

Description of individual course unit

— Course title:	Intelligent Decision and Control
— Course code:	
— Type of course:	Elective
— Level of course:	Advanced / PhD
— Year of study:	
— Semester:	
— Number of credits allocated (workload based):	6
— Name of lecturer:	Luís Rato
— Objective of the course (expected learning outcomes and competences to be acquired):	After this course the students with a background in computer science should have the theoretical and practical knowledge of intelligent techniques applied to decision and control problems. The students should be able to model several kind of processes as well as, to apply different decision and control algorithms (signal and system theory based algorithms, adaptive algorithms, rule based algorithms, and machine learning based algorithms).
— Prerequisites	
— Course contents:	— 1 Introduction. — 1.1 Signal and system theory, discrete and continuous systems. — 1.2 System modelling and simulation. — 1.3 System estimation and identification. — 2 Decision and control systems. — 2.1 Linear and non-linear filtering. — 2.2 Adaptive control, fuzzy control, rule-based control. — 2.3 Fault diagnosis and isolation. — 2.4 Pattern recognition — 3 Application of intelligent techniques in practical cases.
— Recommended reading:	Signals and Systems, Alan V. Oppenheim, 1996 Feedback Control of Dynamic Systems (5th Edition) by Gene Franklin, J.D. Powell, et al, 2005 Fault-Diagnosis Systems: An Introduction from Fault Detection to Fault Tolerance by Rolf Isermann, 2005 Intelligent Control Systems Using Computational Intelligence Techniques (IEE Control Series), by Antonio Ruano, 2005 Reconhecimento de Padrões, Jorge Salvador Marques, IST PRESS, 1999 Introduction to machine learning, E. Alpaydin, 2004 Besides this bibliography scientific papers will be distributed for each topic
— Teaching methods:	Lectures with theoretical fundamentals and practical cases, and lab sessions with problems requiring the corresponding theory. A strong component of based in applied practical work. Scientific papers are the preferred way to transmit knowledge.
— Assessment methods:	Final examination with a weight less or equal to 50%. Strong lab component with the realization of several

	practical problems and the presentation of one work in an article format.
 Language of instruction:	Portuguese and English. English is fundamental to scientific bibliographic references.