

## 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				
E-mail	sara.perezcarabaza@unican.es				
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. SUBJECT PROGRAM	
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-linear 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
<b>TOTAL</b>				<b>100,00</b>
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) <i>Matemáticas avanzadas para la Ingeniería</i> . 3ª Edición. Cecsá
Nagle KR, Saff EB, Snider AD (2001) <i>Ecuaciones Diferenciales y problemas con valores en la frontera</i> . 3ª Edición. Addison Wesley
Hengl T (2009) <i>A practical guide to geostatistical mapping</i> . ISBN 978-90-9024981-0 < <a href="http://spatial-analyst.net/book/system/files/Hengl_2009_GEOSTATE2c1w.pdf">http://spatial-analyst.net/book/system/files/Hengl_2009_GEOSTATE2c1w.pdf</a> >
Castillo E, Pruneda RE (2001) <i>Estadística Aplicada</i>
Castillo E, Hadi AS, Balakrishnan N, Sarabia JM (2004) <i>Extreme Value and Related Models with Applications in Engineering and Science</i> .
Quarteroni A, Saleri F (2006) <i>Calculo científico con Matlab y Octave</i> . Springer Verlag
Haberman R (2003) <i>Ecuaciones en Derivadas Parciales con series de Fourier y Problemas de Contorno</i> . 3ª Edición. Prentice Hall

