



Course Code MATH-270	Course Title Calculus III	ECTS Credits 8
Department Computer Science	Semester Fall, Spring	Prerequisites MATH-191
Type of Course Required	Field Mathematics	Language of Instruction English
Level of Course 1 st Cycle	Year of Study 2 nd or 3 rd	Lecturer(s) Dr Nectarios Papanicolaou
Mode of Delivery Face-to-face	Work Placement N/A	Co-requisites None

Objectives of the Course:

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.
- Discuss the applications of vector fields in gravitation and electromagnetics

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 Contents:

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 and Assignments

Assessment Methods:

2 Mid-Term Exams; Final Exam; Class Participation.

Required Textbook/Reading:

Authors	Title	Publisher	Year	ISBN
Howard Anton, Irl Bivens, Stephen Davis	Calculus: Late Transcendentals, Combined <i>9th Edition</i>	Wiley	2009	0470183497
	-or-			
Howard Anton, Irl Bivens, Stephen Davis	Calculus: Multivariable <i>9th Edition</i>	Wiley	2009	0470183462

Recommended Textbooks/Reading:

Authors	Title	Publisher	Year	ISBN
Colley	Vector Calculus	Pearson-Prentice Hall	2006	0131858742