UNIVERSITAT DE BARCELONA

Teaching plan for the course unit

General information

Course unit name: Robotics and Mechatronics

Course unit code: 362708

Academic year: 2017-2018

Coordinator: Manuel Puig Vidal

Department: Department of Electronics and Biomedical Engineering

Credits: 3

Single program: S

Estimated learning time — Total number of hours 75

Face-to-face learning activities	45	
- Lecture		30
- Laboratory session		15
Independent learning	30	

Competences to be gained during study

Generic competences for the degree

- Initiative and creativity for solving technology-based problems, taking into account parameters such as cost, quality, safety, sustainability, time and professional ethics (instrumental).
- Capacity to work in a team or cross-disciplinary group (personal).
- Capacity to work independently (personal).

Specific competences for the degree

- Understanding of the interaction between electronics and other areas of knowledge (telecommunications and IT, as well as automotion, medicine, aeronautics, etc.) and ability to work efficiently as part of a multi-disciplinary team, applying the principles of related technologies and

suggesting potential improvements to the functions of electronic systems and innovations leading to the production of smaller, more powerful, cheaper and more sustainable systems.

- Capacity to conceive, design and produce electronic equipment and systems for industrial electronics and consumer electronics. A particular focus should be placed on the development of equipment for controlling an industrial plant or system and applications for the measurement, regulation and control of electronic systems.

Learning objectives

Referring to knowledge

— To understand and review the fields of application for mechatronics and robotics.

— To learn to use Matlab and Labview simulation environments.

— To learn control system theory.

— To learn different mechatronic and robotic systems.

— To learn different control systems for user interfaces.

Teaching blocks

1. Introduction to mechatronic and robotic systems
2. Classical and modern control systems
3. Mechatronic systems

3.1. Inverted pendulum

3.2. Magnetic levitation

4. Robotic systems

4.1. Arm-type robots

4.2. Mobile robots

5. User interface control

Teaching methods and general organization

The methodology of the course consists of:

— Lectures combined with exercise-solving activities.

— Research work and proposed exercises completed at home with the lecturer’s supervision.

— Development of additional practical laboratory sessions.

Official assessment of learning outcomes

Continuous assessment
The assessment of the course includes:

— Resolution of exercises at home and/or development of proposed research work (40%).

— Completion of laboratory practices (30%).

— Project examination (30%).

Repeat assessment

— Students have to complete the laboratory practice.

— Final examination: worth 100%.

In cases where plagiarism/copy is detected in any assessed activity, the minimum penalty will be to qualify said activity with a zero. If a student is found indulging in a second case of plagiarism/copy during the same year, the teacher will assess the course with a zero and the student will not have the possibility of reassessment.

Examination-based assessment

Single assessment
The assessment is carried out as follows:

— Students have to opt out of the continuous assessment procedure.

— Students have to complete the laboratory practices.

— Final examination: worth 100%.

Repeat assessment

— Students have to complete the laboratory practices.

— Final examination: worth 100%.

In cases where plagiarism/copy is detected in any assessed activity, the minimum penalty will be to qualify said activity with a zero. If a student is found indulging in a second case of plagiarism/copy during the same year, the teacher will assess the course with a zero and the student will not have the possibility of reassessment.

Reading and study resources

Book

BOLTON, W. *Mechatronics: electronic control systems in mechanical and electrical engineering.* 5th ed. Harlow: Pearson Education, 2015

CORKE, PETER. *Robotics, vision and control: fundamental algorithms in MATLAB*. Berlin: Springer, 2013

OGATA, KATSUHIKO. *Ingeniería de control moderna*. 5a ed. Madrid: Pearson Prentice Hall, 2010

REYES CORTÉS, FERNANDO. *Matlab aplicado a robótica y mecatrónica*. Barcelona: Marcombo, 2012