

Academic Year/course: 2021/22

25203 - Basic mathematics for environmental studies

Syllabus Information

Academic Year: 2021/22

Subject: 25203 - Fundamentos matemáticos para el estudio del medio ambiente

Faculty / School: 201 - Escuela Politécnica Superior

Degree: 571 - Degree in Environmental Sciences

ECTS: 6.0

Year: 1

Semester: First Four-month period

Subject Type: Basic Education

Module:

1. General information

1.1. Aims of the course

The subject and its expected results respond to the following approaches and objectives:

It is intended, with the teaching of this subject, to provide mathematical tools that serve as a basis to construct and / or study certain mathematical models related to environmental phenomena.

2. Learning goals

3. Assessment (1st and 2nd call)

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is oriented towards the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as lectures, problem-solving sessions and practice sessions.

4.2. Learning tasks

This course is organized as follows:

- **Lectures.** The teacher will explain the topics of the course according to the syllabus.
- **Problem-solving sessions.** These sessions are participative.
- **Practice sessions.** Problems similar to exam ones are solved working in small groups. These sessions are supervised by teachers. Studying the recommended bibliography is a useful task.
- **Autonomous work and study** is essential for the student.

4.3. Syllabus

This course will address the following topics:

- **Topic 1.** MATRIX THEORY AND VECTORIAL SPACES
- **Topic 2.** SYSTEMS OF LINEAR EQUATIONS. NUMERICAL APPLICATIONS
- **Topic 3.** MINIMAL SQUARES AND INTERPOLATION

- **Topic 4.** EIGENVALUES AND EIGENVECTORS. APPLICATIONS
- **Topic 5.** DIFFERENTIAL CALCULUS
- **Topic 6.** INTEGRAL CALCULATION
- **Topic 7.** DIFFERENTIAL EQUATIONS
- **Topic 8.** SYSTEMS OF DIFFERENTIAL EQUATIONS

4.4. Course planning and calendar

It is estimated that an average student should devote to this subject, 6 ECTS, a total of 150 hours. With this provision, load hours by week and by student are reflected in the following schedule.

Type activity/Week	1	2	3	4	5	6	7	8	9	10	11
Classroom activity											
Lectures	1	2	2		1	2		2	2	2	2
Problem-solving	1	2	2	2	3	2	2	2		2	2
Practice sessions				2	2			2			2
Exams							2		2		
Evaluation											
Non face-to-face activity											
Autonomous work:	2	3	3	3	2	3	4	4	4	3	3
Team work:	2	1	1	1	1	2				1	
TOTAL	6	8	8	8	9	9	8	10	8	8	9

Type activity/Week	12	13	14	15	16	17	18	Total
Classroom activity								68
Lectures	2	2			1	2	2	25
Problem-solving		2				2	1	25
Practice sessions						2		10
Exams					2		2	8
Evaluation								
Non face-to-face activity								82
Autonomous work	3	3	5	5	2	3	4	68
Team work	2	1				1		13
TOTAL	8	8	8	8	8	10	9	150

Further information concerning the timetable, classroom, office hours, assessment dates and other details regarding this course will be provided on the first day of class or please refer to the Faculty of Sciences website and Moodle.

4.5. Bibliography and recommended resources

- BB** Arvesú Carballo, Jorge. : Problemas resueltos de álgebra lineal / Jorge Arvesú Carballo, Francisco Marcellán Español, Jorge Sánchez Ruiz . Madrid : Thomson-Paraninfo, D.L. 2005
- BB** Borobia Vizmanos, Alberto. Matemáticas para ciencias ambientales : álgebra lineal y ecuaciones diferenciales / Alberto Borobia, Beatriz Estrada . Madrid : Sanz y Torres, 2004
- BB** Godés Blanco, Carmen. Valores y vectores propios : problemas de aplicación resueltos paso a paso / Carmen Godés y José Antonio Sánchez Nadal . Zaragoza : Prensas Universitarias de Zaragoza, 2007
- BB** Larson, Ron. Cálculo y geometría analítica / Roland E. Larson, Robert P. Hostetler, Bruce H. Edwards, con la colaboración de David E. Heyd ; traducción Lorenzo Abellanas Rapun . [5a. ed., reimp.] Madrid [etc.] : McGraw-Hill, D.L. 1998
- BB** Strang, Gilbert. Algebra lineal y sus aplicaciones / Gilbert Strang ; revisión técnica, Edmundo Palacios Pastrana . - 4ª ed. México D. F. : International Thomson, cop. 2007
- BC** Apostol, Tom M.. Análisis matemático / Tom M. Apostol ; versión española por José Plá Carrera, revisada por Enrique Linés Escardó . 2a ed., [reimp.] Barcelona, [etc.] : Reverté, D.L.1996
- BC** Apostol, Tom M.. Calculus. vol.1, Cálculo con funciones de una variable, con una introducción al álgebra lineal / Tom M. Apostol . - 2a ed. [reimp.] Barcelona, [etc.] : Reverté, D.L.1991
- BC** Apostol, Tom M.. Calculus. vol.2, Cálculo con funciones de varias variables y álgebra lineal, con aplicaciones a las ecuaciones diferenciales y a las probabilidades / Tom M. Apostol . - 2a ed. Barcelona, [etc.] : Reverté, D.L.1986
- BC** Berman, G.N.. Problemas y ejercicios de análisis matemático / G.N. Berman . 2a. ed Moscú : Mir, 1983
- BC** Bugrov, Ya.S.. Matematicas superiores : cálculo diferencial e integral / Ya. S. Bugrov, S.M. Nikolski ; traducido del ruso por D. Medkov . Moscú : Mir, 1984
- BC** Burgos Roman, Juan de. Fundamentos matemáticos de la ingeniería (álgebra y cálculo) : definiciones, teoremas y resultados / Juan de Burgos Román . Ed. Estudiante Madrid : García-Maroto, D. L. 2008
- BC** Galindo Soto, Félix. Guía práctica de cálculo infinitesimal en una variable real / Félix Galindo Soto, Javier Sanz Gil, Luis A. Tristán Vega . 1ª ed. Madrid [etc.] : Thomson, D. L. 2003
- BC** Grossman, Stanley I.: Álgebra lineal. México [etc.] : McGraw-Hill, cop. 1992
- BC** Herstein, I.N.. Algebra lineal y teoría de matrices / I.N. Herstein David J. Winter ; traductor, Eduardo M. Ojeda Peña . México : Grupo Editorial Iberoamericano, cop. 1989
- BC** Lipschutz, Seymour. Algebra lineal / Seymour Lipschutz ; Traducción Celia Martínez Ontalba ; Revisión Lorenzo Abellanas . 2a ed. Madrid [etc.] : McGraw-Hill, cop.1992
- BC** Nicholson, W. Keith. Algebra lineal con aplicaciones / W. Keih Nicholson ; traducción Julián Martínez Valero ; revisión técnica Juan Llovet Verdugo . 4ª ed. Madrid : McGraw-Hill, D.L. 2003
- BC** Noble, Ben. Algebra lineal aplicada / Ben Noble, James W. Daniel ; traducción, Virgilio González Pozo ; revisión técnica, Mary Glazman Nowolski . 3a. ed México [etc.] : Prentice-Hall Hispanoamericana, cop. 1989
- BC** Piskunov, N.. Cálculo diferencial e integral / por N. Piskunov ; [colaborador en la traducción, Departamento Técnico de Montaner y Simón ; revisión Carlos Vázquez, Fernández- Victorio] . [1a. ed., reimpr.] México [etc.] : Limusa, cop. 2007
- BC** Problemas y ejercicios de análisis matemático / revisado por B.Demidovich . 11a.ed. Madrid : Paraninfo, 1993
- BC** Rojo, Jesús. Ejercicios y problemas de algebra lineal / Jesús Rojo, Isabel Martín . 2ª ed. Madrid [etc.] : McGraw-Hill, D.L. 2004
- BC** Soler Dorda, Mariano. Cálculo infinitesimal e integral / Mariano Soler Dorda, Rosendo Bronte Abaurrea, Leandro Marchante Gutierrez Madrid : Los autores, 1992
- BC** Thomas Ara, Luis. Problemas de cálculo : escuelas de ingenieros técnicos / L. Thomas Ara, J.L. Rembado,

Ma. C. Thomas Ríos . Santander : Los autores, 1972

BC Torregrosa Sánchez, Juan Ramón. Teoría y problemas de algebra lineal y sus aplicaciones / Juan Ramón Torregrosa Sánchez, Cristina Jordán Lluch . - [2ª ed.] Madrid [etc.] : McGraw-Hill, D.L. 1993

The updated recommended bibliography can be consulted in: <http://psfunizar10.unizar.es/br13/egAsignaturas.php?id=10966>