MF2044 Embedded Systems for Mechatronics, II 6.0 credits

Inbyggda system för mekatronik, II

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for MF2044 valid from Spring 2018

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Mechanical Engineering

Specific prerequisites

Approved of at least 50% of the course MF2042 Embedded Systems for Mechatronics I.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

This course aims to equip the participants with fundamental knowledge and practical skills for the development of embedded systems with emphasis on correctness by construction, verification, and debugging. This understanding means that You after the course should be able to

1. examplify embedded systems and their applications, describe the special requirements placed in developing such systems and the differences among different application domains (e.g. automotive, automation and medtech).

2. describe and apply systematic approaches to system development including requirement specification, function design and realization, verification and validation.

3. classify and explain different types of functionalities, behaviors, their corresponding modeling techniques and implications on software, hardware, and real-time implementation.

4. apply your knowledge in control theory and software programming in the design and implementation of control applications on distributed computers.

5. describe, explain, and apply software platform technologies (real-time operating systems - RTOS).

6. describe and explain fundamental techniques for verification and debugging, including how to derive test cases, and apply a subset of these techiques.

7. analyze system requirements, derive the implied functional and nonfunctional constraints, and motivate architectural design and execution strategies using reference styles and patterns.

8. understand the trends and state-of-the-art approaches to model- and component-based development of embedded systems.

Course contents

The course includes

- Lectures, where overview and inspiration are provided.
- Laboratory exercises, where tools and techniques are introduced, and a set of practical excercises are carried out by the participants in groups.
- Classroom exercises, where the participants can elaborate and practice theoretical parts of the course.

Each week of the course focuses on a specific theme. The exercises are modularized according to these themes. The exercises include the implementation of functionalities with RTOS in a single and distributed system. In parts of the exercises, the system designs will be modelled and analyzed using Matlab Simulink/Stateflow and other techniques.

Course literature

Will be announced at the beginning of the course.

Examination

- TEN1 - Written Exam, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 3.0 credits, grading scale: P, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

Other requirements for final grade

a) Approved laboratory exercises.

b) Approved miniexams (Quizes).

The grading is based on a weighted score of the results from (a) and (b).

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.