UNIVERSITY of NICOSIA

# Course Syllabus

| Course Code | Course Title | ECTS Credits |
|---|---|---|
| MATH-276 | Calculus III | 6 |
| **Prerequisites** | **Department** | **Semester** |
| MATH-196, MATH-280 | Computer Science | Fall |
| **Type of Course** | **Field** | **Language of Instruction** |
| Required | Mathematics | English |
| **Level of Course** | **Lecturer(s)** | **Year of Study** |
| 1st Cycle | Dr. Nectarios Papanicolaou | 2nd |
| **Mode of Delivery** | **Work Placement** | **Corequisites** |
| Face-to-face | NA | None |

**Course Objectives:**

The main objectives of the course are to:

- Introduce students to coordinate systems, lines and planes in three dimensions.
- Thoroughly discuss all necessary concepts for performing all basic vector algebra operations.
- Introduce students to curves and surfaces in 3-D.
- Familiarize students with functions of two and three variables.
- Provide students with deep knowledge of the theory and techniques of partial differentiation.
- Introduce students to double and triple integration.
- Define vector fields and vector differential operators.
- Cover the fundamental concepts that will enable students to work with basic identities.

**Learning Outcomes:**

After completion of the course students are expected to be able to:

1. Carry out vector operations(addition, scalar multiplication, cross product).
2. Employ vectors to describe lines and planes in 3-D.
3. Use vectors to analyze curves in 3-D. Compute their arc-length.
4. Calculate partial derivatives using techniques such as the chain, product and quotient rules.
5. Use partial derivatives to find relative and absolute extrema of functions of two variables.
6. Evaluate multiple integrals.
7. Apply vector differential operators to vector fields.

8. Prove identities involving vector differential operators.
9. Evaluate line integrals.

**Course Content:**

1. 3-D space and coordinate systems (lines, planes, spheres).
2. Vector Algebra (basic operations, dot and cross products, projections) .
3. Curves in 3-D (parametrization and arc-length).
4. Limits and Continuity of multivariable functions.
5. Partial Derivatives and Differentiability of functions of two and three variables. Implicit differentiation and the Chain rule.
6. Absolute and relative extrema of functions of two variables.
7. Double and Triple Integrals.
8. Vector Fields and Vector Differential Operators (gradient, divergence, Laplacian and curl).
9. Surface and line integrals.
10. The theorems of Green, Gauss and Stokes.

**Learning Activities and Teaching Methods:**

Lectures, Handouts, Online Material, Assignments, In-class Exercises.

**Assessment Methods:**

Final Examination, Midterm Examinations, Assignments and Participation.

**Required Textbooks / Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Calculus: Late Transcendentals, Combined | Howard Anton, Irl Bivens, Stephen Davis | Wiley ($10^{th}$ Ed.) | 2012 | 9781118092484 (print book)<br>9781118379318 (e-book) |

**Recommended Textbooks / Readings:**

| Title | Author(s) | Publisher | Year | ISBN |
|---|---|---|---|---|
| Colley | Vector Calculus | Pearson | 2006 | 9780131858749 |