

28834 - Integrated Project

Syllabus Information

Academic Year: 2022/23

Subject: 28834 - Integrated Project

Faculty / School: 175 - Escuela Universitaria Politécnica de La Almunia

Degree: 424 - Bachelor's Degree in Mechatronic Engineering

ECTS: 6.0

Year: 4

Semester: First semester

Subject Type: Compulsory

Module:

1. General information

1.1. Aims of the course

The objective of the course is to train the student in the production of mechatronic projects by applying the multidisciplinary knowledge for the analysis, design, development and manufacturing of prototypes and documentation. Not only will the basics be studied, but also the student will go further into analysis and to design. The student must be able to build and start up, a functional prototype in the laboratory, from the posed mechatronic solution suggested along the course.

These approaches and objectives are in line with the following Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda (<https://www.un.org/sustainabledevelopment/>), in such a way that the acquisition of the course learning outcomes provides training and competence to contribute to their achievement to some degree

Goal 4: Quality Education

4.3 Ensure equal access for all women and men to affordable and quality technical, vocational and tertiary education, including university.

4.4 Substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship.

Goal 5: Gender Equality

5.1 End all forms of discrimination against all women and girls everywhere.

1.2. Context and importance of this course in the degree

The Integrated Project Course, focused on the practical content and based on the solving of problems and projects applying interdisciplinary techniques for the production of mechatronic systems, offers a global view that allows to study, develop, innovate and implement complex comprehensive solutions.

1.3. Recommendations to take this course

The Integrated Project course does not have mandatory prior requirements, but it is advisable for the students of the Degree to have at least completed the following subjects: Fluid Engineering, Basic Physics I and II, Computer Science, Electrical and Mechanical Engineering, Electronic Technology I and II, Materials Engineering, Automatic Regulation and Control, Machine Calculation and Design, Manufacturing Processes I and II, Programmable Electronic Systems and Electronic Instrumentation.

2. Learning goals

2.1. Competences

- GI03: Knowledge of basic and technological subjects, enabling them to learn new methods and theories, and provide them with versatility to adapt to new situations.
- GI04: Ability to solve problems with initiative, decision making, creativity, critical thinking and to communicate and transmit knowledge, abilities and skills in the field of Industrial Engineering

- GC01: Ability to integrate and apply mechanical, electronic and control knowledge in the design, development and maintenance of products, equipment or industrial facilities.
- GC02: Interpret experimental data, contrast them with the theoretical ones and draw conclusions.
- GC04: Ability for lifelong, independent learning.
- GC05: Ability to evaluate alternatives.
- GC08: Ability to locate technical information, as well as its understanding and evaluation.
- GC09: Positive attitude towards technological innovations.
- GC10: Ability to produce technical documentation and present it with the help of appropriate computer tools
- GC13: Ability to assess the technical and economic feasibility of complex projects.
- GC14: Ability to understand the operation and develop maintenance of mechanical, electrical and electronic equipment and installations.
- GC15: Ability to analyze and apply simplified models to technological equipment and applications that allow to make predictions about their behavior.
- GC17: Ability to correctly interpret plans and technical documentation.
- GC18: Demonstrate control of multidisciplinary knowledge and skills acquired through the production, presentation and defense, individually or in groups, of a project in the field of specific technologies involved in Mechatronics, in which such knowledge and skills are synthesized and integrated.
- IE12: Knowledge and skills to organize and manage projects. Know the organizational structure and functions of a Project Office.

2.2. Learning goals

Understanding of concepts related to the knowledge areas of the degree.

Understand, order and transmit the information obtained from different sources.

Present the work done coherently, orally and in writing.

Motivation and self-learning ability.

Preparation and interpretation of plans and diagrams according to the regulations and appropriate symbols.

2.3. Importance of learning goals

It is a course included in the module called Projects. Based on problem solving and practical projects representative of numerous industrial sectors, allows the student to strengthen and demonstrate the knowledge acquired in the different disciplines of the degree, and may be considered a finalist course in the training of the soon-to-become Mechatronic Engineer.

3. Assessment (1st and 2nd call)

3.1. Assessment tasks (description of tasks, marking system and assessment criteria)

The student must demonstrate that they have achieved the expected learning outcomes by the assessment of the following activities:

- **Laboratory Practice Activities:** In each of the practice activities the results obtained and the process followed will be evaluated. Once the practice tasks have been completed, a report must be produced. This activity is valued from 0 to 10 points and students must get a minimum score of 4 points in each one to make an average. This activity will be carried out individually.

? Course Project: A course project will be posed throughout the course. It is a document with basic specifications of the design and manufacturing of a mechatronic solution. The project will be specified at the beginning of the course and will be communicated in class and at <http://moodle.unizar.es/>, and the student will be guided all along the development process.

Assessment activity	Weighting
Laboratory practice activities	25%
Written assessment tests and posed works	75%

To opt for the Continuous Assessment system, at least 80% of the classroom classes (practical, technical visits, classes, etc.) must be attended

Global assessment test.

Following the regulations of the University of Zaragoza in this regard, in courses that offer continuous assessment, a global evaluation test will be scheduled for those students who decide to opt for this second system.

4. Methodology, learning tasks, syllabus and resources

4.1. Methodological overview

The methodology followed in this course is focus on the achievement of the learning objectives. A wide range of teaching and learning tasks are implemented, such as:

1. Lectures: The theoretical concepts of the subject are explained and illustrative examples are developed as a support to the theory when necessary, focused on calculation, design and development of a mechatronic system
2. Laboratory Workshop. These classes are highly recommended for a better understanding of the concepts because those items whose calculation is done in theory classes are shown in working mode.
3. Tutorials related to any concept of the subject. This activity is developed in an on-site mode with a defined schedule or through the messaging and forum of the Moodle virtual classroom.

The approach, methodology and assessment of this guide are intended to be the same for any teaching scenarios. They will be adapted to the social-health situation at any particular time, as well as to the instructions given by the authorities concerned.

4.2. Learning tasks

The course includes the following learning tasks:

Lectures. They will take up 2 hours per week till the 30 hours, necessary to accomplish the objectives of the subject study, are reached.

Laboratory Workshop. It will take up 15 sessions of 2 hours duration. The group is divided up into various groups, according to the laboratory capacity.

Autonomous work and study. This off-site part is equivalent to 90 hours, necessary for the study of theory, problem solving and revision of documents.

Tutorials. Each teacher will announce a Student Tutorial Timetable throughout the four-month period.

4.3. Syllabus

Unit 1	State of the art and technical specification of a mechatronic project
Unit 2	Identification by modules. Block diagrams and information flows.
Unit 3	Mechatronic systems Modeling and simulation
Unit 4	Mechatronic systems Design
Unit 5	Prototype Manufacturing
Unit 6	Programming, verification and functional tests
Unit 7	Cost Analysis and Documentation
Unit 8	Final Course Project

4.4. Course planning and calendar

In the continuous assessment mode, the delivery of several partial works and a final course work whose delivery dates will be defined during the course is mandatory

The final dates will be published in the digital teaching network (Moodle)

The global assessment test will be held at the end of the semester and will consist of a written test on theoretical arguments and problems of all the topics explained in class. The dates will be those officially posted in <https://eupla.unizar.es/asuntos-academicos/examenes>.

The class timetable will be found on the EUPLA website <http://www.eupla.unizar.es/>.

In addition, students will have, at the beginning of the course, the dates and places of the exams necessary to pass this subject.

4.5. Bibliography and recommended resources

<http://psfunizar10.unizar.es/br13/egAsignaturas.php?codigo=28834>