

MATH 119: Calculus With Analytic Geometry

(Fall 2012)

Credit: (4-2)5

Catalog description: Functions, limits, continuity and derivatives. Applications: extreme values, the Mean Value Theorem and its applications, graphing. The definite integral. Area and volume as integrals. The indefinite integral. Transcendental functions and their derivatives. L'Hospital's Rule. Techniques of integration. Improper integrals.

Course Objectives: The sequence Math 119-120 is the standard complete introduction to the concepts and methods of calculus, taken by all engineering students. The emphasis is on concepts, solving problems, theory and proofs. All sections take uniform midterm and final exams. Students develop their reading, writing and questioning skills in mathematics.

Course Coordinator: İbrahim Ünal
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Exams and Grading: Course grades are determined by (online) homework, short exams (organized by the teaching assistants), two (non-cumulative) midterm exams, and a cumulative final exam, as well as a small number of bonus points.

- ❖ **Midterm Exams :** (2x) **20 %** (Nov. 10-11 and Dec. 15-16) ¹
- ❖ **Final Exam:** **35 %**
- ❖ **Short Exams:** (3x) **7 %** (Oct. 17, Nov. 28, and Dec. 26)
- ❖ **Homework:** **4%** (2% WeBWork and 2% Written)
- ❖ **Bonus:** **5 %**

Homework: There will be online homeworks and one written homework. The online homeworks are assigned and graded using the online [WeBWork system](#). The written homework covers optimization, and curve sketching and includes a MATLAB component.

Short Exams: There will be 3 short exams, and will be given on Wednesday evening Oct. 17, Nov. 28, and Dec.26. Problems in short exams will be chosen from the suggested problems which can be found on the course web site, and from the previous WebWork assignments.

Bonus: Exams will each have a bonus problem which counts for 1% bonus. Up to 1% bonus will also be awarded for submitting links to educational videos or finding mistakes with WebWork problems. Bonus for each student is capped at 5%.

Suggested Problems: Due to the limitations of WeBWork, complete mastery of subject material will require solving additional theoretical problems. For each lecture, the assistants will announce additional suggested problems from the textbook. The list of problems is available on the course website, and short exam problems will be chosen out of them.

Course Website: <http://math.ncc.metu.edu.tr/math119>
(Course grades and general course announcements will be posted on the course website. The website also contains links to WeBWork and further course resources.)

¹ Exam dates are tentative. They will be determined by administration.

Textbook: *Calculus*, James Stewart, 7th metric international ed., 2009. (available at the bookstore)

Reference Books:

- George B. Thomas et. al., *Thomas' Calculus* 11th ed.
- Robert A. Adams, *Calculus, A Complete Course* 5th ed.
- Howard Anton, *Calculus with Analytic Geometry* 5th ed.

Make-up Policy: In order to be eligible to enter the make-up examination for a missed examination, a student must have a documented or verifiable and officially acceptable excuse.

It is not possible to make up multiple missed exams. The make-up examination for all exams will be after the final exam, **and will include all topics.**

NA Grade Policy: Students who attend less than 60% of lectures (< 16 classes) will not be eligible to take the final exam and will automatically be given an NA for the course. This will also apply to students who miss (without excuse) more than one midterm and one short exam.

Math Help Room: The [mathematics help room](#) in T-103 is a room staffed by mathematics faculty and teaching assistants where students may gather to ask questions, work on homework, and view exams. *Students are also invited to seek out instructors in their offices.*

Lectures

Section 1	Mon 8:40-10:30 Wed 8:40-10:30	TAZ-10
Section 2	Tue 8:40-10:30 Fri 10:40-12:30	TAZ-10
Section 3	Mon 15:40-17:30 Thu 10:40-12:30	TZ-19
Section 4	Mon 10:40-12:30 Wed 10:40-12:30	TZ-19
Section 5	Mon 13:40-15:30 Thu 8:40-10:30	TAZ-10

Recitations

Recitation 1	Thu 8:40-10:30	SZ-25
Recitation 2	Fri 15:40-17:30	SZ-25
Recitation 3	Fri 13:40-15:30	SZ-25
Recitation 4	Wed 13:40-15:30	SZ-25

Instructors

INSTRUCTOR	SECTION	OFFICE	PHONE	E-MAIL
Erhan Gürel	Sections 1, 5	SZ-32	2942	<i>egurel@metu.edu.tr</i>
İbrahim Ünal	Sections 3, 4	RZ-33	2902	<i>uibrhim@metu.edu.tr</i>
Benjamin Walter	Sections 2	S-132	2960	<i>benjamin@metu.edu.tr</i>

Assistants

ASSISTANT	RECITATION	OFFICE	PHONE	E-MAIL
Münevver Çelik	Recitations S2, S3	SZ-43	2953	<i>mucelik@metu.edu.tr</i>
Arda Buğra Özer	Recitations S1, S4	RZ-40	2907	<i>abozer@metu.edu.tr</i>

Course Structure: There will be 28 lectures given by the instructors, each lasting 2 class hours. The actual timing of the lectures may differ slightly from section to section because of the holidays, but the total number will be the same. Besides these lectures, there will be recitations, 2 hours per week, during which the assistants will solve extra problems.

The table below is a rough guideline for the content of course lectures. Professors may reorder content as necessary/desired. The section and page numbers below are from the textbook, *Calculus*, by James Stewart, 7th international metric ed., 2012.

Exam dates will be determined by the administration and are currently only approximate guesses.

<u>Week 1:</u> Sep.24-28	1	Chapter 1. Functions and Limits §1.4: The Tangent and Velocity Problems. §1.5: The Limit of a Function.
	2	§1.6: Calculating Limits Using the Limit Laws. §1.8: Continuity.
<u>Week 2:</u> Oct.1-5	3	§1.7: The Precise Definition of a Limit.
	4	Chapter 2. Derivatives §2.1: Derivatives and Rates of Change. §2.2: The Derivative as a Function.
<u>Week 3:</u> Oct.8-12	5	§2.3: Differentiation Formulas. §2.4: Derivatives of Trigonometric Functions.
	6	§2.5: The Chain Rule. §2.6: Implicit Differentiation.
<u>Week 4:</u> Oct.15-19	7	§2.8: Related Rates.
	➤	SHORT EXAM #1: Wed., Oct. 17
	8	§2.9: Linear Approximations and Differentials. Chapter 3. Applications of Differentiation §3.1: Maximum and Minimum Values.
<u>Week 5:</u> Oct.22-24	9	§3.2: The Mean Value Theorem. §3.3: How Derivatives Affect the Shape of a Graph.
Holiday: Kurban Bayramı		
<u>Week 6:</u> Oct 30-Nov2	10	§3.4: Limits at Infinity, Horizontal Asymptotes
<u>Week 7:</u> Nov.5-Nov.9	11	§3.5: Summary of Curve Sketching.
	12	§3.7: Optimization Problems.
Midterm #1 (tentative)		
<u>Week 8:</u> Nov.12-16	13	§3.8: <i>Newton's Method (Reading Assignment)</i> . §3.9: Antiderivatives.
	14	Chapter 4. Integrals §4.1: Areas and Distances. §4.2: The Definite Integral.
<u>Week 9:</u> Nov.19-23	15	§4.3: The Fundamental Theorem of Calculus. §4.4: Indefinite Integrals and the Net Change Theorem.
	16	§4.5: The Substitution Rule. Chapter 5. Applications of Integration §5.1: Areas between Curves. §5.5: Average Value of a Function.

Week 10: Nov.26-Dec.30	17	§5.2: Volume. §5.3: Volumes by Cylindrical Shells.
	➤	SHORT EXAM #2: Wed., Nov. 28
	18	Chapter 7. Inverse Functions; Exp, log, and trig §6.1: Inverse Functions. §6.2: Exponential Functions and Their Derivatives. §6.2*: The Natural Logarithmic Function.
Week 11: Dec.3-7	19	§6.3: Logarithmic Functions. §6.3*: The Natural Exponential Function. §6.4: Derivatives of Logarithmic Functions. §6.4*: General Logarithmic and Exponential Functions.
	20	§6.6: Inverse Trigonometric Functions. §6.7: <i>Hyperbolic Functions (Reading Assignment)</i> . §6.8: Indeterminate Forms and L'Hospital's rule.
Week 12: Dec.10-14	21	Chapter 8. Techniques of Integration §7.1: Integration by Parts.
	22	§7.2: Trigonometric Integrals
Midterm #2(tentative)		
Week 13: Dec.17-21	23	§7.3: : Trigonometric Substitution
	24	§7.4.1: Integration of Rational Functions by Partial Fractions (I, II).
Week 14: Dec.24-28	25	§7.4.2: Integration of Rational Functions by Partial Fractions (III, IV). §7.5: Strategy for Integration.
	➤	SHORT EXAM #3: Wed., Dec. 26
	26	§7.7: Approximate Integration. §7.8: Improper Integrals.
Week 15: Dec.31-Jan.4	27	Chapter 9. Further Applications of Integration §8.1: Arc Length.
	28	§8.2: Area of a Surface of Revolution.
FINAL EXAM		

Important Dates

- **September 24:** Classes Start
- **October 1-5:** Add-Drop
- **October 17:** Short Exam #1
- **October 25-29:** HOLIDAY (Kurban and Cumhuriyet Bayram)
- **November 10 or 11:** Midterm #1 (Tentative)
- **November 15:** HOLIDAY (TRNC Republic Day)
- **November 28:** Short Exam #2
- **November 30:** Withdrawal Deadline
- **December 15 or 16:** Midterm #2 (Tentative)
- **December 26:** Short Exam #3
- **January 1:** HOLIDAY (New Year's)
- **January 4:** Classes End
- **January 7-19:** Finals Period