

Course guide 280636 - 280636 - Fundamentals of Mathematics II

Develope Colored of Neutrical Chudies

Last modified: 27/05/2024

Teaching unit:	749 - MAT - Department of Mathematics.		
Degree:	BACHELOR'S DEGREE IN MARINE TECHNOLOGIES (Syllabus 2010). (Compulsory subject). BACHELOR'S DEGREE IN NAVAL SYSTEMS AND TECHNOLOGY ENGINEERING (Syllabus 2010). (Compulsor subject).		
Academic year: 2024	ECTS Credits: 6.0 Languages: Catalan		
LECTURER			
Coordinating lecturer:	FRANCESC TIÑENA SALVAÑÀ - NÚRIA MIRA GÓMEZ		

 Others:
 Primer quadrimestre:

 NÚRIA MIRA GÓMEZ - GESTN, GTM

Segon quadrimestre: FRANCESC TIÑENA SALVAÑÀ - GESTN, GTM

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

Units in all a second

GTM.CE0. Ability to solve math problems that may arise in engineering. Ability to apply knowledge about: linear algebra, geometry, differential geometry to, differential and integral calculus, differential equations and partial differential, numerical methods, algorithmic numerical and statistical optimization.

GESTN.CE1. Ability to solve math problems that may arise in the field of naval engineering technology. Ability to apply knowledge of: linear algebra, geometry, differential geometry, differential and integral calculus, differential equations and partial, numerical methods, numerical algorithms, statistical and optimization.

TEACHING METHODOLOGY

- Receive, understand and summarize knowledge.
- Posing and solving problems.
- developing arguments from a critical point of view and defending them.
- Doing work in group and individually.

LEARNING OBJECTIVES OF THE SUBJECT

- To be able to apply the knowledge on basic functions, differential and integral calculus, numerical methods and statistics.

- To solve the matematical problems that arise in engineering.

- To develop the capacity of abstraction while solving problems.

STUDY LOAD

Туре	Hours	Percentage
Hours large group	30,0	20.00
Self study	90,0	60.00
Hours medium group	30,0	20.00



Total learning time: 150 h

CONTENTS

1. Functions

Description:

Functional relations, properties and operations. Elementary functions: polinomials, rational functions, potencial, exponential and trigonometric functions. Inverse functions. Functions in 1 and 2 variables, curves and surfaces.

Full-or-part-time: 17h 30m Theory classes: 7h Self study : 10h 30m

2. Differentiation

Description:

Variation of functions, derivatives and partial derivatives. Geometrical interpretation, tangent line and plane. Rules for derivation, chain rule, implícit function. Differential of a function. Linear approximation of a function. Maxima and minima of a function.

Full-or-part-time: 35h Theory classes: 14h

Self study : 21h

3. Integration

Description:

Primitive of a function. Methods of integration. Definite integral. Integral function and the rule of Barrow. Applications: areas and volumes of revolution. Double and triple integrals: definition, iterated integrals and computation. Application: areas and volums, computation of CM and inertial moments.

Full-or-part-time: 25h

Theory classes: 10h Self study : 15h

4. Series of functions

Description:

Power series: definition and convergence, radius of convergence, sum function. Properties. Taylor series. Trigonometric series: Fourier series in an interval. Fourier series of a periodic function. Complex Fourier series.

Full-or-part-time: 17h 30m Theory classes: 7h Self study : 10h 30m



5. Ordinary differential equations

Description:

Differential equations: definition and solutions. Ordinary differential equations of first order: separable and exact variables. First order linear systems. Application: RL and RC circuits. Homogeneous and non-homogeneous second order linear systems. Application: free and forced damped oscillator.

Full-or-part-time: 27h 30m

Theory classes: 11h Self study : 16h 30m

6. Numerical methods

Description:

Errors and their propagation. Resolution of nonlinear equations: bisection and Newto-Raphson methods. Approximation of functions. Taylor polynomials. Polynomial interpolation and cubic splines. Numerical integration: trapezoidal and Simpson's rules.

Full-or-part-time: 12h 30m Theory classes: 5h Self study : 7h 30m

7. Statistics

Description:

Sampling and statistical analysis. Mean and variance. Parameter estimation. Sampling distribution. Confidence interval. Testing hypotesis. 'Xi²' test.

Full-or-part-time: 15h Theory classes: 6h Self study : 9h

GRADING SYSTEM

The final grade, Nfinal, is highest of Nmig and Npf Nfinal = Maxim(Nmig, Npf) where: Nmig = 0,40 Nac + 0.60 Npf Npf: grade of final test, Nac: continuous grade.

The final test consist of same theoretical questions about concepts related to the course' learning aims, and a set of problems that require the application of the methods studied. Its duration is 3 hours.

The continuous grade consist of two or tree test (each one hour long), and the supervised activities carried out during the semester.

Reevaluation: If you have obtained a grade between 3 and 4.9, you can choose to reassessment will consist of a final test similar to the one described above.

EXAMINATION RULES.

- If some of activities of the continuous grade are missed, the continuous grade is 0.

- Those who do not appear in the final test and do not carry out any of the activities of the continuous assessment are considered "Not Presented"



BIBLIOGRAPHY

Basic:

- Larson, Ron E.; Edwards, Bruce H. Cálculo, vol. 1 De una variable [on line]. 8a ed. Mexico: McGraw-Hill, 2010 [Consultation: 30/05/2022]. Available on:

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- Braun, Martin. Ecuaciones diferenciales y sus aplicaciones. México: Grupo Editorial Iberoamérica, 1990. ISBN 9687270586.

Chapra, Steven C. Métodos numéricos para ingenieros [on line]. 6a ed. México: McGraw-hill, 2011 [Consultation: 01/09/2022].
 A v a i l a b l e
 <u>https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB BooksVis?cod primaria=1000187&codigo libro=8100</u>. ISBN

9786071504999.

- Colomer, M.A. Curs d'estadística. Lleida: Universitat de Lleida, 1997. ISBN 8489727503.

- Herman, Edwin; Strang, Gilbert. Calculus. Vol. 2 [on line]. Houston: OpenStax, Rice University, 2016 [Consultation: 22/09/2020]. Available on: <u>https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/CalculusVolume2-OP_esPpXTB.pdf</u>. ISBN 9781947172142.

Complementary:

- Salas, S.; Hille, E.; Etgen, G. Calculus : una y varias variables, Vol. 1. 4a. Barcelona: Reverté, 2002. ISBN 8429151575.

- Simmons, G.F. Ecuaciones diferenciales con aplicaciones y notas históricas. Madrid: McGraw-Hill Interamericada, 1993. ISBN 844810045X.

Ross, Sheldon M. Introducción a la estadística [on line]. Barcelona: Reverté, 2007 [Consultation: 01/09/2022]. Available on: https://www-ingebook-com.recursos.biblioteca.upc.edu/ib/NPcd/IB_BooksVis?cod primaria=1000187&codigo libro=7717. ISBN 9788429150391.

- Grau Sánchez, Miquel; Noguera Batlle, Miquel. Cálculo numérico [on line]. Barcelona: Edicions UPC, 2001 [Consultation: 22/09/2020]. Available on: <u>http://hdl.handle.net/2099.3/36159</u>. ISBN 8483014556 .