

Academic Year: ( 2021 / 2022 )

Review date: 22-06-2021

Department assigned to the subject: Systems Engineering and Automation Department

Coordinating teacher: RODRIGUEZ URBANO, FRANCISCO JOSE

Type: Electives ECTS Credits : 3.0

Year : 1 Semester : 1

**REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)**

None.

**OBJECTIVES**

- 1.- Know the concepts of physical modelling, object-oriented modeling and component-based modeling and simulation.
- 2.- Demonstrating modeling examples from a wide range of application areas.
- 3.- Providing an understanding of the compilation techniques used for equation-based languages as well as an understanding of the mathematical aspects of dynamic systems.

**DESCRIPTION OF CONTENTS: PROGRAMME**

- 1.-Introduction to modeling and simulation.
  - 1.1 Model concept.
  - 1.2 Simulation concept.
  - 1.3 Model construction and analysis.
  - 1.4 Kinds of mathematical models.
  - 1.5 Examples.
- 2.- Modelica environments.
  - 2.1 OmEdit and DrModelica.
  - 2.2 Modelica Software component model.
- 3.- Modelica specification description.
  - 3.1 Classes and Instances.
  - 3.2 Connectors.
  - 3.3 Equations.
  - 3.4 Algorithms and Functions.
- 4.- Hybrid systems.
  - 4.1 Discrete time systems modeling and simulation.
  - 4.2 Hybrid systems modeling and simulation.
5. Package management.
  - 5.1 Package as ADT.
  - 5.2 Library management.

**LEARNING ACTIVITIES AND METHODOLOGY**

- 1.- Modelica language description on master class.
- 2.- Practical sessions with Open Modelica development system.
- 3.- Personal modeling and simulation work by the student.

**ASSESSMENT SYSTEM**

Personal modeling and simulation work with Open Modelica software

<b>% end-of-term-examination:</b>	0
<b>% of continuous assessment (assignments, laboratory, practicals...):</b>	100

**BASIC BIBLIOGRAPHY**

- Paul A. Fishwick Handbook of Dynamic System Modeling, CRC Press, 2007
- Peter Fritzson Object-Oriented Modeling and Simulation with Modelica 3.3, IEEE Press, 2015

- Peter Fritzson Introduction to Modeling and Simulation of Technical and Physical Systems with Modelica, Wiley (IEEE Press), 2011

#### ADDITIONAL BIBLIOGRAPHY

- Edward B. Magrab An Engineer's guide to Matlab, Prentice Hall, 2011
- François E. Cellier Continuous system simulation, Springer , 2006
- Katsuhiko Ogata Ingeniería de control moderna, Pearson Educacion S.A., 2010
- Katsuhiko Ogata Sistema de control en tiempo discreto, Pearson Educacion S.A., 1995

#### BASIC ELECTRONIC RESOURCES

- Peter Fritson . Open Modelica web site: <http://www.openmodelica.org>