VNIVERSITAT DE VALÈNCIA

Course Guide
33075 Mathematics I

COURSE DATA

Data Subject	
Code	33075
Name	Mathematics I
Cycle	Grade
ECTS Credits	6.0
Academic year	2023 - 2024

Study (s)

Degree	Center	Acad. year	Period
1104 - Degree in Environmental Sciences	Faculty of Biological Sciences	1	First term

Subject-matter

Degree	Subject-matter	Character
1104 - Degree in Environmental Sciences	113 - Mathematics I	Basic Training

Coordination

Name	Department
MIQUEL MOLINA, VICENTE FELIPE	205 - Geometry and Topology

SUMMARY

The course Mathematics I forms part of scientific literacy that students of environmental sciences must acquire before entering fully into the specifics of the degree.

As a first goal, the subject must fill in the gaps in mathematical knowledge of many students who enter university without studying mathematics at second course of high school. Corresponding to this aspect, the course begins with an introduction in which issues such as operations with numbers and vector elementary functions (including trigonometric and drawing to do a review of trigonometry), graphs of functions and their interpretation .. are remembered.

As another goal, the subject should take the basic math skills for any experimental science: a) the differential and integral calculus needed to see how math involved in issues related to speed, slope, determining maximum and minimum measurement areas, ..., b) an introduction to differential equations, with more emphasis in its concept and meaning of the solutions than in the methods of solution, on one side because it is more interesting for a user which is not going to be a professional mathematician, on the other side, because time does not permit to go far away, c) an introduction to the methods of numerical calculations, since most of the mathematical problems that they will find have no exact solution and we must go to use these methods, with the help of software for them.

PREVIOUS KNOWLEDGE

Relationship to other subjects of the same degree

There are no specified enrollment restrictions with other subjects of the curriculum.

Other requirements

OUTCOMES

1104 - Degree in Environmental Sciences

- Uso de herramientas matemáticas para la resolución de problemas relacionados con el medio ambiente.
- Adquirir destrezas mínimas de cálculo diferencial e integral.
- Reconocer cuestiones matemáticas y su tipo en problemas de medio ambiente.

LEARNING OUTCOMES

Capacity of logical-mathematical though.

Use of the mathematical language.

Applying mathematical concepts to practical cases of environmental and other experimental sciences.

Knowing basic mathematical functions graphically.

Acquire minimum skills of differential and integral calculus.

Recognizing issues of mathematics and its type in environmental problems.

Knowing the basic properties of ordinary differential equations and how to find solutions (at least graphical) with the help of computers.

DESCRIPTION OF CONTENTS

1. Part 1: Introduction

Cap 1. The plane R ^ 2 and the space R ^ 3.
Vectors. Equation of a line in the plane. Slope of a line. Distance in the plane and in the space.
Cap. 2 Functions.
Graph of a function. Inverse of a function. Review of elementary functions. Exponential growth, logarithmic and polynomial. Equations. Graphical solution of equations. Limits of sequences and functions Continuous functions and their graphs.

2. Part 2: Differential and Integral Calculus

Cap. 3 The derivative
3.1 The derivative of a variable as a function of speed. 3.2 Calculation of derivatives 3.3 Rules of the chain. Contour 3.4. Derivative of functions defined implicitly. 3.5 The derivative of a function as the slope of its graph. 3.6 Numerical methods of solving equations based on the use of the derivative.
Cap. 4: Optimization
4.1 points critical functions of a variable. 4.2 Maximum and minimum numbers. 4.3 Maximum and minimum relative. 4.4 Concavity and convexity. 4.5 Interpreting and drawing graphs.
Cap. 5 The integral for functions of one variable
5.1 Primitives or antiderivatives. 5.2 The primitive as solutions of differential equations 5.3 Some methods of integration.
Ch 6 The Definite Integral
6.1 Definition of definite integral 6.2 Relationship with the primitive. Barrow Rule 6.3 Applications of the definite integral to the calculation of areas. 6.4 Numerical methods of integration

3. Part 3: Differential Equations
Part 3: Differential Equations
Part 3: Differential Equations

Cap 7. Ordinary differential equations of first order
7.1 Background. Unit constant. Initial conditions. 7.2 Differential Equations of first order. Graphical view in the plane. 7.3 Explicit solutions of some equations simpler first order 7.4 Numerical solutions of differential equations of first order
Cap. 8. Some differential equations in biology and environment.
8.1 Equilibrium and stability 8.2 Crecimiento an exponential population. Restricted growth. Logistics Equation 8.3 Allometric growth 8.4 Homeostasis 8.5 Dynamic balance of matter or energy and matter.

WORKLOAD

ACTIVITY	Hours	% To be attended
Theory classes	45,00	100
Computer classroom practice	12,00	100
Tutorials	3,00	100
Development of group work	14,00	0
Preparation of evaluation activities	13,00	0
Preparing lectures	45,00	0
Preparation of practical classes and problem	18,00	0
TOTAL	**150,00**	

TEACHING METHODOLOGY

The course will be developed in

- Theoretical classes with attendance not mandatory. One try to stimulate the involvement of the student in the class, trying to fix two flaws that tend to have students in thier first year in the univeristy: they are frightened to do questions and have fear of being ridiculed for a false answer.

- Practical classes of problem-solving face and learning of concepts using a computer program in the computer room, with compulsory attendance. Idea is to encourage initiative and creativity of the student looking for that, to many problems, first look how to resolve it or get an idea of what can happen with the help of computer.

Practices will lead to the realization of work to be delivered to the teacher for correction.

- Attendance at seminars and participation in them. Active participation in tutorials regulated

EVALUATION

The evaluation will be conducted by:

- Objective test, consisting of a test with both theoretical and practical questions. The rate at which this test will influence the final grade will be 80%.

- They require the submission of all proposed work to each student (mainly practical classes and an exercise in a seminar). The rate at which the score of this work will influence the final grade will be 20%.

- To apply for the advancement of the exam of this subject, students should be aware that the mandatory activities outlined in this guide have to be accomplished.

REFERENCES

Basic

- J. Stewart: Cálculo : conceptos y contextos, Tercera Edición, Cengeage Learning Ed. 2006
- Claudia Neuhauser: "Matemaìticas para Ciencias", Ed. Pearson/Prentice Hall, Segunda edición, 2009
- R.Larson, B.H. Edwards: Caìlculo 1 Mc Graw Hill 2010.
- D.G. Zill, W.S. Wright: Cálculo de una variable Mc Graw Hill 2011.

Additional

- James Callahan, Kenneth Hoffman, David Cox, Donal OShea, Harriet Pollatsek, Lester Senechal : Calculus in Context . The Five College Calculus Project. http://math.smith.edu/Local/cicintro/cicintro.html
- S. L. Salas, E. Hille."Calculus I y II", 1994, I Reverté, Barcelona
- S. T. Tan: Applied Calculus for the Managerial, Life, and Social Sciences, 5th Edition, Thomson Learning, Belmont 2002
- G.B. Thomas, R.L. Finney. "Cálculo con Geometría Analítica", 1987, Addison-Wesley Iberoamericana, Wilmington
- David F. Parkhurst : Introduction to Applied Mathematics for Environmental Science Ed. Springer, 2006
- Athel Cornish-Bowden: Basic Mathematics for Biochemists Editorial: Oxford University Press (1999)
- Victoriano Ramírez, Pedro González, Miguel Pasadas y Domingo Barrera: MATEMÁTICAS CON MATHEMATICA Editorial: Proyecto Sur, 1997