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220008 - ENIA - Airspace, Air Navigation and Infrastructure

Coordinating unit: 205 - ESEIAAT - Terrassa School of Industrial, Aerospace and Audiovisual Engineering

Teaching unit: 220 - ETSEIAT - Terrassa School of Industrial and Aeronautical Engineering

Academic year: 2019

Degree: BACHELOR'S DEGREE IN AEROSPACE TECHNOLOGY ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)
BACHELOR'S DEGREE IN AEROSPACE VEHICLE ENGINEERING (Syllabus 2010). (Teaching unit Compulsory)

ECTS credits: 4,5 Teaching languages: Catalan, Spanish

Teaching staff

Coordinator: Jordi Margarit

Others: Jon Tugores, Xavier Roca

Degree competences to which the subject contributes

Specific:

1. GrETA/GrEVA - An overall understanding of air navigation systems and the complexity of air traffic

Teaching methodology

In the theoritical classes teachers will explain concepts, methods and results, showing them with some examples to facilitate understanding.
The sessions in the classrooms the teacher guide the student in applying theoretical concepts to workgroup.

Learning objectives of the subject

Know the organization of the air transport system and air navigation system, their rules and the institutions that regulate these systems, and the elements of the air navigation and their relationship with the airport.
Particularly, to understand the air space structure, the instrumental navigation techniques, the procedures used by airplanes in the controlled air space, the navigations aids and their relationship with the airport both from standpoint of design and operation.

Study load

Total learning time: 112h 30m	Hours large group:	31h	27.56%
	Hours medium group:	14h	12.44%
	Self study:	67h 30m	60.00%

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Content

1. Introduction to air navigation

Learning time: 10h

Theory classes: 2h
Practical classes: 0h
Self study : 8h

Description:
1.1 Definitions
1.2 History
1.3 Air navigation techniques

2. Flight basic instruments

Learning time: 11h

Theory classes: 3h
Practical classes: 2h
Self study : 6h

Description:
2.1 Anemometer, altimeter and vertical speed indicator
2.2 Attitude indicator, artificial horizon and direction indicator
2.3 Others

3. Institutional framework

Learning time: 9h

Theory classes: 2h
Practical classes: 0h
Self study : 7h

Description:
3.1 Basic regulation
3.2 National agencies
3.3 International agencies

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4. Air navigation systems	Learning time: 18h 30m Theory classes: 7h Practical classes: 4h Self study : 7h 30m

Description:
4.1 Visual flight
4.2 Instrumental flight with VORD/DME
4.3 Instrumental flight with NDB
4.4 Instrumental flight with ILS
4.5 Onboard Systems (ACAS, GPWS)
4.6 Autonomous systems (INS)

5. Airspace	Learning time: 16h Theory classes: 4h Practical classes: 0h Self study : 12h

Description:
5.1 Division of the airspace
5.2 Classification of the airspace

6. Navigational charts, flight plans and weather service	Learning time: 11h Theory classes: 3h Practical classes: 2h Self study : 6h

Description:
6.1 Navigational charts
6.2 Flight plans
6.3 Weather service

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7. Air navigation services	Learning time: 10h Theory classes: 2h Practical classes: 0h Self study : 8h

Description:
7.1 Air Traffic Control service (ATC)
7.2 Flight Information Service (FIS)
7.3 Advisory Service
7.4 g service

8. Special activities in airspace	Learning time: 14h Theory classes: 4h Practical classes: 2h Self study : 8h

Description:
8.1 UAV

9. Airport infrastructures	Learning time: 13h Theory classes: 4h Practical classes: 4h Self study : 5h

Description:
9.1 Construction of airport infrastructure
9.2 Examples of airport infrastructure

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Planning of activities

1. Theory classes	Hours: 81h 30m Theory classes: 28h Self study: 53h 30m
3. Airport infrastructure practise session	Hours: 1h 30m Theory classes: 1h 30m
4. Final exam	Hours: 1h 30m Theory classes: 1h 30m

Qualification system

The final mark is the sum of the following qualifications:

Final Mark = 0,3 NA2 + 0,3 NA3 + 0,4 NA4

NA2: Activity 2
NA3: Activity 3
NA4: Activity 4 (Final exam)

In case of being unable to pass the activities 2 or 3, the student will have a second opportunity for the day of the final exam.

Regulations for carrying out activities

Except the exam, the teacher is available to be consulted and it's possible to discuss the activities with the other students. A forum in ATENEA is enable to discuss and share information between the students or to ask for help from other students.

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Bibliography

Basic:

" Reglamento de circulación aérea". Mapelli López, Enrique [et al.]. Legislación aérea. Madrid: Tecnos, 2004.

Adsuar Mazón, J. C. Circulación aérea. Madrid: Paraninfo, 1994. ISBN 8428321205.

Sáez Nieto, Francisco Javier [et al.]. Sistemas y equipos para la navegación y circulación aérea. MAdrid: Universidad Politécnica, 1995.

Nolan, Michael S. Fundamentals of air traffic control. 4th ed. Belmont: Thomson--Brooks/Cole, 2004. ISBN 0534393756.

Kayton, Myron [et al.]. Avionics navigation systems. 2nd ed. New York: Wiley and Sons, 1997. ISBN 0471547956.

Skolnik, Merrill I. Radar handbook. New York: McGraw-Hill, 2008. ISBN 9780071485470.

Complementary:

Internacional Civil Aviation Organization. Operación de aeronaves: normas y métodos recomendados internacionales: anexo 6 al convenio sobre aviación civil internacional. Madrid: OACI, 1998.

International Civil Aviation Organization. Reglamento del aire: normas internacionales: anexo 2 al convenio sobre aviación civil internacional. 9a ed. Madrid: OACI, 1990.

International Civil Aviation Organization. Telecomunicaciones aeronáuticas: normas y métodos recomendados internacionales : anexo 10 al convenio sobre aviación civil internacional. 3a ed. Madrid: OACI, 1995.

Gil Diez, J.M. ATC control de tráfico aéreo. Madrid: Paraninfo, 1984. ISBN 9788428312882.

Skolnik, Merrill I. Introduction to radar systems. 3rd ed. Boston: McGraw-Hill, 2001. ISBN 0072909803.

Sáez Nieto, F.J [et al.]. La navegación aérea y el aeropuerto. Madrid: Fundación Aena, 2002. ISBN 8495567091.

Others resources:

Hyperlink

www.eurocontrol.int
Eurocontrol

www.icao.int
International Civil Aviation Organization

www.aena.es
Aeropuertos Españoles y Navegación Aérea

www.ignss.org
International Global Navigation Satellite System Society

www.esa.int
European Space Agency