MAT 120: Calculus for Functions of Several Variables
(Spring 2015)

Credit: (4-2)5

Catalog description: Sequences, infinite series, power series, Taylor series. Vectors, lines and planes in space. Functions of several variables: Limits, continuity, partial derivatives, the chain rule, directional derivatives, tangent plane approximation, differentials, extreme values, and Lagrange multipliers. Double integrals with applications. The line integral.

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: Erhan Gürel   (**office**: TZ-32, **phone**: x3425, **email**: egurel@metu.edu.tr)

Course Website: http://math.ncc.metu.edu.tr/math120
(*Course grades and general course announcements will be posted on ODTUClass. The website contains links to WeBWorK and further course resources. Students are responsible for regularly checking ODTUClass and the course web page for updates and announcements.*)

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.

- ❖ **Midterm Exams :** (2x) **21 %**
- ❖ **Final Exam: 35 %**
- ❖ **Short Exams:** (3x) **7 %**
- ❖ **WeBWorK: 7%**
   Total: 105%

Homework: There will be online homeworks assigned and graded using the online WeBWork system.

Short Exams: There will be 3 short exams and each is worth 7% of your total grade. 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. Their timing will be announced by TAs. *Please contact your TAs anything related to Short Exams.*

Textbook: *Calculus*, James Stewart, 7th Metric International ed., 2012. *(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.**

Missed Short Exam Policy: At most one short exam may be missed with a valid, acceptable excuse. This short exam's grade will be replaced by the average grade of the other exams.

NA Grade Policy: Students who don't attend any of the midterm and final exams will automatically be given an NA grade for the course. Students with NA grade are not eligible to take re-sit exams.

Cheating Policy: Cheating on any midterm or short exam will result in any of the following: (1) immediate score of 0 on that exam, (2) immediate grade of FF in the course, (3) forwarding the case to the university disciplinary committee.

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, or view exams. *Students are also invited to seek out instructors in their offices.*

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

Lectures

S1-E. Gürel	Wed 15:40-17:30￼Thu 08:40-10:30	TAZ-09
S2-C. Tezer	Mon 13:40-15:30￼Thu 08:40-10:30	TAZ-10
S3-C. Tezer	Mon 08:40-10:30￼Wed 08:40-10:30	TAZ-11
S4-İ. Ünal	Mon 8:40-10:30￼Wed 8:40-10:30	TZ-19
S5-İ. Ünal	Tue 08:40-10:30￼Thu 08:40-10:30	TAZ-11

Recitations

R1-A. Özer	Fri 8:40-10:30	SZ-22
R2-A. Özer	Fri 15:40-17:30	SZ-22
R3-A. Özer	Tue 15:40-17:30	SZ-22
R4-A. Özer	Thu 08:40-10:30	SZ-22
R5-A. Özer	Fri 12:40-14:30	SZ-23

Instructors

INSTRUCTOR	SECTION	OFFICE	PHONE	E-MAIL
Erhan Gürel	Section 1	TZ-32	3425	*egurel@metu.edu.tr*
Cem Tezer	Section 2,3	TZ-29	3422	*rauf@metu.edu.tr*
İbrahim Ünal	Sections 4,5	R-134	2916	*uibrahim@metu.edu.tr*

Assistants

ASSISTANT	RECITATION	OFFICE	PHONE	E-MAIL
Arda Buğra Özer	Recitations S1-S5	SZ-36	2946	*abozer@metu.edu.tr*

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 numbers below are from the textbook, *Calculus*, by James Stewart, 7th International metric ed., 2012.

SCHEDULE

Week 1: Feb. 16-20	1	**Chapter 12. Vectors and the Geometry of Space** **§12.1:** Three-Dimensional Coordinate Systems. **§12.2:** Vectors. **§12.3:** The Dot Product.
	2	**§12.4:** The Cross Product. **§12.5:** Equations of Lines and Planes.
Week 2: Feb. 23-27	3	*§12.5: Equations of Lines and Planes (cont).*
	4	*§12.5: Equations of Lines and Planes (cont).* **§12.6:** Cylinders and Quadric Surfaces
Week 3: Mar. 2-6	5	*§12.6: Cylinders and Quadric Surfaces (cont).* **Chapter 13. Vector Functions** **§13.1:** Vector Functions and Space Curves.
	6	**§13.2:** Derivatives and Integrals of Vector Functions
Week 4: Mar. 9-13	7	**Chapter 14. Partial Derivatives** **§14.1:** Functions of Several Variables **§14.2:** Limits and Continuity.
	8	**§14.3:** Partial Derivatives. **§14.4:** Tangent Planes and Linear Approximations.
Week 5: Mar. 16-20	9	**§14.5:** The Chain Rule.
	10	**§14.6:** Directional Derivatives and the Gradient Vector.
Week 6: Mar. 23-27	11	**§14.7:** Maximum and Minimum Values.
	12	**§14.8:** Lagrange Multipliers.
Week 7: Mar. 30-Apr.3	13	**Chapter 15. Multiple Integrals** **§15.1:** Double Integrals over Rectangles. **§15.2:** Iterated Integrals.
		Holiday: Thursday, April 23
	14	**§15.3:** Double Integrals over General Regions. **§15.5:** Applications of Double Integrals.
Week 8: Apr. 6-10	15	**§10.3:** Polar Coordinates. **§15.4:** Double Integrals in Polar Coordinates.
	16	**§15.10:** Change of Variables in Multiple Integrals.
Week 9: Apr. 13-17	17	**§15.7:** Triple Integrals *(Simple regions.Omit moments & center of mass.).*
	18	**§Chapter 16. Vector Calculus** **§16.1:** Vector Fields. **§16.2:** Line Integrals.

Week 10: Apr. 20-24	19	**§16.3:** The Fundamental Theorem for Line Integrals.
	20	**§16.4:** Green's Theorem.
Week 11: Apr. 27-30	21	**Chapter 11. Infinite Sequences and Series** **§11.1:** Sequences.
	22	*§11.1: Sequences (cont)* (Including Monotonic Sequence Thm). **§11.2:** Series.
		Holiday: Friday, May 1
Week 12: May. 4-8	23	*§11.2: Series (cont).* **§11.3:** The Integral Test (Not including 'Estimating the Sum of a Series').
	24	**§11.4:** The Comparison Tests (Including 'Estimating Sums').
Week 13: May. 11-15	25	**§11.5:** Alternating Series (Including 'Estimating Sums'). **§11.6.1:** Absolute Convergence.
	26	**§11.6.2:** The Ratio and Root Tests. *§11.7: Strategy for Testing Series (Reading/Recitation Assignment).*
Week 14: May. 18-22	27	**§11.8:** Power Series. **§11.9:** Representations of Functions as Power Series.
		Holiday: Tuesday, May 19
	28	*§11.9: Representations of Functions as Power Series (cont).* **§11.10:** Taylor and Maclaurin Series.
		FINAL EXAM

* Reading assignments may be tested in the exams and quizzes.

Important Dates

- **February 16: Classes Start**

- **February 23-27: Add-Drop**

- **April 23: HOLIDAY (Thursday)**

- **April 24: Withdrawal deadline**

- **May 1: HOLIDAY (Friday)**

- **May 19: HOLIDAY (Tuesday)**

- **May 22: Classes End**

- **May 25-June 6: Finals Period**

- **June 13: Grades Announced**

- **June 17-19: Resit Exams**