

Course guides

300247 - SEA - Sustainability of Aerospace Engineering

Last modified: 21/12/2020

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 707 - ESAII - Department of Automatic Control.

Degree: BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING (Syllabus 2015). (Compulsory subject).
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING (Syllabus 2015). (Compulsory subject).
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERING/BACHELOR'S DEGREE IN NETWORK ENGINEERING (Syllabus 2015). (Compulsory subject).
BACHELOR'S DEGREE IN AEROSPACE SYSTEMS ENGINEERINGS/BACHELOR'S DEGREE IN TELECOMMUNICATIONS SYSTEMS ENGINEERING - NETWORK ENGINEERING (AGRUPACIÓ DE SIMULTANÈITAT) (Syllabus 2015). (Compulsory subject).

Academic year: 2020 **ECTS Credits:** 3.0 **Languages:** English

LECTURER

Coordinating lecturer: Definit a la infoweb de l'assignatura.

Others: Definit a la infoweb de l'assignatura.

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CE22. CE 22 AERON. Conocimiento adecuado y aplicado a la Ingeniería de: Los fundamentos de sostenibilidad, mantenibilidad y operatividad de los sistemas de navegación aérea. (CIN/308/2009, BOE 18.2.2009)

CE9. CE 9 AERO. Comprender la globalidad del sistema de navegación aérea y la complejidad del tráfico aéreo. (CIN/308/2009, BOE 18.2.2009)

CE23. CE 23 AERON. Conocimiento adecuado y aplicado a la Ingeniería de: Las operaciones de vuelo de los sistemas aeroespaciales; el impacto ambiental de las infraestructuras; la planificación, diseño e implantación de sistemas para soportar la gestión del tráfico aéreo. (CIN/308/2009, BOE 18.2.2009)

Generical:

CG7. (ENG) CG7 - Capacidad de analizar y valorar el impacto social y medioambiental de las soluciones técnicas.

CG8. (ENG) CG8 - Conocimiento, comprensión y capacidad para aplicar la legislación necesaria en el ejercicio de la profesión de Ingeniero Técnico Aeronáutico.

Transversal:

CT7. THIRD LANGUAGE. Learning a third language, preferably English, to a degree of oral and written fluency that fits in with the future needs of the graduates of each course.

CT2N1. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 1. Analyzing the world's situation critically and systemically, while taking an interdisciplinary approach to sustainability and adhering to the principles of sustainable human development. Recognizing the social and environmental implications of a particular professional activity.

CT2N2. SUSTAINABILITY AND SOCIAL COMMITMENT - Level 2. Applying sustainability criteria and professional codes of conduct in the design and assessment of technological solutions.

CT4. 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.

Basic:

CB1. (ENG) CB1 - Que los estudiantes hayan demostrado poseer y comprender conocimientos en un área de estudio que parte de la base de la

educación secundaria general, y se suele encontrar a un nivel que, si bien se apoya en libros de texto avanzados, incluye también algunos aspectos que implican conocimientos procedentes de la vanguardia de su campo de estudio

CB3. (ENG) CB3 - Que los estudiantes tengan la capacidad de reunir e interpretar datos relevantes (normalmente dentro de su área de estudio)

para emitir juicios que incluyan una reflexión sobre temas relevantes de índole social, científica o ética

CB5. (ENG) CB5 - Que los estudiantes hayan desarrollado aquellas habilidades de aprendizaje necesarias para emprender estudios posteriores con un alto grado de autonomía

TEACHING METHODOLOGY

The course combines the following teaching (learning) methodologies:

- Autonomous learning, because students will work many self-learning materials at home.
- Cooperative learning, because students will solve many tasks in small groups.

We will make an experiment on "flipped classroom" methodology but it will depend on the group sizes

LEARNING OBJECTIVES OF THE SUBJECT

Knowing the concept and conditions of unsustainability, and knowing how to apply techniques and procedures to approach sustainability

Knowing data about the current state of the world from the economic, environmental and social points of view. Having a historical idea about how we have arrived to the present situation

Awareness of complexity and the need for the systemic approach

Awareness of the engineering responsibility and especially of the aerospace engineering responsibility

STUDY LOAD

Type	Hours	Percentage
Self study	46,3	61.65
Hours large group	28,8	38.35

Total learning time: 75.1 h



CONTENTS

CHAPTER 1 - STATE OF THE WORLD AND CAUSES OF UNSUSTAINABILITY

Description:

- 1 Some ecological data
- 2 Some economic data
- 3 Some social data
- 4 Historical causes of unsustainability
- 5 Technology as a problem
- 6 Science, technology and politics as a solution

Specific objectives:

Knowing data about the current state of the world from the economic, environmental and social points of view. Having a historical idea about how we have arrived to the present situation

Related activities:

Theoretical and more practical questionnaires

Full-or-part-time: 12h 30m

Theory classes: 5h

Self study : 7h 30m

CHAPTER 2 - SUSTAINABLE DEVELOPMENT

Description:

- 1 Some basic concepts
- 2 History of the idea
- 3 Some counterexamples
- 4 Indicators and indexes

Specific objectives:

Knowing the concept, evolution and conditions of unsustainability and also the tools to try measuring our distance from the ideal

Related activities:

Theoretical questionnaires

Full-or-part-time: 6h 15m

Theory classes: 2h 30m

Self study : 3h 45m



CHAPTER 3 - SYSTEMICS AND COMPLEXITY

Description:

- 1 Reductionism, systemic approach and complex systems
- 2 Linear and nonlinear behavior
- 3 Deterministic chaos
- 4 Chaotic life
- 5 Networks

Specific objectives:

Awareness of complexity and the need for the systemic approach

Related activities:

Theoretical and practical questionnaires

Full-or-part-time: 12h 30m

Theory classes: 5h

Self study : 7h 30m

CHAPTER 4 - GLOBALIZACION

Description:

- 1 Concept and reality
- 2 Who is who in globalization?
- 3 Human rights
- 4 The welfare state
- 5 Globalization of safety and justice
- 6 Globalization of health and education

Specific objectives:

Knowing the current globalization process and its main agents

Related activities:

Theoretical questionnaires

Full-or-part-time: 6h 15m

Theory classes: 3h 45m

Self study : 2h 30m



CHAPTER 5 - HUMAN VALUES

Description:

0 Does engineering need human values?

1 Science and engineering

2 Reasons not to harm the others

3 Game of Cooperation and Desertion

4 Human values in engineering

Specific objectives:

Awareness of the need for human values and their analysis from the engineering point of view

Related activities:

Theoretical and practical questionnaires

Full-or-part-time: 12h 30m

Theory classes: 5h

Self study : 7h 30m

CHAPTER 6 - TOOLS FOR SUSTAINABILITY

Description:

1 Approach: Life Cycle Analysis

1.1 a 1.5 different stages

2 Environmental norms and directives

2.1 Environmental Impact Assessment

3 Corporate social responsibility and sustainability norms

3.1 Global Reporting Initiative

3.1 ISO 26000

4 Technological tools for sustainability

Specific objectives:

Knowing how to apply techniques and procedures to approach sustainability

Related activities:

Theoretical and more practical questionnaires

Full-or-part-time: 6h 15m

Theory classes: 2h 30m

Self study : 3h 45m



CHAPTER 7 - IMPACT OF AEROSPACE ENGINEERING

Description:

- 1 Economic impact of aerospace engineering
- 2 Environmental impact of aerospace engineering
- 3 Social impact of aerospace engineering
- 4 Specific administrative tools
- 5 Involved organizations
- 6 Developing technologies

Specific objectives:

Awareness of the engineering responsibility and especially of the aerospace engineering responsibility

Related activities:

Theoretical and more practical questionnaires

Full-or-part-time: 18h 45m

Theory classes: 5h

Self study : 13h 45m

GRADING SYSTEM

Defined at the course infoweb.

BIBLIOGRAPHY

Basic:

- Mulder, Karel. Sustainable development for engineers : a handbook and resource guide. Sheffield: Greenleaf, 2006. ISBN 1874719195.
- Sustainable aviation futures. Bingley: Emerald, 2013. ISBN 9781781905951.
- Janic, Milan. The Sustainability of air transportation : a quantitative analysis and assessment. Aldershot: Ashgate, 2007. ISBN 9780754649670.

Complementary:

- McManners, Peter J. Fly and be damned : what now for aviation and climate change?. London: Zed Books, 2012. ISBN 9781848139749.