

Montgomery County Community College  
 MAT 188  
 Calculus With a Review of Functions I  
 4-4-0

**COURSE DESCRIPTION:**

A course primarily designed for students who will major in mathematics, science, engineering, or business. The sequence of courses, MAT 188 and MAT 189, is designed for students who have a good background in functions and trigonometry. MAT 188 and MAT 189 cover similar topics as the sequence MAT 161, MAT 162, and MAT 190 but at a faster pace. Together with MAT 189 the course covers all of the material in MAT 190, Calculus I. MAT 188 covers inequalities, Fundamental Theorem of Algebra, basic trigonometry, Law of Sines and Cosines, limits, differentiation, integration, curve sketching and applications for polynomials and trigonometric functions. A graphing calculator is required for class, homework, and testing. Classroom instruction and programs will be presented using a TI-84 Plus. You must pass both MAT 188 and MAT 189 to transfer credits equivalent to Calculus I. You should not take MAT 188 unless you are planning on taking MAT 189 the next semester.

**REQUISITE(S):***Previous Course Requirements*

- MAT 100 Intermediate Algebra or MAT100B Intermediate Algebra with Review with a minimum grade of “B” and high school trigonometry or MAT 116 Applied Algebra/Trigonometry II and high school trigonometry or MAT 116 Applied Algebra/Trigonometry II with a minimum grade of “C”

*Concurrent Course Requirements*

None

**COURSE COMMENTS**

- Quantitative Reasoning, Algebra, and Statistics Accuplacer Test Score of 251 or higher or an Advanced Algebra and Functions Accuplacer Test Score of 237-275.

LEARNING OUTCOMES Upon successful completion of this course, the student will be able to:	LEARNING ACTIVITIES	EVALUATION METHODS
1. Evaluate limits of polynomials and trigonometric functions including one-sided limits, infinite limits, and limits at infinity.	Lectures Group Work The Use of Technology	Tests Homework Quizzes

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
2. Demonstrate the concept of the limit.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
3. Verify the limit of a linear function by the definition.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
4. Discuss the continuity and points of discontinuity of polynomial, piece-wise, and trigonometric functions.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
5. Demonstrate the concept of the derivative.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
6. Differentiate polynomials and trigonometric functions using the product, quotient and chain rules.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
7. Integrate polynomials and trigonometric functions.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
8. Integrate function by the method of substitution.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
9. Apply the Fundamental Theorem of Algebra.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
10. Explain and illustrate the Fundamental Theorem of Calculus.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
11. Apply knowledge of integration to finding area.	Lectures Small Group Discussions The Use of Technology	Tests Homework Quizzes
12. Apply knowledge of differentiation to curve sketching and maximum-minimum problems involving polynomials and trigonometric functions.	Lectures Group Work The Use of Technology	Tests Homework Quizzes

LEARNING OUTCOMES	LEARNING ACTIVITIES	EVALUATION METHODS
13. Use the knowledge of trigonometric definitions involving angles, circular functions, and right triangles to solve relevant applications.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
14. Graph the six trigonometric functions and their inverses.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
15. Solve trigonometric identities and equations.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
16. Use law of sines and cosines to solve trigonometric applications.	Lectures Group Work The Use of Technology	Tests Homework Quizzes
17. Use the TI-84 plus graphing calculator in relevant Calculus I and Precalculus concepts.	Lectures Group Work The Use of Technology	Tests Homework Quizzes

At the conclusion of each semester/session, assessment of the learning outcomes will be completed by course faculty using the listed evaluation method(s). Aggregated results will be submitted to the Associate Vice President of Academic Affairs. The benchmark for each learning outcome is that *70% of students will meet or exceed outcome criteria.*

#### SEQUENCE OF TOPICS:

1. Review of Functions
2. Introduction to Polynomials
3. Definition of Limits
4. Limits of Polynomials
5. Continuity
6. Introduction to the Derivative
7. Numerical Approximation to the Derivative
8. Definition of the Derivative
9. The Derivative of Polynomials
10. The Fundamental Theorem of Algebra
11. First Derivative Test of Polynomials
12. Second Derivative Test of Polynomials
13. Max Min Problem with Polynomials
14. Antiderivatives of Polynomials
15. Applications of the Integral

16. Riemann Sums of Polynomials
17. Definite Integrals of Polynomials
18. Fundamental Theorem of Calculus
19. Area between Polynomials
20. Right Angle Trigonometry
21. Graph of Trigonometric Functions
22. Trigonometric Identities
23. Composition, Inverse Functions
24. Inverse Trigonometric Functions
25. Solving Trigonometric Equations
26. Limits of Trigonometric Functions
27. Derivative of Trigonometric Functions
28. Product, Quotient, and Chain Rules
29. Max-Min Problems, Complicated Graphs
30. Integration of Trigonometric
31. Functions Including Substitution and Area Between Curves
32. Law of Sines and Cosines
33. Polar Coordinates

#### LEARNING MATERIALS:

##### Textbook:

Larson. (2012). *Calculus I with Precalculus* (3<sup>rd</sup> ed.). Cengage Learning.

##### Required Materials:

TI-84+ Graphing Calculator. If a student has a TI-83+, they do not need to buy a TI-84+.

Other learning materials may be required and made available directly to the student and/or via the College's Libraries and/or course management system.

#### COURSE APPROVAL:

Prepared by:	Walter Hunter, Assoc. Professor of Mathematics	Date:	12/2001
Revised by:	Walter R. Hunter, Professor of Mathematics	Date:	10/2004
Revised by:	Walter R. Hunter, Professor of Mathematics	Date:	5/2005
Revised by:	Marion Graziano	Date:	12/2/2012
Revised by:	Marion Graziano	Date:	4/2/2013
VPAA/Provost or designee Compliance Verification:	Victoria L. Bastecki-Perez, Ed.D.	Date:	4/18/2013
Revised by:	Marion Graziano/Debbie Dalrymple	Date:	8/2/2017
VPAA/Provost or designee Compliance Verification:		Date:	8/24/2017



*This course is consistent with Montgomery County Community College's mission. It was developed, approved and will be delivered in full compliance with the policies and procedures established by the College.*