

SYLLABUS
for the discipline:

“EMBEDDED SYSTEMS II”

FACULTY OF AUTOMATION AND COMPUTERS

DOMAIN/SPECIALIZATION: MASTER AUTOMOTIVE EMBEDDED SOFTWARE

Year of studies: I

Semester: 2

Course instructor: *Eng. Nicolae ROBU, PhD, Professor*

Applications instructor: *Eng. Adriana ALBU, PhD, Lecturer*

Number of hours/week/Evaluation/Credits					
Course	Seminar	Laboratory	Project	Evaluation	Credits
3	0	2	0	E	8

A. COURSE OBJECTIVES

This course focuses on embedded real-time systems. The course contributes to the skills 1 (20 %), 2 (20 %), 3 (30%), and 4 (30%) from the skills table.

B. COURSE SUBJECTS

1. *The structure of an embedded system: An introduction to Embedded Systems (3 hours);*
2. *Processes, Tasks, Threads, Multitasking, Multithreading, Multitasking with Multithreading Notions (6 hours);*
3. *Context Switching and Tasks Scheduling (6 hours);*
4. *Synchronization Problems and Afferent Mechanisms (6 hours);*
5. *Interrupt Handling (6 hours);*
6. *Choosing an RTOS (6 hours);*
7. *An Embedded Oriented Real-Time Operating System — OSEK: Architecture, Tasks Management, Interrupts Processing, Events Mechanism, Resources Management, Alarms (9 hours).*

C. APPLICATIONS SUBJECTS (laboratory, seminar, project)

During laboratories the students will focus on the following subjects:

1. *Dynamic Scheduling of Real-time Tasks (2 hours);*
2. *Scheduling Methods for A-periodic Tasks (2 hours);*
3. *Genetic Methods for Scheduling in Real-time Systems (4 hours);*
4. *Heuristic Methods Used in Scheduling Algorithms (4 hours);*
5. *Scheduling Real-time Tasks in Distributed Systems (4 hours);*
6. *Communication Methods in Distributed Real-time Systems (2 hours);*
7. *Scheduling Methods for Soft A-periodic Tasks in Hard Real Time Systems (2 hours);*
8. *Scheduling Methods in Embedded Distributed Real-time Systems (2 hours);*
9. *Task Scheduling in Multiprocessor System (4 hours);*
10. *Synchronisation Methods in Real-time Embedded Systems (2 hours).*

D. REFERENCES

1. Michael Barr, and Anthony Massa, *Programming Embedded Systems*, Second Edition, ISBN 10: 0-596-00983-6,

- ISBN 13: 9780596009830, October 2006;
2. Frank Vahid, and Tony Givargis, *Embedded System Design: A Unified Hardware/Software Introduction*, John Wiley & Sons, ISBN: 0471386782, 2002.

E. EVALUATION PROCEDURE

Written tests. The final grade is obtained as follows:

$FG = (2 * TestGrade + AppliedActivityGrade) / 3.$

F. INTERNATIONAL COMPATIBILITY

1. *Embedded System Design, University of Colorado, Boulder, Colorado*
(<http://ece.colorado.edu/~mcclurel/syllabus.html>);
2. *Embedded Systems, University of Strathclyde, UK*, (<http://www.strath.ac.uk/cis/localteaching/localug/cs402/>);
3. *Software for Embedded Systems, University of Washington, Computer Science and Engineering*
(http://www.cs.washington.edu/education/abet_syllabi/CSE466.html).

Date: October 5, 2008

HEAD OF DEPARTMENT,
Eng. Ioan SILEA, PhD
Professor

COURSE INSTRUCTOR,
Eng. Nicolae ROBU, PhD
Professor