

Academic Year: (2022 / 2023)

Review date: 11-05-2022

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: ESCALERA HUESO, ARTURO DE LA

Type: Compulsory ECTS Credits : 6.0

Year : 4 Semester : 2

OBJECTIVES

Competences and skills that will be acquired and learning results. Further information on this link

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

0- Introduction

1- Transformations.

- 1.1 Basic concepts
- 1.2 Fourier Transform
- 1.3 Laplace Transform.

2- Modelling of systems

- 2.1 Mathematical models
- 2.2 Linealization.
- 2.3 Transference function.
- 2.4 Diagram Blocks.
- 2.5 Mason

3- Temporary analysis of systems

- 3.1 The concept of Temporal analysis
- 3.2 Response to the step signal
- 3.3 Equivalent systems
- 3.4 Routh-Hurwitz's Method
- 3.5 Influence of poles and zero.
- 3.6 Response to standard signals.
- 3.7 Systems of first and second order.
- 3.8 Root Locus.

4- Introduction to control systems

- 4.1 Architectures of control.
- 4.2 Precision.
- 4.3 Sensitivity to disturbances.
- 4.4 Temporary design of regulators PID.
- 4.5 Empirical adjustment of regulators PID.

- 5 - Frequential analysis of systems
 - 5.1 Diagram of Bode.
 - 5.2 Nyquist Diagram.
 - 5.3 Frequential design 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

- 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.

% end-of-term-examination:	50
% of continuous assessment (assignments, laboratory, practicals...):	50

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

- Farid Golnaraghi, Benjamin C. Kuo Automatic Control Systems, John Wiley & Sons, 2009

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>