SUBJECT TEACHING GUIDE

G283 - Calculus II

Degree in Telecommunication Technologies Engineering
First Degree in Telecommunication Technologies Engineering

Academic year 2023-2024

1. IDENTIFYING DATA			
Degree	Degree in Telecommunication Technologies Engineering First Degree in Telecommunication Technologies Engineering	Type and Year	Core. Year 1 Core. Year 1
Faculty	School of Industrial Engineering and Telecommunications		
Discipline	Subject Area: Mathematics Basic Training Module		
Course unit title and code	G283 - Calculus II		

Number of ECTS credits allocated	6	Term	Semester based (2)
Web			

Language of instruction	Spanish	English Friendly	Yes	Mode of delivery	Face-to-face

Department	DPTO. MATEMATICA APLICADA Y CIENCIAS DE LA COMPUTACION
Name of lecturer	ANA CASANUEVA VICENTE
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Other lecturers	DIEGO RUIZ ANTOLIN

3.1 LEARNING OUTCOMES
- To solve mathematical problems in engineering. To apply methods of differential and integral calculus to solve telecommunication engineering problems. Use numerical methods to approximate results.

4. OBJECTIVES
To understand and use the main concepts and tools of double and volume integrals, line and surface integrals.
To comprehend the basic concepts of ordinary differential equations and partial differential equations and to be able to apply them to address and solve real problems.
To acquire skills in the use of mathematical software as an aid in the resolution of problems.

6. COURSE ORGANIZATION	
CONTENTS	
1	BLOCK 1 - MULTIPLE INTEGRATION AND INTEGRATION OF VECTOR FUNCTIONS
1.1	Lesson 1: Multiple integrals. Double integral over rectangles. Geometric interpretation. Existence and properties. Double integral over regular domains. Change of variable in double integrals. Change to the polar coordinates. Applications. Triple integrals over boxes. Triple integrals over regular domains. Change of variable in triple integrals. Change to cylindrical and spherical coordinates. Equations of some common surfaces.
1.2	Lesson 2: Vector fields and line integrals. Scalar fields and vector fields. Definitions. Differential operators: gradient, divergence, curl, Laplace operator. Theorems. Conservative vector field. Potential function. Flow lines and equipotential curves. Line integrals. Definition of the differential element of arc length in Cartesian, parametric and polar coordinates. Line integral of a scalar field over a curve. Applications. Properties. Line integral of a vector field over a curve. Applications. Properties. Green' s Theorem. Fundamental Theorem of the line integrals. Conservative fields Theorem.
1.3	Lesson 3: Surface integrals. Definition of the differential element of surface in Cartesian and parametric coordinates . Surface integral of a scalar field. Properties. Applications. Surface integrals of a vector field. Gauss Theorem. Stokes Theorem.
2	BLOCK 2 - DIFFERENTIAL EQUATIONS
2.1	Lesson 4: First order ordinary differential equations. General, particular and singular solution. Analytic resolution. Numerical resolution. Application of the initial value problems to model processes.
2.2	Lesson 5: Second order ordinary differential equations and first order equation systems. General solution of the homogeneous equation. Constant coefficient equations. Analytic resolution. Numerical resolution. First order differential equations system: analytic resolution and numerical resolution.
2.3	Lesson 6:Introduction to the partial differential equations. Boundary conditions problem. Heat equation. Wave equation. Laplace equation.

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Laboratory (computer) practices	Laboratory evaluation	No	No	20,00
Tests	Activity evaluation with Virtual Media	No	No	10,00
Theoretical and practical examination of block 1	Written exam	No	Yes	35,00
Theoretical and practical examination of block 2	Written exam	Yes	Yes	35,00
TOTAL				100,00

Observations
A student can go to the extraordinary examination only to those recoverable parts that he /she failed (score of less than 5 out of 10 points). The final score will be 4.9 (fail) for those students who, while having a mean score of above 5, got less than the minimum score in any of the evaluated activities. In the activities with a specific format (template for practical reports, programming templates, reserved space in written exams), the lack of adaptation to the format will be punished. Likewise, unjustified answers, inaccurate use of mathematical terminology and concepts and the lack of basic mathematical competences will be penalized.

Observations for part-time students
The subject can be entirely followed through the Moodle website. Those students enrolled part-time, who request it at the beginning of the term, may have a single evaluation, which means having all the theoretical and practical exams of all the subject blocks in the ordinary examination. It is mandatory to attend all in-person evaluation activities (tests and computer practices), to ensure the evaluation of the same concepts and competences as their classmates. They will have the choice to do the team work individually if they request it at the beginning of the term.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
Bradley, G.L. y Smith, K. J. "Cálculo de una variable". Editorial Prentice Hall. . http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=145826
Bradley, G.L. y Smith, K. J. "Cálculo de varias variables". Editorial Prentice Hall. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=145826
Nagle, R.K. y Saff, E.B. "Fundamentos de Ecuaciones Diferenciales". Editorial Addison-Wesley Iberoamericana. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=72061
Salas, S. y Hille, E. "Calculus". Tomo 2. Editorial Reverté. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN= 110844
Álvarez, E., Herrero, MªT.y Ruiz, R. Colección Fundamentos Matemáticos. Tomos 3, 4 y 5. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=163560
Stewart, J. "Cálculo multivariable" (2002). Thomson & Learning. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=175358
Frank Ayres, J.R. "Teoría y problemas de ecuaciones diferenciales". Editorial MacGraw-Hill. http://catalogo.unican.es.unican.idm.oclc.org/cgi-bin/abnetopac/?TITN=30434