Control Engineering I

Academic Year: (2019 / 2020)   **Review date: 27/11/2019 12:19:11**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: ARMINGOL MORENO, JOSE MARIA

Type: Compulsory ECTS Credits : 6.0

Year : 3 Semester : 1

OBJECTIVES

By the end of this content area, students will be able to have:

1.   a systematic understanding of the key aspects and concepts of their branch of engineering in control engineering;

2.   coherent knowledge of their branch of engineering including some at the forefront of the branch in control engineering;

3.   the ability to apply their knowledge and understanding of control engineering to identify, formulate and solve engineering problems using established methods;

4.   the ability to apply their knowledge and understanding to develop and realise designs to meet defined and specified requirements;

5.   an understanding of design methodologies, and an ability to use them.

6.   workshop and laboratory skills.

7.   the ability to select and use appropriate equipment, tools and methods;

8.   the ability to combine theory and practice to solve control engineering problems;

9.   an understanding of applicable techniques and methods in control engineering, and of their limitations;

DESCRIPTION OF CONTENTS: PROGRAMME

1. Laplace Transform.
2. Modelling of systems:
 2.1 Linealization.
 2.2 Diagram Blocks.
 2.3 Transfer function.
3. Temporal analysis of systems:
 3.1 Influence of poles and zero.
 3.2 Response to standard signals.
 3.3 Systems of first and second order.
4. Frequential analysis of systems:
 4.1 Diagram of Bode.
 4.2 Design of filters.
5. Introduction to control systems:
 5.1 Architectures of control.
 5.2 Precision.
 5.3 Sensitivity to disturbances.
6. Temporary analysis of feedback systems:
 6.1 Root Locus.
7. Frequential analysis of feedback systems:
 7.1 Nyquist Diagram.
8. PID Controllers:
 8.1 Temporary design of regulators PID.
 8.2 Frequential design of regulators PID.
 8.3 Empirical adjustment of regulators PID.

LEARNING ACTIVITIES AND METHODOLOGY

- Skillful classes, classes of resolution of doubts in reduced groups, individual presentations of the students, individual tutorials and personal work of the student; oriented to the theoretical knowledge acquisition (3 credits ECTS).
- Practices of laboratory and individual classes of problems in reduced groups, individual tutorials and personal work of the student; oriented to the acquisition of practical abilities related to the program of the subject (3 credits ECTS).

ASSESSMENT SYSTEM

% end-of-term-examination/test: 50

% of continuous assessment (assigments, laboratory, practicals…):   50

- Continuous evaluation (deliverables problems) 10%
- Compulsory Practices 10%
- 2 Midterms 15% and 15%
- Final exam 50%
- You will need to get at least a 4 on the final exam to pass the course.

BASIC BIBLIOGRAPHY

 - Jacqueline Wilkie & Michael A. Johnson & Reza Katebi Control Engineering: An Introductory Course, Palgrave Macmillan, 2002

 - K. Ogata Modern Control Engineering, Pearson-Prentice Hall, 2002

ADDITIONAL BIBLIOGRAPHY

 - Charles L. Phillips, John M. Parr, Eve Ann Riskin Signals, Systems, and Transforms, 2008, Prentice Hall

 - R. C. Dorf Sistemas de Control Moderno, Prentice Hall, 2008

BASIC ELECTRONIC RESOURCES

 - Eric Cheever . Linear Physical Systems Analysis: http://lpsa.swarthmore.edu/index.html

 - Michigan U. and Carnegie Mellon . Control Tutorial for Matlab:
http://ctms.engin.umich.edu/CTMS/index.php?aux=Home