SUBJECT TEACHING GUIDE

1130 - Mathematical and Numerical Methods in Engineering

Master's Degree in mining engineering

Academic year 2023-2024

1. IDENTIFYING DATA

Degree	Master's Degree in mining engineering		Type and Year	Compulsory. Year 1
Faculty	School of Mines and Energy Engineering			
Discipline	MATHEMATICS			
Course unit title and code	1130 - Mathematical and Numerical Methods in Engineering			
Number of ECTS credits allocated	7,5	Term	Semester based (1)	
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	SARA PEREZ CARABAZA
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Office	E.T.S. de Ingenieros Industriales y de Telecomunicación. Planta: - 4. DESPACHO (S4018)
Other lecturers	SIXTO HERRERA GARCIA DIEGO RUIZ ANTOLIN

3.1 LEARNING OUTCOMES

- Knowledge of the fundamentals of Partial Differential Equations and their numerical solution
  Knowledge of the basics of geostatistics and the statistical characterization of extreme events
  Ability to apply this knowledge to the solution of practical problems in the area of study

4. OBJECTIVES

Complement the mathematical knowledge base of graduate students with numerical and statistical methods applied to mining and energy engineering

6. COURSE ORGANIZATION

CONTENTS	
1	Mathematical methods in engineering Common probability models in mining and energy engineering Extreme value statistics Statistical quality control Geostatistics Partial differential equations (PDE) in engineering
2	Numerical methods in engineering Eigenvalue computation Numerical PDE solution. Initial and boundary value problems. Systems of non-lineal equations. Applications Optimization

7. ASSESSMENT METHODS AND CRITERIA

Description	Type	Final Eval.	Reassessn	%
Computer work reports	Others	No	Yes	20,00
Homework reports	Work	No	Yes	30,00
Final exam Block I	Written exam	No	Yes	25,00
Final exam Block II	Laboratory evaluation	Yes	Yes	25,00
TOTAL				100,00

Observations
All evaluation activities that obtain a qualification under 5 can be re-taken during the extraordinary evaluation period.

Observations for part-time students
Part-time students can follow the same rules as the rest of the students, given that all materials will be available through the Moodle virtual environment, which will also be used to collect the assignments. Part-time students must attend written exams.

8. BIBLIOGRAPHY AND TEACHING MATERIALS

BASIC
O'Neil PV (1994) Matemáticas avanzadas para la Ingeniería. 3ª Edición. Cecsa
Nagle KR, Saff EB, Snider AD (2001) Ecuaciones Diferenciales y problemas con valores en la frontera. 3ª Edición. Addison Wesley
Hengl T (2009) A practical guide to geostatistical mapping. ISBN 978-90-9024981-0 <http://spatial-analyst.net/book/system/files/Hengl_2009_ GEOSTATe2c1w.pdf>
Castillo E, Pruneda RE (2001) Estadistica Aplicada
Castillo E, Hadi AS, Balakrishnan N, Sarabia JM (2004) Extreme Value and Related Models with Applications in Engineering and Science.
Quarteroni A, Saleri F (2006) Calculo científico con Matlab y Octave. Springer Verlag
Haberman R (2003) Ecuaciones en Derivadas Parciales con series de Fourier y Problemas de Contorno. 3ª Edición. Prentice Hall