Course guide
240276 - 240AU133 - Software Architecture and Evaluation

Unit in charge: Barcelona School of Industrial Engineering
Teaching unit: 747 - ESSI - Department of Service and Information System Engineering.
Degree: MASTER'S DEGREE IN INDUSTRIAL ENGINEERING (Syllabus 2014). (Optional subject).
MASTER'S DEGREE IN AUTOMOTIVE ENGINEERING (Syllabus 2019). (Optional subject).
Academic year: 2022
ECTS Credits: 4.5
Languages: Catalan, Spanish

LECTURER
Coordinating lecturer: Franch Gutiérrez, Javier
Martínez Fernández, Silverio Juan
Others:

PRIOR SKILLS
Basic knowledge of programming

DEGREE COMPETENCES TO WHICH THE SUBJECT CONTRIBUTES
Specific:
CEAU 3. (ENG) Explicar l'arquitectura d'un vehicle d'automoció, el seu comportament, les seves parts i els sistemes que l'integren.
CEAU 1. (ENG) Realitzar models d'enginyeria, aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, per al disseny, simulació, optimització i control de processos i sistemes.
CEAU14. (ENG) Seleccionar i utilitzar les eines adequades per dissenyar elements d'automoció en resposta a les especificacions tècniques donades.

Generical:
CGAU10. Adapt to changes, being able to apply new and advanced technologies and other relevant processes, initiative and entrepreneurship
CGAU11. Develop independent learning skills to maintain and enhance the powers of Automotive Engineering, to allow the continued development of the profession.

Transversal:
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

TEACHING METHODOLOGY
Theory lessons will be based upon the combination of concept exposition by the teacher and active participation by the student.
Laboratory classes will consist mainly in the individual solving of exercises by the student with overall analysis in the class.

LEARNING OBJECTIVES OF THE SUBJECT
The objective of this course will be to expose the architecture of an intelligent vehicle at the level of hardware, units and software, and acquire the basic abilities for the design and evaluation of such architecture.
CONTENTS

Software engineering

Description:
Preliminaries. Software life cycle. Automotive SPICE

Related competencies:
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Full-or-part-time: 6h
Theory classes: 4h
Laboratory classes: 2h

Software Requirements

Description:
Requirements elicitation, documentation, validation and management. Non-functional requirements: sustainability, security/safety.

Related competencies:
CGAU10. Adapt to changes, being able to apply new and advanced technologies and other relevant processes, initiative and entrepreneurship
CGAU11. Develop independent learning skills to maintain and enhance the powers of Automotive Engineering, to allow the continued development of the profession.
CEAU3. (ENG) Explicar l'arquitectura d'un vehicle d'automoció, el seu comportament, les seves parts i els sistemes que l'integren.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Full-or-part-time: 12h
Theory classes: 8h
Laboratory classes: 4h

Software architecture

Description:
Architectural levels. Architectural models. Components and connectors. AUTOSAR and MAPE-K reference architectures

Related competencies:
CGAU11. Develop independent learning skills to maintain and enhance the powers of Automotive Engineering, to allow the continued development of the profession.
CEAU14. (ENG) Seleccionar i utilitzar les eines adequades per dissenyar elements d'automoció en resposta a les especificacions tècniques donades.
CEAU3. (ENG) Explicar l'arquitectura d'un vehicle d'automoció, el seu comportament, les seves parts i els sistemes que l'integren.
CEAU1. (ENG) Realitzar models d'enginyeria, aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, per al disseny, simulació, optimització i control de processos i sistemes.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

Full-or-part-time: 12h
Theory classes: 8h
Laboratory classes: 4h
**Software evaluation**

**Description:**
Verification and validation. Functional tests. System integration tests

**Related competencies:**
CEAU14. (ENG) Seleccionar i utilitzar les eines adequades per dissenyar elements d'automoció en resposta a les especificacions tècniques donades.
CEAU 3. (ENG) Explicar l'arquitectura d'un vehicle d'automoció, el seu comportament, les seves parts i els sistemes que l'integren.
CEAU 1. (ENG) Realitzar models d'enginyeria, aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, per al disseny, simulació, optimització i control de processos i sistemes.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

**Full-or-part-time:** 6h
Theory classes: 4h
Laboratory classes: 2h

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**Big Data and Connected Vehicles**

**Description:**
Process through Big Data solutions of the huge amount of data collected by the different sensors, not only of the cars, but also of the context (e.g., smart roads).

**Related competencies:**
CGAU10. Adapt to changes, being able to apply new and advanced technologies and other relevant processes, initiative and entrepreneurship
CGAU11. Develop independent learning skills to maintain and enhance the powers of Automotive Engineering, to allow the continued development of the profession.
CEAU 1. (ENG) Realitzar models d'enginyeria, aplicar mètodes innovadors en la resolució de problemes i aplicacions informàtiques adequades, per al disseny, simulació, optimització i control de processos i sistemes.
CT4. EFFECTIVE USE OF INFORMATION RESOURCES: Managing the acquisition, structuring, analysis and display of data and information in the chosen area of specialisation and critically assessing the results obtained.

**Full-or-part-time:** 8h
Theory classes: 6h
Laboratory classes: 2h

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**GRADING SYSTEM**

The final mark is composed of two parts: theory (50%) and laboratory (50%). The theory part is evaluated by means of two partial exams, each weighting 25%. The first partial exam can be repeated if failed in the same act as the second partial exam. The laboratory part is evaluated continuously along the course, in the fortnightly laboratory sessions. The attendance to laboratory classes must be 100% in order to pass the course, except in cases justified by writing.
BIBLIOGRAPHY

Basic:

Complementary:

RESOURCES

Hyperlink:

Other resources:
http://publica.fraunhofer.de/documents/N-186361.html