

PhD Courses in Embedded Systems

2008-2009

Title:	Introduction to neural networks
Type:	triennale, specialistica, perfezionamento (general)
Teacher:	Giorgio Buttazzo
Hours:	10 lectures + 10 lab
Credits:	2
Abstract:	The aim of the course is to introduce the fundamental concepts of neural computing.
Program:	The course introduces some neural computational models for pattern recognition, classification, event prediction and control. Models include Hopfield networks, Back Propagation, Competitive Learning and Reinforcement Learning.
Prerequisites:	None
Exam:	Oral + project
Start date:	April 2008
Location:	RETIS Lab

Title:	Real-Time Systems
Type:	specialistica, perfezionamento (general)
Teacher:	Giorgio Buttazzo
Hours:	20 lectures + 10 lab
Credits:	3
Abstract:	The aim of this course is to introduce analysis methodologies and kernel mechanisms for increasing the predictability of software control systems.
Program:	Requirements of a real-time control system. Task models. Specifying timing constraints. Task scheduling and feasibility analysis. Periodic task management. Protocols for accessing shared resources. Asynchronous communication mechanisms. Overload handling.
Prerequisites:	Basic knowledge of a computer architecture and the C language.
Exam:	Written test + project
Start date:	Feb. 25, 2008 - 9:00
Location:	RETIS Lab

Title:	Advanced Real-Time Systems
Type:	specialistica, perfezionamento (specific)
Teacher:	Giorgio Buttazzo
Hours:	24 lectures
Credits:	3
Abstract:	The objective of the course is to provide advanced real-time methodologies for the development of embedded systems with stringent timing requirement and efficient resource usage.
Program:	The course introduces methods for sensitivity analysis, overrun handling, transient and permanent overload management, quality of service control in multimedia systems and energy-aware scheduling algorithms.
Prerequisites:	Operating Systems, Real-Time Systems
Exam:	Written test
Start date:	May 2008
Location:	RETIS Lab

Title:	Real-Time Control Systems
Type:	specialistica, perfezionamento (specific)
Teacher:	Manel Velasco
Hours:	27 lectures
Credits:	3
Abstract:	The objective of the course is to provide fundamental techniques in control systems for computer science engineers. The course will explain how digital control systems can be implemented as software programs, evaluating and analyzing the impact of major timing effects introduced in their execution.
Program:	Stability analysis of digital control systems. Feedback control systems. Implementing digital control systems as a C program. Jitter control methods. Dealing with input-output delays. Methods for evaluating control performance. Optimizing control performance.
Prerequisites:	Real-Time Systems
Exam:	Written test
Start date:	May 2008
Location:	RETIS Lab

Title:	Communication Protocols for Wireless Sensor Networks
Type:	specialistica, perfezionamento (specific)
Teacher:	Paolo Pagano and Yao Liang
Hours:	16 lectures + 4 lab
Credits:	2
Abstract:	The course will expose students to the fundamental issues in designing and analyzing sensor networks and their information processing applications. The course will also consider the simulation and implementation of communication protocols on real-time operating systems and real hardware platforms.
Program:	Node architectures, Relevant metrics, Power consumption issues, MAC protocols, Routing and data dissemination, Data centric view, Data compression, Selected real world applications, Transport layer, Data Base abstractions, Bandwidth allocation algorithms, Operating system services, Simulation packages.
Prerequisites:	Real-Time Systems
Exam:	Written test
Start date:	March 5 – April 1, 2008
Location:	RETIS Lab