

<i>Course</i>	Mechanical and Industrial Informatics			<i>Academic year</i>	2021/2022		
<i>Subject</i>	Measurement and Control Systems			ECTS	6,5		
<i>Type of course</i>	Compulsory						
<i>Year</i>	2nd	<i>Semester</i>	2nd	<i>Student Workload:</i>			
<i>Professor(s)</i>	Adérito Neto Alcaso			<i>Total</i>	175,5	<i>Contact</i>	60
<i>Area Coordinator</i>	Rui António Pitarma S. Cunha Ferreira						

Planned SD

1. LEARNING OBJECTIVES

Know and understand the operation's principles of measurement and control systems and their need and importance in the industrial context, so that they can intervene in the design, implementation and operation of the most common used electromechanical systems. Upon completion of the curricular unit, the student should:

- O1 Describe the principles and objectives of measurement and control systems;
- O2 Characterize technologies and applications of sensors and actuators;
- O3. Characterize technologies and applications of logic, discrete and continuous control systems;
- O4. Identify common controllers by developing their implementation, programming and tuning in electromechanical uses.

2. PROGRAMME

- C1 - Concepts and definitions on measurement, instrumentation, automation and control;
- C2 - Technologies and operation principles of sensors and actuators;
- C3 - Conditioning circuits and signal processing;
- C4 - Characterization and modelling of systems;
- C5 - Systems behaviour in time and frequency;
- C6 - ON-OFF and PID control;
- C7 - Physical implementation of analog and digital controllers;
- C8 - Programmable controllers of PLC type;
- C9 - Simulation and controller programming.

3. COHERENCE BETWEEN PROGRAMME AND OBJECTIVES

Objective O1 is transversal to all contents; objective O2 is interconnected mainly with contents C2 and C3; objective O3 is interconnected to C4 and C5 contents and objective O4 to C6, C7, C8 and C9 contents.

4. MAIN BIBLIOGRAPHY

- Paulo Oliveira, "Curso de Automação Industrial", Lidel, 2009 (ISBN: 9789728480219);
- J. Norberto Pires, "Automação e Controlo Industrial", Lidel, 2019 (ISBN: 9789897524127);
- Curtis Johnson, "Controlo de Processos: Tecnologia da Instrumentação", Fundação Calouste Gulbenkian, 1990 (ISBN: 9789723104943);
- Thomas Hughes, "Measurement and Control Basics", ISA, 2015 (ISBN 978-0876640142).

5. TEACHING METHODOLOGIES (INCLUDING EVALUATION)

Teaching Methodologies:

- Expository method using video projection of professor notes and online simulators.
- Experimental demonstration method using demonstrations and laboratory work.

Evaluation Methodologies:

Continuous evaluation: behaviour:10%; laboratory group work: 40%; written test: 50%.

Written test grade must be greater than 6.5 and the laboratory practice grade must be greater than 9.5. Mean grade equal to or higher than 10 values to obtain approval.

For students with student worker status the laboratory and behavioural components are replaced by simulation and research work exclusively.

Final evaluation: exam.

Students must have a grade equal or higher than 10 (out of 20) to get approval.

6. COHERENCE BETWEEN TEACHING METHODOLOGIES AND OBJECTIVES

Expository method is transversal to all objectives O1 to O4 due to the introduction of theoretical contents. Demonstrative and experimental methods will be used to meet objectives O2 to O3 for the characterization and practical validation of different technologies and uses of sensors, actuators and their controls.

7. ATTENDANCE

N.A.

8. CONTACTS AND OFFICE HOURS

Professor: Adérito Neto Alcaso (Ph.D); aderitona@ipg.pt; office n.º 11

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