Simulation of dynamic systems

Academic Year: (2019 / 2020) **Review date: 12-12-2019**

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: RODRIGUEZ URBANO, FRANCISCO JOSE

Type: Compulsory ECTS Credits : 3.0

Year : 2 Semester : 1

OBJECTIVES

By the end of this subject, students will be able to :
1. To have the knowledge and understanding of the principles related to scientific computing for modelling and simulation of dinamical systems.
2. Apply their knowledge and understanding of dynamical systems to identify, formulate and solve modelling and simulation problems of engineering systems using established methods;
3. To select and apply relevant analytic and modelling methods.
4. To have an understanding of the different programming methods used for implementing mathematical algorithms on scientific computation computer programs, and the capacity to apply them to solve engineering problems.
5. To have the workshop and laboratory skills to work with scientific computation programs.
6. Select and use appropriate mathematical tools and programming methods to solve engineering problems related to modelling and simulation of dinamical systems.
7. To combine theory and practice to implement on a computer program the solution to engineering problems regarding modelling and simulation of dynamic systems;
8. Understand the applicable techniques and methods in modelling and simulation of dynamic systems, and their limitations;

DESCRIPTION OF CONTENTS: PROGRAMME

1. Introduction to modeling and simulation.
a. Definition an basic concepts.
b. Basic types of models of dynamical systems.
2. Modeling and simulation languages review.
a. Introduction to block oriented languages for simulation.
3. Basic techniques for Matlab programming.
a. Vectors an Matrices handling.
b. Functions and flow control components.
c. Special functions and libraries.
d. Graphics management.
4. Development of examples and applications on several application domains.
a. Application to vibrational systems.
b. Application to control systems.
c. Examples of biological systems.

LEARNING ACTIVITIES AND METHODOLOGY

Teoretical and Practical sessions mainly on computer rooms with Matlab software. Tuition session for the development of practical problems for subject evaluation. Some evaluation session interleaved during the classes.

ASSESSMENT SYSTEM

Classroom exercises interleaved with the theoretical sessions. Final modeling and simulation project. Final examination of basic modeling and simulation concerns.

% end-of-term-examination:	20
% of continuous assessment (assigments, laboratory, practicals…):	80

BASIC BIBLIOGRAPHY

- Edward B. Magrab An Engineers guide to Matlab third edition, Prentice Hall, 2010

ADDITIONAL BIBLIOGRAPHY

- K.Ogata Modern control Engineering, Prentice Hall, 2010