

## Course Unit Description - (SICOC)

(Computer Controlled Systems)

(Mestrado em Engenharia Electrotécnica e de Computadores)

Academic year: 2008/2009



### Subject group: Automação e Robótica

	Semestral	Compulsory	
Mode of study	Diurno	Hours/Week	T-Teórica 2
Year	1 <sup>o</sup>		PL-Prática-Laboratorial 2
Semester	2 <sup>o</sup>		OT-Orientação Tutorial 1

ECTS 6

### Objectives

The students will learn how to analyze discrete-time control systems, and to design and implement real-time digital controllers. Also, the student will be introduced to computational tools for the development of computer-controlled systems.

### Course Contents

1. Review of continuous control
2. Introduction to computer-controlled systems
3. Discrete system analysis
4. Sampled-data systems
5. Discrete equivalents
6. Design of controllers using transform techniques
  - 6.1 Emulation method
  - 6.2 Root-locus method
  - 6.3 Frequency response method
7. Design of controllers in state space
8. Implementation issues of digital controllers

### Recommended reading

1. Digital Control of Dynamic Systems, G. F. Franklin, J. D. Powell, M. Workman, Addison-Wesley
2. Computer Controlled Systems: Theory and Design, Karl J. Astrom, Bjorn Wittenmark, Prentice Hall
3. Discrete-Time Control Systems, K. Ogata, Prentice-Hall
4. Digital Control Systems, Kuo, Oxford University Press
5. Feedback Control of Dynamic Systems, G. F. Franklin, J. D. Powell, Emami-Naeini, Addison-Wesley
6. Modern Control Engineering, K. Ogata, Prentice-Hall

### Teaching Methods

The teaching methods are divided into different types of classes, namely in theoretical classes, laboratory classes and tutorial classes.

In the theoretical classes, the teaching subjects of the course will be exposed, which are supported by the use of slides. The emphasis to the application concepts will be made through examples and analysis of concrete cases.

In the laboratory classes, it will be proposed and solved problems about the concepts taught in the theoretical classes. The problem sets should be solved analytically and/or by using the computational tool Matlab/Simulink. The use of the Matlab/Simulink aims to introduce the student to the analysis, design and simulation of computer-controlled systems.

In the tutorial classes, the student should solve, in an autonomous way, problems similar to those given in the classes. The teacher has the main function of clarifying any doubts that the students have in the resolution of such problems. The tutorial class aims the solidification of the underlying concepts learned in the course.

All support material and on-line resources regarding the course will be made available in the e-learning platform Moodle of ISEP.

### Assessment methods

The assessment of the course is made through a continuous assessment and the realization of exams.

The continuous assessment consists in the realization of, at least, three midterm tests during the teaching period. These tests focus the teaching subjects given in the theoretical, laboratorial and tutorial classes. The grade of the continuous assessment

(NFREQ) is given by the arithmetic mean of the grades obtained in the tests. This part of assessment will have a weight of 50% in the final classification.

The assessment in exam is made through the realization of exams with theoretical and practical components focusing the learned concepts during the teaching period, both for the "normal" and "recurso" seasons. This part of assessment will have a weight of 50% in the final classification.

The final classification of the course is given by the weighed mean of the classification obtained in the continuous assessment

NFREQ = 50% of the total classification (max. of 10 values)

and of the exams (PE)

PE = 50% of the total classification (max. of 10 values)

The expression for the computation of the final classification will be:

Final classification =  $0,5 \cdot \text{NFREQ} + 0,5 \cdot \text{PE}$

This formula applies to both the exams of "normal" and "recurso" seasons.

The approval in the course requires a minimum of 6,0 values (in a scale of 20 values) both in the continuous assessment and in the exams.

For the students excused of the continuous assessment, the assessment of the course will only correspond to the realization of the exam (20 values).

The classifications obtained in each one of the assessment components are rounded until tenth.

The final classification results of the weighed mean of the classifications obtained in the different components of assessment, being the resultant value rounded to the nearest integer value.

The improvement of the course grade is made through the realization of an exam with theoretical and practical components focusing the learned concepts during the teaching period. In this examination it will not be considered the component of continuous assessment.

	<b>Name</b>
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