

Academic Year: (2024 / 2025)

Review date: 04-02-2025

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: ARMINGOL MORENO, JOSE MARIA

Type: Electives ECTS Credits : 6.0

Year : 4 Semester :

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Industrial Automation I
Control Engineering

SKILLS AND LEARNING OUTCOMES

- RA1.3: Coherent knowledge of their branch of industrial engineering including some at the forefront of the branch.
- RA2.1: The ability to apply their knowledge and understanding to identify, formulate and solve engineering problems using established methods.
- RA3.1: The ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements.
- RA5.2: The ability to combine theory and practice to solve engineering problems.
- RA5.3: An understanding of applicable techniques and methods, and of their limitations.
- RA6.3: Demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice.
- CB1: Students have demonstrated possession and understanding of knowledge in an area of study that builds on the foundation of general secondary education, and is usually at a level that, while relying on advanced textbooks, also includes some aspects that involve knowledge from the cutting edge of their field of study.
- CB2: Students are able to apply their knowledge to their work or vocation in a professional manner and possess the competences usually demonstrated through the development and defence of arguments and problem solving within their field of study.
- CG1: Ability to resolve problems with initiative, creativity decision-making and critical reasoning skills, and to communicate and transmit knowledge, skills and abilities in the Industrial Engineering area.
- CG3: Capacity to design a system, component or process in the area of electronic and automatic engineering in compliance with required specifications.
- CE8: Knowledge of regulators and control techniques and application to industrial automation.
- CE11: Capacity for designing control systems and industrial automation.

OBJECTIVES

By the end of this content area, students will be able to have:

1. coherent knowledge of their branch of engineering including some at the forefront of the branch in vehicle automation applications;
2. the ability to apply their knowledge and understanding of automation applications to identify, formulate and solve engineering problems using established methods in vehicle automation;
3. the ability to apply their knowledge and understanding to develop and realise designs of automation applications to meet defined and specified requirements (localization, control and communications);
4. workshop and instrumentation skills.
5. an understanding of applicable techniques and methods in automation applications, and of their limitations;
6. demonstrate awareness of the health, safety and legal issues and responsibilities of engineering practice, the impact of engineering solutions in a societal and environmental context, and commit to professional ethics, responsibilities and norms of engineering practice;

DESCRIPTION OF CONTENTS: PROGRAMME

- 1- Introduction.
- 2- Automotive embedded systems.
 - 2.1 - Safety features in cars
 - 2.2 - Advanced driver assistance systems
 - 2.3 - Intelligent vehicles
- 3- Rail embedded systems.
 - 3.1 - Railway installations
 - 3.2 - Rail signalling system
 - 3.3 - Maintenance
- 4- Aircraft embedded systems.
 - 4.1 - Flight control systems
 - 4.2 - Air navigation
 - 4.3 - Unmanned Air systems
- 5- Traffic Control Systems.
 - 5.1- Road, Railroad and Aerial Safety
 - 5.2 - Environmental impact

LEARNING ACTIVITIES AND METHODOLOGY

- Skillful classes, classes of resolution of doubts in reduced groups, individual presentations of the students, individual tutorials and personal work of the student; oriented to the theoretical knowledge acquisition (3 credits ECTS).
- Practices of laboratory and individual classes of problems in reduced groups, individual tutorials and personal work of the student; oriented to the acquisition of practical abilities related to the program of the subject (3 credits ECTS).

ASSESSMENT SYSTEM

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

Continuous evaluation based on works, participation in class and tests of evaluation of abilities and knowledge.

BASIC BIBLIOGRAPHY

- E. H. J. Pallett & Shawn Coyle Automatic Flight Control, Blackwell Science Ltd., 1993
- Editors: Eskandarian, Azim (Ed.) Handbook of Intelligent Vehicles, Springer, 2012
- LOPEZ PITA, ANDRES FERROCARRIL Y AVION EN EL SISTEMA DE TRANSPORTES EUROPEO, UPC, 2001
- Navet N. Automotive embedded systems handbook, CRC Press, 2009

ADDITIONAL BIBLIOGRAPHY

- Bishop, Richard Intelligent vehicle technology and trends, Artech House, 2005
- Bonnett, Clifford F. Practical railway engineering , Imperial College Press, 2005
- Chen, Yaobin; Li, Lingxi Advances in Intelligent Vehicles, Elsevier, 2014
- Lemke K. Embedded security in cars, Springer, 2006
- Roger W. Pratt Flight Control Systems, Loughborough University - Progress in Astronautics and Aeronautics Series, V-184 Published by AIAA, 2000

- Roger W. Pratt Flight Control Systems, Loughborough University - Progress in Astronautics and Aeronautics Series, V-184 Published by AIAA, 2000

- Yaobin Chen, Lingxi Li Advances in Intelligent Vehicles, Elsevier, 2014

BASIC ELECTRONIC RESOURCES

- . Intelligent Vehicles Enabling Technologies and Future Developments:
<http://https://www.sciencedirect.com/book/9780128128008/intelligent-vehicles>

- Yaobin Chen and Lingxi Li . Advances in Intelligent Vehicles :
[//http://www.sciencedirect.com/science/book/9780123971999](http://www.sciencedirect.com/science/book/9780123971999)