

Course guide 220325 - 220325 - Air Transport

Last modified: 02/04/2024

Unit in charge:	Terrassa School of Industrial, Aerospace and Audiovisual Engineering	
Teaching unit:	732 - OE - Department of Management.	
Degree:	MASTER'S DEGREE IN AERONAUTICAL ENGINEERING (Syllabus 2014). (Optional subject). MASTER'S DEGREE IN SPACE AND AERONAUTICAL ENGINEERING (Syllabus 2016). (Optional subject).	
Academic year: 2024	ECTS Credits: 5.0 Languages: English	

LECTURER

Coordinating lecturer: Lordan Gonzalez, Oriol

Others:

PRIOR SKILLS

Students must have a good knowledge of R and data.table package (taught in 220309 - Transport Aeri i Sistemes de Navegació).

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES

Specific:

CEEAEROP3. MUEA/MASE: The ability to apply analytical and business management techniques to aeronautical companies (specific competency for the specialisation in Airports).

CEEAEROP1. MUEA/MASE: The ability to analyse airport operations, planning and air transport (specific competency for the specialisation in Airports).

TEACHING METHODOLOGY

The course is divided into parts:

- Theory classes
- Practical classes
- Self-study for doing exercises and activities

In the theory classes, teachers will introduce the theoretical basis of the concepts, methods and results and illustrate them with examples appropriate to facilitate their understanding.

In the practical classes (in the classroom), teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning. We propose that students solve exercises in and outside the classroom, to promote contact and use the basic tools needed to solve problems.

Students, independently, need to work on the materials provided by teachers and the outcomes of the sessions of exercises/problems, in order to fix and assimilate the concepts. The teachers provide the syllabus and monitoring of activities (by ATENEA).

LEARNING OBJECTIVES OF THE SUBJECT

This course introduces the concepts, principles and fundamentals of optimization problems for analysis and decision-making of airline operations and scheduling such as fleet assignment, aircraft routing and crew scheduling. But first, students will learn to solve mixed integer linear problems and report with R Markdown.



STUDY LOAD

Туре	Hours	Percentage
Hours small group	15,0	12.00
Self study	80,0	64.00
Hours large group	30,0	24.00

Total learning time: 125 h

CONTENTS

Module 1: Introduction

Description:

- Mixed integer linear programming
- Reporting with R Markdown
- Flight scheduling

Related activities:

Assignment 1

Full-or-part-time: 41h 40m Theory classes: 10h Laboratory classes: 5h

Self study : 26h 40m

Module 2: Fleet assignment

Description:

- Introduction
- Fleet assignment problem
- Fleet assignment linear model

Related activities: Assignment 2

Full-or-part-time: 31h 15m Theory classes: 7h 30m Laboratory classes: 3h 45m Self study : 20h

Module 3: Aircraft Routing

Description:

- Introduction
- Aircraft routing problem
- Aircraft routing linear model

Related activities: Assignment 3

Full-or-part-time: 31h 15m Theory classes: 7h 30m Laboratory classes: 3h 45m Self study : 20h



Module 4: Crew scheduling

Description:

- Introduction
- Crew pairing problem
- Crew pairing linear model
- Crew rostering problem
- Crew rostering linear model

Related activities: Assignment 4 Assignment 5

Full-or-part-time: 20h 50m Theory classes: 5h Laboratory classes: 2h 30m Self study : 13h 20m

GRADING SYSTEM

The final grade depends on the following assessment criteria:

Assignment 1: 15% (10% result + 5% report) Assignment 2: 25% (15% result + 10% report) Assignment 3: 30% (20% result + 10% report) Assignment 4: 15% (10% result + 5% report) Assignment 5: 15% (10% result + 5% report)

As there are no written tests, there won't be any exam to retake.

BIBLIOGRAPHY

Basic:

- Barnhart, C.; Smith, B.C. Quantitative problem solving methods in the airline industry: a modeling methodology handbook [on line]. New York [etc.]: Springer, cop. 2012 [Consultation: 01/06/2023]. Available on: https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?docID=884293. ISBN 9781461416074.

- Yu, Gang. Operations research in the airline industry. Boston: Kluwer Academic Publishers, 1998. ISBN 9781461375135.

- Bazargan, Massoud. Airline operations and scheduling [on line]. 2nd ed. London; New York: Routledge, 2016 [Consultation: 03/05/2022]. Available on:

https://ebookcentral-proquest-com.recursos.biblioteca.upc.edu/lib/upcatalunya-ebooks/detail.action?pq-origsite=primo&docID=5545 59. ISBN 9786612657580.

Complementary:

- Pindado Carrión, S. Elementos de transporte aéreo. Madrid: Escuela Técnica Superior de Ingenieros Náuticos, DL 2006. ISBN 9788492111398.

- Sallán, J.M. [et al.]. Métodos cuantitativos de organización industrial I [on line]. 2ª ed. Barcelona: Edicions UPC, 2005 [Consultation: 17/11/2016]. Available on: http://hdl.handle.net/2099.3/36256. ISBN 8483017954.

- Fonollosa, Joan B. [et al.]. Métodos cuantitativos de organización industrial II [on line]. [2ª ed.]. Barcelona: Edicions UPC, 2005 [Consultation: 17/11/2016]. Available on: <u>http://hdl.handle.net/2099.3/36257</u>. ISBN 8483017946.