

**COURSE DATA****DATA SUBJECT****Code:** 34688**Name:** Automation systems and robotics**Cycle:** Undergraduate Studies**ECTS Credits:** 6**Academic year:** 2025-26**STUDY (S)**

Degree	Center	Acad. year	Period
1400 - Degree in Computer Engineering	Escola Tècnica Superior d'Enginyeria	4	Second quarter
1403 - Degree in Telematics Engineering	Escola Tècnica Superior d'Enginyeria	4	Second quarter

SUBJECT-MATTER

Degree	Subject-matter	Character
1400 - Degree in Computer Engineering	Optional subject	ELECTIVES
1403 - Degree in Telematics Engineering	Optional subjects	ELECTIVES

COORDINATION

VEGARA MESEGUER FRANCISCO

SUMMARY

This course presents to the student a general view of the knowledge, programming and use of devices for the interaction between computers and the real world. This includes robots, industrial automation systems, domotics and similar ones. The topics include from the acquisition of signals from the environment to the execution of actions that change this environment; this will include robots (either manipulators or autonomous robots) but also other devices for automation used in factories, homes or biomedical applications.

The main lines of the syllabus are as follows: measurement of physical magnitudes (sensorization). Movement generation (actuators). Communication devices (buses). Motor control. Manipulators and mobile robots. Perception and Intelligence.

Times\>



PREVIOUS KNOWLEDGE

RELATIONSHIP TO OTHER SUBJECTS OF THE SAME DEGREE

There are no specified enrollment restrictions with other subjects of the curriculum.

OTHER REQUIREMENTS

This subject has not previous requirements.

COMPETENCES / LEARNING OUTCOMES

1400 - Degree in Computer Engineering

IC2 - Ability to analyse, evaluate and select the most appropriate hardware and software platforms to support embedded and real-time applications.

IC3 - Ability to analyse, evaluate, select and configure hardware platforms for the development and implementation of computer applications and services.

DESCRIPTION OF CONTENTS

1. Nombre de la U.T. (English) Motivation and Introduction

Necessity of the automation in real processes. Current possibilities of automation. Robots and their current use.

2. Nombre de la U.T. (English): Sensorization

The information acquisition process. Types of sensors. Basic technologies and characteristics. Sensor choice and interpretation of the specifications. Characteristics of the signal. Digitalization. Signal preprocessing.

3. Nombre de la U.T. (English): Actuators and power.

Actuator types. Technologies and basic characteristics. Actuator choice and interpretation of the specifications. Sources of energy: characteristics and limitations. Power devices: storage and regulation.



4. Nombre de la U.T. (English): Control techniques.

Relationship between perception and action. The closed feedback control loop. Notion of controller. Types of controllers. Stability analysis, Parameter tuning.

5. Nombre de la U.T. (English): Software and intelligence

Architectures for the control of perception. Classification. Implementation: software, languages and real time issues. Artificial intelligence techniques: state spaces, learning algorithms.

WORKLOAD

PRESENCIAL ACTIVITIES

Activity	Hours
Theory	30,00
Laboratory	20,00
Classroom practices	10,00
Total hours	60,00

NON PRESENCIAL ACTIVITIES

Activity	Hours
Attendance at other activities	0,00
Individual or group project	32,00
Independent study and work	0,00
Preparation of lessons	40,00
Preparation for assessment activities	18,00
Resolution of case studies	0,00
Total hours	90,00

TEACHING METHODOLOGY

1 / Classroom work consisting of:

1.1 / Theory classes, which consist of the presentation and basic explanation of the corresponding matter. Periodically the lecturer will propose activities of short duration, which require the intervention of the students in order to confirm the understanding of the explained theory.

1.2 / Exercise classes, designed to solve problems of higher difficulty, either conceptual or temporal.

1.3 / Laboratory classes designed to experimentally verify some of the most relevant issues seen in the



classes of theory.

2 / Non-classroom work consisting of:

2.1 / Resolution and reporting exercises. These classes are meant to solve bulletins exercises proposed by the teacher and/or exposure in public of the resolution of some of them.

2.2 / Preparation for the examinations.

2.3 / Preparation of the laboratory practice, for which the student must have read and assimilated the content of the practice bulletin, as well as having reviewed the relevant theory.

3 / Tutorials individual and/or collective:

Certain individual unscheduled tutoring hours will be scheduled per week to which students may attend to clarify their doubts, as well as hours of collective scheduled tutoring for the clarification of the doubts raised during exercises classes.

EVALUATION

Key results intended to be achieved as a result of the learning of this matter are essentially practical, and are measured by the degree in which the student has acquired the skills referred to in point VIII. For this purpose, the assessment will be based primarily in the resolution of practical problems, simplified ones in the case of the review or the exercises, and real ones for the proposed main work.

According to the new model, we intend to give the final exam a not excessive prominence, but without arriving to a continuous assessment model. Selected teaching evaluation mechanism consists of the following items and assessments:

Assessment of participation (up to 5% of the final mark)

Assistance and implementation of practical work (up to 25% of the final mark)

Resolution of exercises (up to 20% of the final mark)

Final exam (up to 50% of the final mark)

For students unable to attend regular class, an alternative model is offered in which the evaluation of attendance to practical classes and participation are replaced by some additional work and special tutoring assistance, with an equivalent total percentage.

In the second examination call, the final mark will be obtained by averaging the exam with a weight of 50% and an exam on the submitted practical exercises with a weight of 20% in all cases. Furthermore, in the case of having failed the practicals in the first call the alumni will have to submit them again, individually.

The minimum required to overcome the subject will be the equivalent to a 4 out of 10 in the final examination as in the resolution of exercises. Other assessable items are not subject to minimum.

In any case, this subject requires the personal assistance to the laboratory and the execution of exercises in a progressive manner, according to the basic paradigm of the Bologna's model. Therefore, a student



cannot be admitted to examination without having performed such tasks because he/she has not been enrolled during at least one term. This excludes the possibility of an advanced examination call for these student.

Copying or plagiarism of any activity that is part of the evaluation will result in the impossibility of passing the course, and the student will then be subject to the appropriate disciplinary procedures indicated in the ACTION PROTOCOL FOR FRAUDULENT PRACTICES AT THE UNIVERSITY OF VALENCIA ([ACGUV 123/2020](#)).

REFERENCES

- Tadej Bajd, Matja Mihelj, Jadran Lenarcic, Alec Stanovnik, Marko Munih Robotics. International Series on INTELLIGENT SYSTEMS, CONTROL, AND AUTOMATION: SCIENCE AND ENGINEERING, VOLUME 43, Ed. Springer-Verlag ISBN 978-90-481-3775-6 Libro en línea desde la red de la UV en: <http://link.springer.com/book/10.1007%2F978-90-481-3776-3>
- Reza N. Jazar Theory of Applied Robotics: Kinematics, Dynamics, and Control, 2nd Edition Ed. Springer-Verlag ISBN 978-1-4419-1749-2 Libro en línea desde la red de la UV en: <http://link.springer.com/10.1007/978-1-4419-1750-8>
- George Bekey, Robert Ambrose, Robert, Vijay Kumar Robotics : State Of The Art And Future Challenges Ed. World Scientific ISBN 13 978-1-84816-006-4 Libro en línea desde la red de la UV en: <http://site.ebrary.com/lib/universvaln/Doc?id=10688042>
- Roland Siegwart, Illah R. Nourbakhsh, Davide Scaramuzza Introduction to Autonomous Mobile Robots (2nd Edition) Ed. The MIT Press ISBN 978-0-262-01534-6 Libro en línea desde la red de la UV en: <http://site.ebrary.com/lib/universvaln/Doc?id=10453037>
- Mark Rollins LEGO Technic Robotics Ed. Apress ISBN 978-1-4302-4980-1 Libro en línea desde la red de la UV en: <http://link.springer.com/10.1007/978-1-4302-4981-8>
- John-David Warren, Josh Adams, Halard Molle Arduino Robotics Ed. Apress ISBN 978-1-4302-3183-7 Libro en línea desde la red de la UV en: <http://link.springer.com/10.1007/978-1-4302-3184-4>