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220063 - Introduction to Reverse Engineering

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

Teaching unit: 729 - MF - Department of Fluid Mechanics

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)
BACHELOR'S DEGREE IN INDUSTRIAL DESIGN AND PRODUCT DEVELOPMENT ENGINEERING (Syllabus 2010). (Teaching unit Optional)
BACHELOR'S DEGREE IN TEXTILE TECHNOLOGY AND DESIGN ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN CHEMICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN INDUSTRIAL ELECTRONICS AND AUTOMATIC CONTROL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN ELECTRICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN AUDIOVISUAL SYSTEMS ENGINEERING (Syllabus 2009). (Teaching unit Optional)
BACHELOR'S DEGREE IN MECHANICAL ENGINEERING (Syllabus 2009). (Teaching unit Optional)

ECTS credits: 3 Teaching languages: English

Teaching staff

Coordinator: Moreno Llagostera, Hipolit

Degree competences to which the subject contributes

Specific:

1. An understanding of the basic principles of fluid mechanics and their application in solving engineering problems. The ability to calculate pipes, channels and fluid systems.
2. Applied knowledge of manufacturing systems and processes, metrology and quality control
3. Applied knowledge of the fundamentals of fluid-mechanics systems and machines.

Teaching methodology

The course is divided into parts:
Theory & laboratory/seminar 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 laboratory/seminar), teachers guide students in applying theoretical concepts to solve problems, always using critical reasoning. We propose that students work in and outside the classroom, o promote contact and use the basic tools needed. These activities help the student learn the principles behind the design of the product under study, uncover the inner workings of the device, as well as ways to redesign and improve the performance of the system.
The teachers provide the curriculum and monitoring of activities (by ATENEA).

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Learning objectives of the subject

A systematic methodology for analyzing the design of an existing device or system, either as an approach to study the design or as a prerequisite for re-design. The student will be looking at things like the material that the object is made of, the mechanisms that are required, the strength of the materials used, etc.
A reverse engineering activity in the form of a project could enhance engineering students' learning experiences through the tear down of an existing product or device. This activity helps the student learn the principles behind the design of the product under study, uncover the inner workings of the device, as well as ways to redesign and improve the performance of the system.

Study load

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

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Content

Module 1: Identifying the product or component which will be reverse engineered

Learning time: 10h
Theory classes: 5h
Self study : 5h

Description:
In the first stage in the process, sometimes called "prescreening," reverse engineers determine the candidate product for their project. Potential candidates for such a project include singular items, parts, components, units, subassemblies, some of which may contain many smaller parts sold as a single entity.

Module 2: Observing or disassembling the information documenting how the original product works

Learning time: 10h
Theory classes: 5h
Self study : 5h

Description:
The second stage, disassembly or decompilation of the original product, is the most time-consuming aspect of the project. In this stage, reverse engineers attempt to construct a characterization of the system by accumulating all of the technical data and instructions of how the product works.

Module 3: Implementing the technical data generated by reverse engineering in a replica or modified version of the original

Learning time: 20h
Theory classes: 5h
Self study : 15h

Description:
In the third stage of reverse engineering, reverse engineers try to verify that the data generated by disassembly or decompilation is an accurate reconstruction the original system. Engineers verify the accuracy and validity of their designs by testing the system, creating prototypes, and experimenting with the results.

Module 4: Creating a new product (and, perhaps, introducing it into the market)

Learning time: 25h
Theory classes: 10h
Self study : 15h

Description:
The final stage of the reverse engineering process is the introduction of a new product into the marketplace. These new products are often innovations of the original product with competitive designs, features, or capabilities. These products may also be adaptations of the original product for use with other integrated systems, such as different platforms of computer operating systems.

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Module 5: Final report	Learning time: 10h Theory classes: 5h Self study : 5h
Description: Presentation and public defense	

Qualification system

The final grade depends on the following assessment criteria:

- Report nº 1, weight: 20 %
- Report nº 2, weight: 20 %
- Report nº 3, weight: 20 %
- Final report, weight: 20 %
- Presentation and Public Defense weight: 20 %

Due to the nature of this subject's evaluative items, no final exam day will be scheduled at the final exams calendar.

Bibliography

Basic:

Altshuller, G.; Altov, H.; Shulyak, L. And suddenly the inventor appeared: Triz, the theory of inventive problem solving. 2nd ed. Worcester, Mass: Technical Innovation Center, 2004. ISBN 9780964074026.

Streeter, Victor L. Handbook of fluid dynamics. New York: McGraw-Hill, 1961. ISBN 9780070621787.