Course guide
300089 - ASM_MUEA - Aviation Safety Management

Last modified: 06/06/2024

Unit in charge: Castelldefels School of Telecommunications and Aerospace Engineering
Teaching unit: 748 - FIS - Department of Physics.

Degree: MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject).

Academic year: 2024 **ECTS Credits:** 5.0 **Languages:** English

LECTURER

Coordinating lecturer: Jovana Kuljanin

Others: Raúl Sáez García

PRIOR SKILLS

Previous concepts include knowledge of air traffic management, given in any bachelor's degree in aerospace engineering and reviewed in previous subjects of this Master's degree, as well as familiarity with the use of computing tools for engineering. Familiarity with Python and/or Matlab is required.

REQUIREMENTS

Concepts seen in 220309 - Transport Aeri i Sistemes de Navegació
(https://www.upc.edu/estudispdf/guia_docent.php?codi=220309&idioma=en)

TEACHING METHODOLOGY

The course combines the following teaching methodologies:
- Theory classes.
- Autonomous learning: students will study using self-learning material.
- Cooperative learning: students will form small group (2-4 people) to fulfill some of the activities of the course.
- Project based learning: students will build a small team project (3-4 people).

Directed learning hours will consist in exercises and practical examples, after the theory classes in which the professor exposes the content of the subject. With the directed learning hours, the students will be motivated to participate actively in their education and to complete the knowledge acquired during theory classes, usually with the help of computers.

LEARNING OBJECTIVES OF THE SUBJECT

This course addresses the main methodologies for safety assessment in aviation. Different methods for hazard identification and risk assessments of strategies will be examined with special emphasis on the safety assessment of the system as a whole. A broad range of accident modelling approaches will be presented, with special focus on novel approaches recently emerged in aviation safety field. At the end of the course, the student will be able to:
. understand the general concept of safety in the aviation;
. understand different types of safety reports and metrics;
. perform safety assessment in the case of implementation of new systems and/or modification of current ones;
. model and validate accidents/incidents applying different approaches;

STUDY LOAD

Type	Hours	Percentage
Self study	80,0	64.00
Hours large group	45,0	36.00

Total learning time: 125 h

CONTENTS

Introduction to Safety

Description:
- Definition and Basic concepts of Risk and Safety.
- Safety records and Safety metrics (accident statistics, accident causal factors, real-life examples)
- Sources of Accident/Incident Information (notification, investigation, reporting)
- Just Culture concept (Evaluating the benefits of punishment versus learning)

Full-or-part-time: 14h
Theory classes: 6h
Laboratory classes: 2h
Self study : 6h

Safety threats and management

Description:
Overview, description and literature review on:
- Human factor, error and performance
- Airport safety issues (runway excursion, loss of separation, controlled flight into terrain)
- Safety management concepts
- Safety assessment methodology (TOPAZ and SAM)

Full-or-part-time: 25h
Theory classes: 6h
Laboratory classes: 3h
Self study : 16h

Methods for Safety assessment

Description:
Overview, description and literature review on:
-Causal methods/models
-Human Error Models (HESRA, HERA, TRACER-lite, etc.)
-Accident modelling approaches (Technical, Human Factors, Organizational, Systemic)
-Conflict detection and resolution methods

Full-or-part-time: 34h
Theory classes: 10h
Laboratory classes: 4h
Self study : 20h

Project I: Accident modelling by novel methodologies

Description:
Having a detailed insight into a large set of potential methods/models, the students will develop an systemic accident models in order to find the cause of aircraft accident/incident. The models will be applied on a case of mid-air collision of two planes. A report will be delivered and a presentation summarizing the achievement will be given in front of the rest of students.

Full-or-part-time: 52h
Theory classes: 3h
Guided activities: 11h
Self study : 38h

GRADING SYSTEM

Participation in class and exercises: 10%
Individual exams and tests: 35%
Projects and presentations: 55%

BIBLIOGRAPHY

Basic:
- "Air Traffic Safety: Continued Evolution or a New Paradigm?". Air Traffic Safety: Continued Evolution or a New Paradigm? [on line]. [Consultation: 01/07/2022]. Available on: https://dspace.lib.cranfield.ac.uk/bitstream/handle/1826/1967/Air%20Traffic%20Safety-Transport%20Risk%20Management%20Lecture-2007.pdf;jsessionid=6ADD2AF6BD2A6239855AB608D63D4DFD?sequence=1.- Dunjó, J.;Fthenaki, V.;Vílchez, J.; Arnaldos J. "Hazard and operability (HAZOP) analysis: A literature review". Journal of Hazardous Materials [on line]. 2010 vol. 173 p. 19-32 [Consultation: 22/06/2022]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/search?qs=DUNJO%20HAZARD&pub=Journal%20of%20Hazardous%20Materials&cid=271390.- Brooker P.,. "Future Air Traffic Management: Quantitative En Route Safety Assessment Part 2: New Approaches". The Journal of Navigation [on line]. Vol.55 (3), p.363-379 [Consultation: 01/07/2022]. Available on: https://doi.org/10.1017/S037346330200187X.- Netjasov, Fedja. Air transport safety: an introduction. New York: Nova Publishers, [2015]. ISBN 9781633219274.
- Brooker, P.. "Experts, Bayesian Belief Networks, rare events and aviation risk estimates". Safety science [on line]. 2011, vol. 49, núm 8-9, p.1142-1155 [Consultation: 22/06/2022]. Available on: https://www-sciencedirect-com.recursos.biblioteca.upc.edu/science/article/pii/S0925753511000762.