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220044 - Optimization of Industrial Processes

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

Teaching unit: 707 - ESAII - Department of Automatic Control

Academic year: 2019

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

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: ANTONIO GUASCH PETIT

Others: VICENÇ PUIG CAYUELA - JAUME FIGUERAS JOVE

Degree competences to which the subject contributes

Specific:

2. The ability to solve mathematical problems that may arise in an engineering context. The ability to apply knowledge of linear algebra; geometry; differential geometry; differential and integral calculus; differential and partial differential equations; numerical methods; numerical algorithms; statistics and optimisation

Transversal:

1. 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.

Teaching methodology

The course is developed by the use of:

- Lecture sessions.
- Problem-solving classes (case studies and exercises).
- Self-study which includes exercises and activities.
- A project

Learning objectives of the subject

Optimization is the art and science of allocating scarce resources to the best possible effect. Optimization techniques are called into play every day in industrial planning problems, industrial design, resource allocation, scheduling, decision-making, etc. For example: how does an airliner know how to route its planes and schedule its crews at minimum cost; while meeting constraints on airplane flight hours between maintenance and maximum flight time for crews? Another example could be how to schedule body cars into a painting line such as the planned production can be achieved?

The main goals of this course will be:

1. recognize problems that can be tackled using the tools of applied optimization,
2. formulate optimization problems correctly and appropriately,
3. solve optimization problems, primarily by selecting and applying the correct solvers.

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These abilities will be especially useful as the world becomes more complex and computer-focused.

Study load

Total learning time: 75h	Hours large group:	30h	40.00%
	Self study:	45h	60.00%

Content

Module 1: Introduction

Learning time: 12h 30m

Theory classes: 5h
Self study : 7h 30m

Description:
Optimization application areas. Introduction to methods, models and tools for the optimization of industrial processes.

Module 2: Modeling and optimitzation of industrial processes

Learning time: 62h 30m

Theory classes: 25h
Self study : 37h 30m

Qualification system

The final grade depends on the following evaluation criteria

Nfinal = 0.5*Ex + 0.35*Pr + 0.15*Cl

- Ex: individual and group exercises
- Pr: group project
- Cl: participation in class activities

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Bibliography

Basic:

Bazargan, Massoud. Airline operations and scheduling [on line]. 2nd ed. England: Ashgate Pubishing Limited, 2010 [Consultation: 21/05/2014]. Available on: <http://site.ebrary.com/lib/upcatalunya/docDetail.action?docID=10400548&p00=airline%20operations%20scheduling>. ISBN 9780754679004.

Complementary:

Shapiro, Jeremy F. Modeling the supply chain. 2nd ed. Belmont: Thomson Brooks/Cole, 2007. ISBN 049512611X.