

# MATH 119

## Calculus with Analytic Geometry

**Frequency:** Fall/Spring Terms

**METU Credit & ECTS Credit:** (4-2)5 & 7.5

**Catalog description:** Functions. Limits and Continuity. Tangent lines and derivatives. Chain rule. Implicit differentiation. Inverse functions. Related rates. Linear approximations. Extreme values. Mean Value Theorem and its applications. Sketching graphs. Indeterminate forms and L'Hospital's rules. Definite integral. Fundamental Theorem of Calculus. Substitution. Areas between curves. Formal definition of natural logarithm function. Techniques of integration. Improper integrals. Arc length. Volumes and surface areas of solids of revolution. Parametric plane curves. Polar coordinates. Arc length in polar coordinates.

**Justification for the Course Proposal:** This is a fundamental course designed for all science – Engineering Students.

**Course Objectives:** The sequence Math 119-120 is the Standard complete introduction to the concepts and methods of calculus. It is taken by all engineering students. The emphasis is on concepts, solving problems, theory and proofs. All sections are given a uniform midterm and a final exam. Students will develop their reading, writing and questioning skills in Mathematics.

**Course Coordinator:** Canan Bozkaya

MidTerm1:	30 Points	(April 08 2017 Saturday at 13:30)
MidTerm2:	30 Points	(May 13 2017 Saturday at 13:30)
Final Exam:	40 Points	(June 01 2017 Thursday at 13:30)
Quiz/Attendance:	7 Points	

**Suggested textbook:**



Robert A. Adams, Christopher Essex  
CALCULUS  
A Complete Course Calculus. Eight Edition.  
ISBN 978 0-321-78107-9  
QA303.2.A33 2013

**Reference Books:** Calculus  
James Stewart, Fifth Edition

**Current Semester Course Home Page:** <http://www.ma119.math.metu.edu.tr/>

Week	Dates	Syllabus(Math 119) 2016-2	
1	Feb 20-24	<b>Ch 0: Preliminaries</b> (A general overview of Chapter) <b>Ch 1: Limits and Continuity</b> 1.2 Limits of Functions 1.3 Limits at Infinity and Infinite Limits	<b>1.2 :</b> 2,3,4,5,6,11,13,18,22,24,32,56,58, 61,62,63,64 <b>1.3 :</b> 3,6,10,14,20,25,29,33,34,50,51
2	Feb 27- March 3	1.3 Limits at Infinity and Infinite Limits 1.4 Continuity 1.5 The Formal Definition of Limit	<b>1.4 :</b> 1,2,3,4,5,6,9,13,16,18,22,30,32 <b>1.5 :</b> 4,6,8,10,12,16,20,27,30,31,37,38
3	March 06-10	<b>Ch 2: Differentiation</b> 2.1 Tangent Lines and Their Slope 2.2 The Derivative 2.3 Differentiation Rules 2.4 The Chain Rule	<b>2.1 :</b> 3, 5, 9, 13, 15, 17, 19, 21, 23 <b>2.2 :</b> 1, 3, 11, 17, 23, 25, 27, 31, 35, 37, 41, 43, 45, 47, 49 <b>2.3 :</b> 7, 9, 11, 13, 15, 17, 23, 25, 29, 33, 37, 39, 43, 49, 51, 53 <b>2.4 :</b> 3, 5, 11, 13, 15, 19, 23, 25, 31, 37, 45
4	March 13-17	2.5 Derivatives of Trigonometric Functions 2.6 Higher-Order Derivatives 2.8 The Mean-Value Theorem	<b>2.5 :</b> 3, 5, 11, 17, 21, 27, 29, 35, 37, 41, 43, 45, 49, 53, 55, 57, 62 <b>2.6 :</b> 1, 7, 11, 13, 21, 25, 26 <b>2.8 :</b> 1, 3, 5, 7, 9, 11, 15
5	March 20-24	2.9 Implicit Differentiation <b>Ch 3: Transcendental Functions</b> 3.1 Inverse Functions 3.2 Exponential and Logarithmic Functions 3.3 The Natural Logarithm and Exponential	<b>2.9 :</b> 3, 7, 9, 11, 13, 17, 21, 27 <b>3.1 :</b> 3, 9, 12, 17, 19, 23, 26, 29, 34 <b>3.2 :</b> 7, 17, 26, 31, 32, 35 <b>3.3 :</b> 5, 8, 13, 17, 33, 35, 41, 44, 48, 52, 57, 59, 63, 65
6	March 27-31	3.5 The Inverse Trigonometric Functions 3.6 Hyperbolic Functions <b>Ch 4: More Applications of Differentiation</b> 4.1 Related Rates 4.3 Indeterminate Forms	<b>3.5 :</b> 7, 9, 11, 15, 24, 31, 35, 39, 47 <b>3.6 :</b> 1, 5, 7, 9 <b>4.1 :</b> 1, 2, 3, 4, 5, 6, 7, 13, 14, 22, 26 <b>4.3 :</b> 1, 3, 5, 7, 9, 13, 15, 17, 19, 24, 26, 28
7	April 3-7	4.4 Extreme Values 4.5 Concavity and Inflections <b>Midterm 1 (April 08 2017 Saturday at 13:30)</b>	<b>4.4 :</b> p238: 1, 3, 5, 7, 8, 11, 13, 17, 19, 21, 25, 29, 31, 35, 39 <b>4.5 :</b> 1, 3, 5, 7, 9, 11, 13, 14, 16, 17, 19, 25, 27, 29, 31, 35, 39
8	April 10-14	4.6 Sketching the Graph of a Function 4.8 Extreme-Value Problems 4.9 Linear Approximations	<b>4.6 :</b> 1, 2, 3, 4, 5, 6, 15, 16, 17, 18, 29, 31 <b>4.8 :</b> 1, 3, 7, 9, 11, 13, 17, 18, 21, 31, 32, 42 <b>4.9 :</b> 1, 3, 5, 7, 9, 11, 15, 17, 21
9	April 17-21	<b>Ch 5: Integration</b> 5.1 Sums and Sigma Notation 5.2 Areas as Limits of Sums 5.3 The Definite Integral 5.4 Properties of the Definite Integral	<b>5.1 :</b> 3, 5, 11, 13, 17, 21, 31, 33 <b>5.2 :</b> 3, 7, 13, 17, 19 <b>5.3 :</b> 2, 3, 5, 7, 11, 13, 15, 17 <b>5.4 :</b> 1, 2, 7, 9, 11, 13, 15, 17, 19, 21, 25, 29, 31, 35, 36, 37, 39
10	April 24-28	5.5 The Fundamental Theorem of Calculus 5.6 The Method of Substitution <b>Ch 6: Techniques of Integration</b> 6.1 Integration by Parts	<b>5.5 :</b> 3, 7, 11, 13, 15, 17, 19, 23, 27, 29, 31, 33, 37, 39, 41, 43, 45, 46, 47, 49, 51, 52, 53, 54 <b>5.6 :</b> 1, 3, 5, 7, 8, 9, 10, 11, 12, 13, 15, 17, 18, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 40, 41, 43, 44, 45, 47, 48, 49, 50, 51 <b>6.1 :</b> 5, 7, 10, 11, 13, 15, 17, 19, 21, 23, 25, 27, 28, 29, 33, 37
11	May 02-05	6.2 Integrals of Rational Functions 6.3 Inverse Substitutions	<b>6.2 :</b> 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31 <b>6.3 :</b> 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 44, 45, 47, 49, 51
12	May 08-12	6.5 Improper Integrals <b>Midterm 2 (May 13 2017 Saturday at 13:30)</b>	<b>6.5 :</b> 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 24, 25, 31, 33, 35, 37, 39, 41, 42
13	May 15-18	<b>Ch 7: Applications of Integration</b> 5.7 Areas of Plane Regions 7.1 Volumes by Slicing—Solids of Revolution 7.2 More Volumes by Slicing 7.3 Arc Length and Surface Area May 19th National Holiday (Commemoration of Atatürk & Youth and Sports Festival, Friday)	<b>5.7 :</b> 3, 5, 9, 11, 15, 17, 19, 21, 23, 29 <b>7.1 :</b> 1, 3, 7, 11, 13, 15, 19 <b>7.2 :</b> 3, 5, 7, 9, 11, 13, 16 <b>7.3 :</b> 3, 5, 7, 9, 11, 13, 14, 21, 24, 25, 27, 28, 29
14	May 22-26	8.5 Polar Coordinates and Polar Curves 8.6 Slopes, Areas, and Arc Lengths for Polar Curves	<b>8.5 :</b> 3, 4, 5, 7, 9, 11, 13, 16, 18, 22, 26 <b>8.6 :</b> 2, 4, 7, 11, 12, 20
<b>Final Exam (June 01 2017 Thursday at 13:30)</b>			