

# **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.

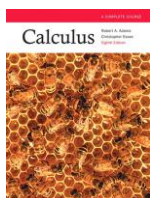
**Course Objectives:** The sequence Math 119-120 is the Standard complete introduction to the concepts and methods of calculus. It is taken by all engineering students. The emphasis is on concepts, solving problems, theory and proofs. All sections are given a uniform midterm and a final exam. Students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

**Prerequisites:** Math 119

**Course Coordinator:** [Dr. Muhiddin Uğuz](#)

|                  |           |                                   |
|------------------|-----------|-----------------------------------|
| MidTerm1:        | 30 Points | (April 08 2017 Saturday at 09:30) |
| MidTerm2:        | 30 Points | (May 13 2017 Saturday at 09:30)   |
| Final Exam:      | 40 Points | (June 01 2017 Thursday at 09:30)  |
| 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.ma120.math.metu.edu.tr/>

| Week      | Dates              | Syllabus(Math 120) 2016-2   | Suggested Problem List  |
|-----------|--------------------|---|---|
| <b>1</b>  | Feb 20-24          | <b>Ch. 9: Sequences, Series, and Power Series</b><br>9.1 Sequences and Convergence<br>9.2 Infinite Series   | <a href="#">Worksheet on Sequences and Series</a><br>9.1: 6,8,10,17,18,19,24,26,29,31,35<br>9.2: 4,6,8,10,12,14,26,27,28,29,30,31 |
| <b>2</b>  | Feb 27-<br>March 3 | 9.3 Convergence Tests for Positive Series<br>9.4 Absolute and Conditional Convergence   | 9.3: 4,6,12,16,18,20,24,26,38,42<br>09.4: 2,4,8,10,16,20,24,27  |
| <b>3</b>  | March 06-10        | 9.5 Power Series<br>9.6 Taylor and Maclaurin Series   | 9.5: 4,8,10,13,14,17,18,22,26,28,30<br>9.6: 6,8,12,18,22,26,34,35,40  |
| <b>4</b>  | March 13-17        | 9.7 Applications of Taylor and Maclaurin Series<br><b>Ch. 10: Vectors and Coordinate Geometry in 3-Space</b><br>10.1 Analytic Geometry in Three Dimensions<br>10.2 Vectors  | 9.7: 6,7,12,16,18,24<br>10.1: 6,19,22,27,32,36,40<br>10.2: 4,13,16,18,22,26,31  |
| <b>5</b>  | March 20-24        | 10.3 The Cross Product in 3-Space<br>10.4 Planes and Lines<br>10.5 Quadric Surfaces<br><b>Ch. 12: Partial Differentiation</b><br>12.1 Functions of Several Variables  | 10.3: 3,5,14,15,17,20,23<br>10.4: 3,6,9,18,23,26,28,29<br>10.5: 3,5,8,10,12,15,17,20,21<br>12.1: 4,5,8,12,13,14,20,24             |
| <b>6</b>  | March 27-31        | 12.2 Limits and Continuity<br>12.3 Partial Derivatives<br>12.4 Higher-Order Derivatives<br>12.5 The Chain Rule  | 12.2: 2,6,8,10,12,14,18<br>12.3: 4,5,6,11,12,16,17,21,24,28,31,36,39<br>12.4: 4,10,16<br>12.5: 4,8,16,18,29,30                    |
| <b>7</b>  | April 03-07        | 12.6 Linear Approximations<br>12.7 Gradients and Directional Derivatives<br>☺Midterm 1 (April 08 2017 Saturday at 09:30)  | 12.6: 4,6,10,16<br>12.7: 4,8,10,17,18,19,22,26,36   |
| <b>8</b>  | April 10-14        | 12.8 Implicit Functions ( <i>"Systems of Equations" is not included</i> )<br><b>Ch. 13: Applications of Partial Derivatives</b><br>13.1 Extreme Values<br>13.2 Extreme Values of Functions Defined on Restricted Domains  | 12.8: 2,5,6,11<br>13.1: 1, 3, 6, 7, 9, 11, 17, 19, 24, 26<br>13.2: 3, 5, 7, 8, 9, 11, 17  |
| <b>9</b>  | April 17-21        | 13.3 Lagrange Multipliers<br><b>Ch. 14: Multiple Integration</b><br>14.1 Double Integrals<br>14.2 Iteration of Double Integrals in Cartesian Coordinates  | 13.3: 1, 3, 5, 7, 9, 11, 19, 21, 22<br>14.1: 5,13,15,18,19<br>14.2: 1-27 odd  |
| <b>10</b> | April 24-28        | 14.4 Double Integrals in Polar<br>14.5 Triple Integrals<br>14.6 Change of Variables in Triple Integrals   | 14.4: 1-25 odd<br>14.5: 2,4,6,7,9,10,14,15<br>14.6: 2,3,4,6,10,12,16  |
| <b>11</b> | May 02-05          | 14.7 Applications of Multiple Integrals (The Surface Area of a Graph)<br><b>Ch. 11: Vector Functions and Curves</b><br>11.1 Vector Functions of One Variable<br>11.3 Curves and Parametrizations<br><small>May 1<sup>st</sup> Labor and Solidarity Day (Monday)</small> | 14.7: 1,3,5,7,8,10<br>11.1: 8,10,16,18<br>11.3: 1,2,3,4,6,8,17,18,24  |
| <b>12</b> | May 08-12          | <b>Ch. 15: Vector Fields</b><br>15.3 Line Integrals<br>15.1 Vector and Scalar Fields<br>☺Midterm 2 (May 13 2017 Saturday at 09:30)  | 15.3: 2,6,8,13,14<br>15.1: 2,3,6  |
| <b>13</b> | May 15-18          | 16.1 Gradient, Divergence, and Curl<br>15.2 Conservative Fields<br>15.4 Line Integrals of Vector Fields<br><small>May 19th National Holiday (Commemoration of Atatürk &amp; Youth and Sports Festival, Friday)</small>  | 16.1: 3,4<br>15.2: 2,6,9<br>15.4: 4,6,8,9,13,22   |
| <b>14</b> | May 22-26          | 15.4 Line Integrals of Vector Fields<br><b>Ch. 16: Vector Calculus</b><br>16.3 Green's Theorem in the Plane   | 16.3: 1, 2, 3, 4, 5, 6, 7, 9  |
|           |                    | ☺Final Exam (June 01 2017 Thursday at 09:30)  |   |