

## 300205 - AM - Further Mathematics

Coordinating unit:	300 - EETAC - Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit:	749 - MAT - Department of Mathematics
Academic year:	2018
Degree:	BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2015). (Teaching unit Compulsory) BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory) BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERINGS/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING - NETWORK ENGINEERING (AGRUPACIÓ DE SIMULTANEÏTAT) (Syllabus 2015). (Teaching unit Compulsory) BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Teaching unit Compulsory)
ECTS credits:	6
Teaching languages:	Catalan, Spanish

### Teaching staff

Coordinator:	Definit a la infoweb de l'assignatura.
Others:	Definit a la infoweb de l'assignatura.

### Degree competences to which the subject contributes

#### Specific:

1. CE 1 AERO. Capacidad para la resolución de los problemas matemáticos que puedan plantearse en la ingeniería. Aptitud para aplicar los conocimientos sobre: álgebra lineal; geometría; geometría diferencial; cálculo diferencial e integral; ecuaciones diferenciales y en derivadas parciales; métodos numéricos; algorítmica numérica; estadística y optimización. (CIN/308/2009, BOE 18.2.2009)

#### Transversal:

2. SELF-DIRECTED LEARNING - Level 1. Completing set tasks within established deadlines. Working with recommended information sources according to the guidelines set by lecturers.
3. TEAMWORK - Level 1. Working in a team and making positive contributions once the aims and group and individual responsibilities have been defined. Reaching joint decisions on the strategy to be followed.

### Teaching methodology

X

### Learning objectives of the subject

X



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### Study load

Total learning time: 150h	Hours large group:	39h	26.00%
	Hours medium group:	13h	8.67%
	Hours small group:	0h	0.00%
	Guided activities:	14h	9.33%
	Self study:	84h	56.00%

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### Content

<p>(ENG) 1 Integració en dos i tres dimensions</p>	<p>Learning time: 22h 30m</p> <p>Theory classes: 6h Practical classes: 2h Guided activities: 2h Self study : 12h 30m</p>
<p>Description: (ENG) Integrals dobles. Canvis de variables (coordenades cartesianes i polars). Integrals triples. Canvis de variables (coordenades cartesianes, esfèriques i cilíndriques).</p> <p>Related activities: (ENG) Activitats 1 i 10.</p>	
<p>(ENG) 2 Integració sobre una corba</p>	<p>Learning time: 11h</p> <p>Theory classes: 3h Practical classes: 1h Guided activities: 1h Self study : 6h</p>
<p>Description: Description of curves using different types of coordinates. Scalar fields and vector fields. Line integrals.</p>	
<p>(ENG) 3 Integració sobre una superfície</p>	<p>Learning time: 22h 30m</p> <p>Theory classes: 6h Practical classes: 2h Guided activities: 2h Self study : 12h 30m</p>
<p>Description: (ENG) Expressió d'algunes superfícies en coordenades cartesianes. Parametrització de superfícies. Àrea d'una superfície. Integral sobre una superfície d'una funció escalar. Integral sobre una superfície d'una funció vectorial.</p> <p>Related activities: (ENG) Activitats 3 i 11.</p>	

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<p>(ENG) 4 Teoremes vectorials</p>	<p>Learning time: 24h Theory classes: 6h Practical classes: 2h Guided activities: 3h Self study : 13h</p>
<p>Description: (ENG) Operador nabla. Gradient, rotacional i divergència. Teorema de Green: aplicació al càlcul d'àrees. Teorema de Stokes. Teorema de Gauss. Camps conservatius.</p> <p>Related activities: (ENG) Activitats 4 i 11.</p>	
<p>(ENG)</p>	<p>Learning time: 34h Theory classes: 9h Practical classes: 3h Guided activities: 3h Self study : 19h</p>
<p>Description: Introduction to sequences and numerical series. Harmonic and geometrical series. Fourier series associated to a periodic function. Fourier series of even and odd functions . Sine and cosine series. Convergence and Gibbs phenomenon. Bessel's inequality and Parseval's identity. Complex Fourier series. Frequency spectrum. , convergence in quadratic average. Inequality of *Bessel and relation of *Parseval. Complex shape of the series of Fourier. Spectrum of frequency.</p>	
<p>(ENG) 6 Transformada de Fourier</p>	<p>Learning time: 36h Theory classes: 9h Practical classes: 3h Guided activities: 3h Self study : 21h</p>
<p>Description: The Fourier Transform: definition, properties and calculation. Properties of the transform of a real function. Parseval's identity and the energy spectrum. The convolution theorem. Generalised functions: transformed of the heaviside function and the delta comb, convoluting with a delta. Relation between the Fourier and the Laplace transforms.</p>	

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### Planning of activities

(ENG) TÍTOL ACTIVITAT 1: SESSIÓ IDT 1	Hours: 4h Guided activities: 2h Self study: 2h
VECTOR ANALYSIS 1	Hours: 4h Guided activities: 2h Self study: 2h
(ENG) VECTOR ANALYSIS 2	Hours: 4h Guided activities: 2h Self study: 2h
VECTOR ANALYSIS 3	Hours: 4h Guided activities: 2h Self study: 2h
NUMERICAL SERIES	Hours: 3h Theory classes: 0h Guided activities: 1h 30m Self study: 1h 30m
<p>Specific objectives: To calculate the sum of certain numerical series (geometric, or using Parseval's identity and Dirichlet's theorem).</p>	
FOURIER SERIES	Hours: 3h Guided activities: 1h 30m Self study: 1h 30m
FOURIER TRANSFORM 1	Hours: 3h Theory classes: 0h Guided activities: 1h 30m Self study: 1h 30m

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FOURIER TRANSFORM 2	Hours: 3h Theory classes: 0h Guided activities: 1h 30m Self study: 1h 30m
(ENG) TÍTOL ACTIVITAT 10: CONTROL 1	Hours: 10h 30m Theory classes: 0h 30m Self study: 10h
(ENG) TÍTOL ACTIVITAT 12: CONTROL 3	Hours: 10h 30m Theory classes: 0h 30m Self study: 10h

### Qualification system

X

### Regulations for carrying out activities

X

### Bibliography

#### Basic:

Hsu, Hwei P.; Mehra, Raj. Análisis de Fourier. Argentina [etc.]: Addison-Wesley Iberoamericana, 1987. ISBN 9684443560.

Marsden, Jerrold E.; Tromba, Anthony. Cálculo vectorial. 5ª. Madrid [etc.]: Addison Wesley, 2004. ISBN 8478290699.

#### Complementary:

Morrison, Norman. Introduction to Fourier Analysis : Instructor's Manual. New York: John Wiley & Sons, 1995. ISBN 0471128481.

Larson, Ron; Hostetler, Robert P.; Edwards, Bruce H. Cálculo. Vol. 2, Cálculo 2 de varias variables. 8a. Madrid [etc.]: McGraw-Hill, 2006. ISBN 9701052757.

Marsden, Jerrold E.; Tromba, Anthony; Pao, Karen; Soon, Frederick H. Cálculo vectorial : problemas resueltos. 3ª ed. Argentina [etc.]: Addison-Wesley Iberoamericana, 1993. ISBN 0201625644.

Lathi, B. P. (Bhagwandas Pannalal). Introducción a la teoría y sistemas de comunicación. México, [etc.]: Limusa : Noriega, 1974. ISBN 9681805550.

Bradley, Gerald L.; Smith, Karl J. Cálculo. Madrid [etc.]: Prentice Hall, 1998. ISBN 8483220415.

#### Others resources: