University of Nicosia

Course Syllabus

Course Code	Course Title	ECTS Credits
ECE-428	Embedded Systems	6
Prerequisites	**Department**	**Semester**
ECE-111, ECE-221, ECE-322	Engineering	Fall or Spring
Type of Course	**Field**	**Language of Instruction**
Elective	Engineering	English
Level of Course	**Lecturer(s)**	**Year of Study**
1st Cycle	Dr Stelios Neophytou	4th
Mode of Delivery	**Work Placement**	**Corequisites**
Face-to-face	N/A	None

Course Objectives:

The main objectives of this course are to:
- motivate the need for developing embedded system applications
- cover in detail the concepts of embedded systems and real-time operating system paradigms
- make students aware of the concepts of tasks, inter-process communication, synchronization, interrupts, and timers
- thoroughly discuss the presence of and describe the characteristics of latency in real-time system
- expose students to industrial development environment for embedded systems and industrial real-time operating systems
- introduce and discuss special concerns that real-time systems present and how these concerns are addressed.

Learning Outcomes:

After completion of the course students are expected to be able to:
- explain the basics of embedded systems
- identify what makes a system a real-time system
- differentiate between developing "generic" software applications and embedded systems applications
- apply the full life-cycle of developing embedded systems, i.e. design, software developing, build and load application to target host, and debug target host application.

- critically assess reliability concerns and their implication for real-time embedded systems (failures, risks, and recovery).

Course Content:

- Motivation and introduction to Real-Time Embedded Systems
- Overview of the discipline of embedded systems including hardware architectures, software development environments (Tornado), and Real-Time Operating Systems (VxWorks)
- Introduction to VxWorks and Tornado
- Developing for embedded systems and embedded systems initialization
- Introduction to Real-Time Operating Systems (RTOS)
- Familiarization with RTOS concepts: tasks, semaphores, message queues, interrupts, timers, memory management, and synchronization and communication
- Reliability of RTOS applications, their failure model, and recovery techniques.

Learning Activities and Teaching Methods:

Lectures, Lab Presentations and Tutorials, Lab and Homework Assignments.

Assessment Methods:

Homework, Lab Reports, Mid-Term, Project, Final Exam.

Required Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Introduction to Embedded Systems, A Cyber-Physical Systems Approach (2nd Edition)	E. A. Lee, S. A. Seshia	MIT PRESS	2017	978-0-262-53381-2

Recommended Textbooks / Readings:

Title	Author(s)	Publisher	Year	ISBN
Real-Time Concepts for Embedded Systems	Qing Li	CMP Books	2003	978-1578201242
Real-Time Embedded Components and Systems	Sam Siewert	Charles River Media	2006	978-1584504689

Tornado and VxWorks	Christof Wehner	BoD	2006	978-3833444371