now an optional upgrade for students... rather than an included component in the delivery). Once you register for MATH 2144, will login to MyFire and find your MyMathLab course ready to go with the included eText.

If you have questions about the cost of your course materials, please access your financial statement through the Student Information System. The cost will be listed as a textbook fee. If after checking your financial statement you have additional questions, please contact SEU's bookstore @ (863) 669-4412.

REQUIRED: Hass, J., Heil, C., Weir, M. D., Estrugo, J. L. Z., & Thomas, G. B. (2019). Thomas calculus: early transcendentals. Harlow, United Kingdom: Pearson Education.

REQUIRED: MyMathLab (accessible through MyFire)

REQUIRED: Class notes (accessible through MyFire)

OPTIONAL: The use of a non-graphing calculator is permitted in all course work. Phones may not be used as a calculator when testing.

Required and optional textbooks are accessed and ordered through [SEU's bookstore](#).

Disclaimer: The resources utilized in this course provide information, thoughts and insights that should encourage critical thinking on the part of the student. Please note as well that as an Assembly of God institution, Southeastern University does not necessarily endorse specific personal, religious, philosophical, or political positions found in these resources.

Course Topics

The purpose of this course is to introduce, reinforce, and measure learning on the following topics:

- Functions
- Limits and Continuity
- Derivatives
- Applications of Derivatives
- Integrals

Intended Learning Outcomes

As a result of reading, study, and assessments in this course, the student should be able to:

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. Demonstrate an understanding of the consequences of the intermediate value theorem for continuous functions.
6. Describe the relationship between the slope of the secant line and the slope of the tangent line.
7. Discuss the derivative of a function at a point as the instantaneous rate of change.
8. 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.
9. Recognize the graph of the derivative from the given graph of a function.
10. Approximate the value of the derivative at a point using the difference quotient.
11. Compute the value of the derivative at a point algebraically using the (limit) definition.
12. Derive the expression for the derivative of elementary functions from the (limit) definition.
13. Show whether a function is differentiable at a point.

14. Compute the equation for the line tangent to a function at a point.
15. Interpret the tangent line geometrically as the local linearization of a function.
16. 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.
17. Compute the expression for the derivative of a composite function using the chain rule of differentiation.
18. Differentiate a relation implicitly and compute the line tangent to its graph at a point.
19. Differentiate exponential, logarithmic, and trigonometric and inverse trigonometric functions.
20. Obtain expressions for higher order derivatives of a function using the rules of differentiation.
21. Demonstrate an understanding of the consequences of Rolle's theorem and the Mean Value theorem for differentiable functions.
22. Interpret the value of the first and second derivative as measures of increase and concavity of a functions.
23. Compute the critical points of a function on an interval.
24. Identify the extrema of a function on an interval and classify them as minima, maxima or saddles using the first derivative test.
25. Implement Newton's Method to find a root of a polynomial.
26. Find the antiderivative of elementary polynomials, exponential, logarithmic and trigonometric functions.

Late Work

All homework for a given section will be due at the beginning of class on the day it is tested. These assignments cannot be made up!

If a student misses an exam that is NOT an extreme, documented emergency the student will receive a zero for that exam.

A test may be made up only if the professor is contacted and provided with official, dated documentation of an EXTREME circumstance within 48 hours. Otherwise, the missed exam will be a zero in the grade book.

Examples of EXTREME circumstances are as follows:

- Written proof of HOSPITAL/ER stay. No nurse's notes, etc.
- Written proof of subpoena/jury duty
- Involved in an accident; must bring in police report
- Death in immediate family (parent, grandparent, sibling); must bring in documentation

Students who miss an exam due to a school-sanctioned, Provost-approved event, including all athletic events, MUST notify the instructor a minimum of one week in advance and MUST take the exam PRIOR to leaving on the school event unless notified in writing (handwritten or electronic) otherwise by the instructor.

Extra Credit

There is no extra credit

SECTION 2: SOUTHEASTERN POLICIES

Academic Policies


View this link to see Southeastern's Policies regarding SEU's Mission and Vision Statements, Title IX Statement, Student Services, Class Participation, Official Email, MyFIRE Use, Technical Difficulties, Technical Support, Disability Statement, Academic Honesty, Course Evaluation, Official Withdrawal, Grading Scale, and Netiquette.

SECTION 3: COURSE SCHEDULE


The **Course Schedule** provides a listing of your work in this course. The assessments are listed by Module and include the due dates and point values.

AIM, LEARN, AND APPLY DESCRIPTIONS


Aim

 When you see the Aim icon, you will be introduced to topics and ideas that will be covered throughout this module. The AIM will also provide you with a glimpse into your learning objectives and an introduction to this module.

Learn

 When you see the Learn icon, all of your reading assignments will be listed and may include additional resources that your instructor is providing to help you complete the activities and assessments for the module.

Apply

 When you see the Apply Icon, it will be time to demonstrate your learning for the module. The items here are those in which you'll be graded and may include discussions, activities, assignments, quizzes, exams, and projects.


Week 1

 **Be sure you read the learning outcomes that your instructor has set for this week and then do your best to accomplish them.**


- Discuss the course syllabus
- Discuss the Student Acknowledgement Quiz
- Discuss how to log into MyMathLab
- Complete section 1.1

Upon completion of this Chapter, students will be able to:

- Recognize what functions are
- Visualize functions as graphs
- Combine and transform functions
- Classify functions

 **This section lists all your reading assignments and may include additional resources that your instructor is providing to help you complete the activities and assessments for the week.**

- Read: Course Syllabus, section 1.1
- Locate the Student Acknowledgement Quiz in MyFire
- Locate the MyMathLab link in MyFire

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments

- Section 1.1 Functions and Their Graphs


Week 2

Continue Chapter 1

- Section 1.2 Combining Functions; Shifting and Scaling Graphs
- Section 1.3 Trigonometric Functions

Reading – Textbook or eText:

- Section 1.2 Combining Functions; Shifting and Scaling Graphs
- Section 1.3 Trigonometric Functions

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments

- Section 1.2 Combining Functions; Shifting and Scaling Graphs
- Section 1.3 Trigonometric Function


Week 3

Continue Chapter 1

- Section 1.3 Trigonometric Functions
- Section 1.5 Exponential Functions
- Section 1.6 Inverse Functions and Logarithms

Reading – Textbook or eText:

- Section 1.3 Trigonometric Functions
- Section 1.5 Exponential Functions
- Section 1.6 Inverse Functions and Logarithms

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments

- Section 1.3 Trigonometric Functions
- Section 1.5 Exponential Functions
- Section 1.6 Inverse Functions and Logarithms

Week 4


 **Complete Chapter 1, Begin Chapter 2**

Upon completion of Chapter 2, students will be able to:

- Demonstrate an understanding of the concept of a limit.
- Use limits to describe the way a function change.

 **Reading – Textbook or eText:**

- Section 2.1: Rates of Change and Tangent Lines to Curves
- Section 2.2: Limit of a Function and Limit Laws

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MyMathLab Homework Assignments

- Section 2.1: Rates of Change and Tangent Lines to Curves
- Section 2.2: Limit of a Function and Limit Laws


Week 5

Continue Chapter 2

- Section 2.3: The Precise Definition of a Limit
- Section 2.4: One-Sided Limits
- Section 2.5: Continuity
- Section 2.6: Limits Involving Infinity: Asymptotes of Graphs

Reading – Textbook or eText

- Section 2.3: The Precise Definition of a Limit
- Section 2.4: One-Sided Limits
- Section 2.5: Continuity
- Section 2.6: Limits Involving Infinity: Asymptotes of Graphs

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

- Section 2.3: The Precise Definition of a Limit
- Section 2.4: One-Sided Limits
- Section 2.5: Continuity
- Section 2.6: Limits Involving Infinity: Asymptotes of Graphs

Week 6



Complete Chapter 2, Begin Chapter 3 Part 1 (3.1 – 3.5)

Upon completion of Chapter 3 Part 1, students will be able to:

- Find tangent lines and derivatives at a point.
- Find derivative of functions.
- Develop techniques for finding a function's derivative.
- Apply derivatives as a rate of change.



Reading – Textbook or eText:

- Section 3.1: Tangent Lines and the Derivative at a Point
- Section 3.2: The Derivative as a Function



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments

- Section 3.1: Tangent Lines and the Derivative at a Point
- Section 3.2: The Derivative as a Function

Assessments


- Complete Chapter 1-2 Test

Week 7

Continue Chapter 3

Reading – Textbook or eText:

- Section 3.3: Differentiation Rules
- Section 3.4: The Derivative as a Rate of Change
- Section 3.5: Derivatives of Trigonometric Functions

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments

- Section 3.3: Differentiation Rules
- Section 3.4: The Derivative as a Rate of Change
- Section 3.5: Derivatives of Trigonometric Functions

Assessments

- Complete Chapter 3.1-5 Test

Week 8



Complete Chapter 3 Part 1, Begin Chapter 3 Part 2

Upon completion of Chapter 3 Part 1, students will be able to:

- Apply the chain rule to find the derivative of a composite function.
- Find the derivative of an implicit equation.
- Find the derivative of inverse, exponential, logarithmic, and inverse trigonometric functions.
- Setup and solve problems using related rates.
- Use the process of linearization.



Reading – Textbook or eText:

- Section 3.6: The Chain Rule
- Section 3.7: Implicit Differentiation



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments

- Section 3.6: The Chain Rule
- Section 3.7: Implicit Differentiation

Week 9



Continue Chapter 3 Part 2



Reading – Textbook or eText:

- Section 3.8: Derivatives of Inverse Functions and Logarithms
- Section 3.9: Inverse Trigonometric Functions
- Section 3.10: Related Rates
- Section 3.11: Linearization and Differentials



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments

- Section 3.8: Derivatives of Inverse Functions and Logarithms
- Section 3.9: Inverse Trigonometric Functions
- Section 3.10: Related Rates
- Section 3.11: Linearization and Differentials

Assessments

- Complete Chapter 3.6-11 Test

SECTION 3: COURSE SCHEDULE

Week 10


Complete Chapter 3 Part 2, Begin Chapter 4

Upon completion of Chapter 4, students will be able to:

- Find optimal solutions to problems
- Determine shapes of graphs by finding extreme values of functions
- Find the antiderivative of basic functions.

Reading – Textbook or eText:

- Section 4.1: Extreme Values of Functions on Closed Intervals
- Section 4.2: The Mean Value Theorem

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments


- Section 4.1: Extreme Values of Functions on Closed Intervals
- Section 4.2: The Mean Value Theorem

Week 11

Continue Chapter 4

Reading – Textbook or eText:

- Section 4.3: Monotonic Functions and the First Derivative Test
- Section 4.4: Concavity and Curve Sketching
- Section 4.5: Indeterminate Forms and L'Hopital's Rule

 **It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.**

MyMathLab Homework Assignments

- Section 4.3: Monotonic Functions and the First Derivative Test
- Section 4.4: Concavity and Curve Sketching
- Section 4.5: Indeterminate Forms and L'Hopital's Rule

Week 12



Continue Chapter 4



Reading – Textbook or eText:

- Section 4.6: Optimization
- Section 4.7: Newton's Method
- Section 4.8: Antiderivatives



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments

- Section 4.6: Optimization
- Section 4.7: Newton's Method
- Section 4.8: Antiderivatives

Week 13



Complete Chapter 4, Being Chapter 5 (time permitting)

Upon completion of Chapter 5, students will be able to:

- Estimate area with finite sums.
- Use sigma notation.
- Find limits of finite sums.
- Compute definite integrals.
- Use the Fundamental Theorem of Calculus.



Reading – Textbook or eText:

- Section 5.1 Area and Estimating with Finite Sums
- Section 5.2 Sigma Notation and Limits of Finite Sums
- Section 5.3 The Definite Integral



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments

- Section 5.1 Area and Estimating with Finite Sums
- Section 5.2 Sigma Notation and Limits of Finite Sums

Assessments

- Complete Chapter 4 Test

Week 14



Complete Chapter 5 (if time permitted), Review for the Final

- Section 5.3 The Definite Integral
- Section 5.4 The Fundamental Theorem of Calculus



Reading – Textbook or eText

- Section 5.3 The Definite Integral
- Section 5.4 The Fundamental Theorem of Calculus



Review all course content.



It is recommended to complete each section of homework as it is introduced in class. However, all chapter homework is due at your assigned class time on test day. Do not wait until the last minute. MyMathLab will continually update the homework grade as assignments are completed. The final MyMathLab Homework grade will be worth 100 points. Follow MyMathLab due dates for your section of the course.

MyMathLab Homework Assignments


- Section 5.3 The Definite Integral
- Section 5.4 The Fundamental Theorem of Calculus

Assessments

- Complete Chapter 5 Test

Week 15

 **Demonstrate mastery of course content and Intended Learning Outcomes.**

 **Review course content. Study for Final exam using Review Materials. Come to class prepared to ask questions.**

 **Complete Final Exam**

SECTION 4: ASSESSMENTS

MyMathLab Homework

Description

Practice is foundational to mastery in mathematics. Expect to spend a minimum of two hours studying outside of class for each hour in class.

You will be required to complete homework assignments online through MyFire. There are many resources to help you through the homework problems but be sure to attempt the problem yourself first. You are encouraged to work the sections throughout the unit.

Mastery is built by encountering different problems. You will encounter problems in the homework that are similar to what we do in class, and you will also see problems meant to extend ideas. Take your time. Make mistakes and learn from them. Ask questions.

All homework for each section is due the day and time of the given exam for that unit.

Total Possible Points

MyMathLab will continually update the homework grade as assignments are completed.

Chapter Tests

Description

Check Course Schedule for test dates.

The test will be paper/pencil and will be given in class. A scientific calculator may be used. Phones should be placed in backpacks. Use of a phone during testing may result in a zero for the test.

There will be five chapter tests throughout the course of the semester covering the following chapters:

- Chapter 1-2 100 Points
- Chapter 3.1-5 100 Points
- Chapter 3.6-11 100 Points
- Chapter 4 100 Points
- Chapter 5.1-4 100 Points

Total Possible Points

100 points each

Comprehensive Final Exam

Description

The last week of the semester students will receive a cumulative review set of problems. The final exam will be a random selection of competencies as seen in the cumulative review. Students with more than 3 exams scheduled on one day can petition the instructor and department chair/college dean to take one of the exams another day.

Total Possible Points

100 points