



## Course Syllabus:

# Electrical Engineering BA (B), Programming Embedded Systems, 7.5 Credits

## General data

<b>Code</b>	ET014G
<b>Subject/Main field</b>	Electrical Engineering
<b>Cycle</b>	First cycle
<b>Progression</b>	B
<b>Credits</b>	7.50
<b>Progressive specialisation</b>	First cycle, has less than 60 credits in first-cycle course/s as entry requirements
<b>Answerable department</b>	Faculty of Science, Technology and Media
<b>Established</b>	2007-04-03
<b>Date of change</b>	2015-03-04
<b>Version valid from</b>	2013-08-15

## Aim

In this course programming of a modern RISC microprocessor. This course provides advanced information and skills into the programming of the microprocessor-based embedded systems for different application requirements for example on timing, power, resources usage etc., and also on how software code can be optimized.

## Course of objectives

After the course the student should be able to:

- Implement a real-time application in a modern RISC processor using C solving a specified task,
- Implement a software driver for a peripheral device,
- Optimize software components in an embedded system using different techniques,
- Describe how the software performs parallel execution in two different ways
- Describe how switching between processes
- Describe methods for scheduling of processes
- Describe how different processes communicates in a real-time system

## Content

The course covers:

- Techniques and tools for advanced programming in C for a RISC microprocessor.
- Management of application requirements in an embedded system: How real-time, environmental and functional requirements of embedded systems affect the programming of a microprocessor-based embedded system.
- Real-Time: Multitasking, scheduling and operating systems for microprocessor-based embedded systems.
- Optimization of C code for microprocessor-based embedded systems.
- 60% of the course is in the form of lab projects.

## Entry requirements

electrical engineering Gr(A), 15 credits, including digital electronics and microprocessor technology and Computer engineering, Gr(A), 15 credits. Some course including programming in C

## Selection rules and procedures

The selection process is in accordance with the Higher Education Ordinance and the local order of admission.

## Teaching form

In addition to scheduled hours, the student must conduct comprehensive self-study. The number of teaching hours for the specific course time is defined in the schema.

60% of the course is in the form of practical exercises and project.

## **Examination form**

3.0 Credits, T104: Written exam, Theory

Grades: A, B, C, D, E, Fx and F. A-E are passed and Fx and F are failed.

3.0 Credits, L104: Laboratory

Grades: Pass (P) or Fail (F)

1.5 Credits, P104: Project

Grades: A, B, C, D, E, Fx and F. A-E are passed and Fx and F are failed.

Grading criteria for the subject can be found at [www.miun.se/betygskriterier](http://www.miun.se/betygskriterier)

## **Grading system**

The grades A, B, C, D, E, Fx and F are given on the course. On this scale the grades A through E represent pass levels, whereas Fx and F represent fail levels.

## **Course reading**

### **Required literature**

Richard Barnett, Embedded C Programming and the Atmel AVR, Delmar Learning, 2002, 1-4018-1206-6

### **Reference literature**

Daniel W. Lewis, Fundamentals of Embedded Software: Where C and Assembly Meet, Pearson Higher Education, 2001, 0-13-061589-7