MATH 120 Calculus of Functions of Several Variables

Course Number and Title: MATH 120 Calculus of Functions of Several Variables

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

Catalogue Description: Sequences and infinite series. Power series. Taylor series. Vectors and analytic geometry in 3-space. Functions of several variables: limits, continuity, partial derivatives. Chain rule. Directional derivatives. Tangent planes and linear approximations. Extreme values. Lagrange multipliers. Double integrals. Double integrals in polar coordinates. General change of variables in double integrals. Surface parametrization and surface area in double integrals. Triple integrals in Cartesian, cylindrical and spherical coordinates. Parametrization of space curves. Line integrals. Path independence. Green's theorem in the plane.

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.

Prerequisites: Math 119

Course Coordinator: Dr. Kadri İlker Berktav

> **Midterm I (April 11, 2026 Saturday at 09:30)**   30%
> **Midterm II (May 16, 2026 Saturday at 09:30)**   30%
> **Final Exam (June 11, 2026 Thursday at 09:30)**   40%
> **Recitation Activities (like Quiz/attendance/HWs):**   up to 10 bonus points
> (There will be no make-up for missed quizzes)

For more details about exams and grading, see the announcements on the Course Home page.

Suggested textbook:
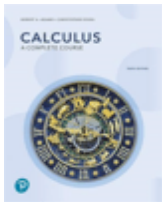
Robert A. Adams, Christopher Essex
CALCULUS
A Complete Course Calculus. 10th (or 9th) Edition.
ISBN 978 0-13-573258-8

Reference Books: Calculus
James Stewart, Fifth Edition

Current Semester Course Home Page: http://www.ma120.math.metu.edu.tr/

Contact: wwwma120@metu.edu.tr

Only the e-mails sent to wwwma120@metu.edu.tr will be answered. Mass e-mails will be ignored.

Week	Dates	Syllabus (Math 120) 2025-2	Suggested Problem List
1	**February 16-20**	**Ch. 9: Sequences, Series, and Power Series** **9.1 Sequences and Convergence**	**Worksheet on Sequences and Series** 9.1:6,8,10,17,18,19,24 ,26,29,31,35
2	**February 23-27** Add-Drop and Advisor Approvals	**9.2 Infinite Series** **9.3 Convergence Tests for Positive Series**	9.2: 4,6,8,10,12,14,26,27,28,29,30,31 9.3: 4,6,12,16,18,20,24,26,38,42
3	**March 2-6**	**9.4 Absolute and Conditional Convergence** **9.5 Power Series**	9.4: 2,4,8,10,16,20,24,27 9.5: 4,8,10,13,14,17,18,22,26,28,30
4	**March 9-13**	**9.6 Taylor and Maclaurin Series** **9.7 Applications of Taylor and Maclaurin Series** **Ch. 10: Vectors and Coordinate Geometry in 3-Space** **10.1 Analytic Geometry in Three Dimensions** **10.2 Vectors**	9.6: 6,8,12,18,22,26,34,35,40 9.7: 6,7,12,16,18,24 10.1: 6,19,22,27,32,36,40 10.2: 4,13,16,18,22,26,31
5	**March 16-20**	**10.3 The Cross Product in 3-Space** **10.4 Planes and Lines** **10.5 Quadric Surfaces** **Mar. 20-22, Ramadan Religious holiday (Holiday eve: Mar. 19) March 19 Thursday is a half day.**	10.3: 3,5,14,15,17,20,23 10.4: 3,6,9,18,23,26,28,29 10.5: 3,5,8,10,12,15,17,20,21
6	**March 23-27**	**Ch. 13: Partial Differentiation** **13.1 Functions of Several Variables** **13.2 Limits and Continuity**	13.1: 4,5,8,12,13,14,20,24 13.2: 2,6,8,10,12,14,18
7	**Mar. 30-April 3**	**13.3 Partial Derivatives** **13.4 Higher-Order Derivatives**	13.3: 4,5,6,11,12,16,17,21,24,28,31, 36, 39 13.4: 4,10,16
8	**April 6-10**	**13.5 The Chain Rule** **13.6 Linear Approximations** **13.7 Gradients and Directional Derivatives** **Midterm I (April 11, 2026 Saturday at 09:30)**	13.5: 4,8,16,18,29,30 13.6: 4,6,10,16 13.7: 4,8,10,17,18,19,22,26,36
9	**April 13-17**	**13.8 Implicit Functions (Systems of Equations part is <u>not</u> included)** **Ch. 14: Applications of Partial Derivatives** **14.1 Extreme Values**	13.8: 2,5,6,11 14.1: 1, 3, 6, 7, 9, 11, 17, 19, 24, 26
10	**April 20-24**	**14.2 Extreme Values of Functions Defined on Restricted Domains** **14.3 Lagrange Multipliers** **Ch. 15: Multiple Integration** **15.1 Double Integrals** April 23, National Sovereignty and Children's Day, Thursday	14.2: 3, 5, 7, 8, 9, 11, 17 14.3: 1, 3, 5, 7, 9, 11, 19, 21, 22 15.1: 5,13,15,18,19
11	**April 27-May 1**	**15.2 Iteration of Double Integrals in Cartesian Coordinates** **15.4 Double Integrals in Polar Coordinates** **15.5 Triple Integrals** May 1 – Labor and Solidarity Day, Friday	15.2: 1-27 odd 15.4: 1-25 odd 15.5: 2,4,6,7,9,10,14,15
12	**May 4-8**	**15.6 Change of Variables in Triple Integrals** **Ch. 12: Vector Functions and Curves** **12.1 Vector Functions of One Variable** **12.3 Curves and Parametrizations** **Ch. 16: Vector Fields** **16.1 Vector and Scalar Fields**	15.6: 2,3,4,6,10,12,16 12.1: 8,10,16,18 12.3: 1,2,3,4,6,8,17,18,24 16.1: 2,3,6
13	**May 11-15**	**17.1 Gradient, Divergence, and Curl** **16.2 Conservative Fields** **16.3 Line Integrals** **Midterm II (May 16, 2026 Saturday at 09:30)**	17.1: 3,4 16.2: 2,6,9 16.3: 2,6,8,13,14
14	**May 18-22**	**16.3 Line Integrals** **16.4 Line Integrals of Vector Fields** **Ch. 17: Vector Calculus** **17.3 Green's Theorem in the Plane** May 19 - National Holiday (Commemoration of Atatürk & Youth and Sports Festival, Tuesday)	16.3: 2,6,8,13,14 16.4: 4,6,8,9,13,22 17.3: 1, 2, 3, 4, 5, 6, 7, 9

15	**May 25-29**	**NO CLASSES** **[May 27-30 Religious holiday: Kurban Bayramı** **(Holiday eve: May 26)]**	
16	**June 1-5**	**17.3 Green's Theorem in the Plane** **Final Exam (June 11, 2026 Thursday at 09:30)**	**17.3: 1, 2, 3, 4, 5, 6, 7, 9**

MATH 120 Course Policy (2025-2)

This document/announcement contains all the necessary information that you need to know about the structure of the ***MATH 120: Calculus of Functions of Several Variables*** *course.* More information will be announced on the official website of the course and the ODTUCLASS page. All students enrolled in this course are supposed to follow these websites regularly.

MATH 120 Coordination reserves the right to make necessary changes in this policy depending on the situations that are out of our control. So it is your responsibility to follow the announcements on the webpage of the course regularly.

Lectures and Recitations
Lectures and Recitations are delivered as announced in **the Schedule of Lectures** on the official website of the course. Keep in mind that this course is **6 (=4+2) hours per week**.
The first 2+2=4 hours are for **lectures,** and the last 2 hours are for **recitations**. See "the schedule of lectures"- tab on the MATH120 web page/ODTUCLASS when available.

Class Attendance
You are strongly advised to attend all lectures and recitations. There is no attendance requirement to pass the course, but you might earn some bonus points for attending recitations (if applicable). Details for the final attendance policy will be announced later.

Make up for Exams and Assignments
You can have at most one make-up exam. In order to be able to take the make-up exam, you must present a reasonable excuse (such as a medical report or an academic leave).
After the final exam, there will be a form on ODTÜClass and via that form, you will apply the make-up exam instead of one missed exam and will send your reasonable excuse to
wwwma120@metu.edu.tr.

Eligibility to take the Final Exam and NA Grade
If your two midterm scores (each one out of 100 points) add up to less than 20 points (out of 200 points in total), then you cannot take the Final Exam and will receive an NA grade from the course. If you did not attend the Final Exam and if you do not have the right to take a make-up exam for the Final, you will receive an NA grade.

Who gets an NA grade?

(A) Before the final exam, students will be categorized in the following way:

1) $M1 + M2 \geq 20$

2) $M1 + M2 < 20$,

for which $M1$ is the Midterm 1 score out of 100, and $M2$ is the Midterm 2 score out of 100.

- Students in group **1** will be able to take the final exam.
- Students in group **2** will **NOT** be able to take the final exam. They will get an automatic NA grade.

Examples:

a) Student A attends to Midterm 1 and his score is 20. He/she does not take Midterm 2 being on leave for academic/medical reasons. Since M1+M2 = 20 >= 20, He/she is eligible for the final exam. If he/she submits relevant documents, it is also possible to take a make-up exam, which is given after the final. *No problem at all.*

b) Student B does not attend to Midterm 1 because of their illness. He/she attends to Midterm 2 and get 18 points. Since M1+M2 = 18 < 20, he/she won't be able to take final exam and get **NA** grade. **It should be kept in mind that in this example, taking make-up for the midterm is not possible even if he/she has an appropriate official document (academic/medical report, etc.).**

(B) According to <u>the university's rules and regulations governing undergraduate studies</u> (Article 24),

"...The grade NA is designated due to one of the conditions below. The grade NA is processed as FF in the calculation of the Grade Point Average.

1) Not fulfilling the attendance requirements for the theoretical and practical course hours as indicated in the course schedule.

2) Not qualifying to take the final exam due to failure in fulfilling the provisions regarding course practices.

3) Having taken none of the mid-term and final examinations.

..."

Note that each instructor/the coordination of the course reserves the right to determine whether the attendance requirements indicated in the above policy (B-1) applies to the students of their section or not.

Information for Students with Disabilities
Students who experience difficulties due to their disabilities and wish to obtain academic adjustments and/or auxiliary aids must contact ODTU Disability Support Office and/or course instructor and the advisor of students with disabilities at academic departments (for the list: http://engelsiz.metu.edu.tr/en/advisor-students-disabilities) as soon as possible. For detailed information, please visit the website of Disability Support Office: https://engelsiz.metu.edu.tr/en/

Academic Honesty
The METU Honour Code is as follows: "Every member of METU community adopts the following honour code as one of the core principles of academic life and strives to develop an academic environment where continuous adherence to this code is promoted. The members of the METU community are reliable, responsible and honourable people who embrace only the success and recognition they deserve, and act with integrity in their use, evaluation and presentation of facts, data and documents."