

MATH 241 Calculus IV

1. Catalog Description

MATH 241 Calculus IV

4 units

Prerequisite: MATH 143.

Partial derivatives, multiple integrals, introduction to vector analysis. 4 lectures. Crosslisted as HNRS/MATH 241.

2. Required Background or Experience

Math 143.

3. Learning Objectives

The student should be able to:

- Do partial differentiation and study applications such as tangent planes, maximum/minimum problems with and without constraints.
- Do multiple integration and/or applications such as volumes, surface area and moments.
- Work with vector fields, and vector integral theorems.

4. Text and References

- Stewart, Calculus, 8th edition, Cengage.

5. Minimum Student Materials

Paper, pencils, and notebook.

6. Minimum University Facilities

Classroom with ample chalkboard space for class use.

7. Content and Method

The sections listed below are considered to be the core of the course. It is estimated that about 30 lectures will be needed to cover them. Quarters vary from 38 to 41 lectures. Possible uses for any remaining lectures include: covering more sections, covering some sections in more depth computer labs, and group projects/class presentations.

Content

No. of Lectures

CHAPTER 12 – Vectors and the Geometry of Space

12.6 Cylinders and Quadric Surfaces

1

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| CHAPTER 14 - Partial Derivatives | 11 |
| 14.1 Functions of Several Variables | |
| 14.2 Limits and Continuity | |
| 14.3 Partial Derivatives | |
| 14.4 Tangent Planes and Linear Approximations | |
| 14.5 The Chain Rule | |
| 14.6 Directional Derivatives and the Gradient Vector | |
| 14.7 Maximum and Minimum Values | |
| 14.8 Lagrange Multipliers | |
| CHAPTER 15 - Multiple Integrals | 11 |
| 15.1 Double Integrals over Rectangles | |
| 15.2 Double Integrals over General Regions | |
| 15.3 Double Integrals in Polar Coordinates | |
| 15.4 Applications of Double Integrals | |
| 15.6 Triple Integrals | |
| 15.7 Triple Integrals in Cylindrical Coordinates | |
| 15.8 Triple Integrals in Spherical Coordinates | |
| CHAPTER 16 - Vector Calculus | 7 |
| 16.1 Vector Fields | |
| 16.2 Line Integrals | |
| 16.3 The Fundamental Theorem for Line Integrals | |
| 16.4 Green's Theorem | |
| 16.5 Curl and Divergence (the vector forms of Green's Theorem should be covered and connections of curl and div with physics should be made) | |
| Total | <u>30</u> |

8. Methods of Assessment

The primary methods of assessment are: essay examinations, quizzes and homework. Typically, there will be one or more hour-long examinations during the quarter, and a required comprehensive final examination.