



Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Industrial Embedded Control Systems

Course Code:	ELGC23
Course Title:	Industrial Embedded Control Systems <i>Industriella inbyggda reglersystem</i>
Credits:	5
Degree Level:	Undergraduate level
Progressive Specialisation:	First cycle, has less than 60 credits in first-cycle course/s as entry requirements (G1F)

Major Field of Study:
ETA (Electrical Engineering)

Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2020-03-11, and is valid from the Autumn semester 2020 at Karlstad University.

Prerequisites

Introduction to Physics for Electrical Engineering (7.5 ECTS credits), Automatic Control (7.5 ECTS credits), Industrial Automation Systems (7.5 ECTS credits), and Programming Techniques (7.5 ECTS credits), or equivalent

Learning Outcomes

The aim of the course is that students acquire basic knowledge of industrial embedded control systems to be able to describe the fundamentals of analysis, design, and implementation of feedback control and automatic sequential control algorithms in embedded systems.

Upon completion of the course, students should be able to:

- give an in-depth account of the structure and various components of embedded systems and

mechatronics systems,

- describe the most important concepts and methods used to design an embedded control system,
- describe the architecture and properties of embedded systems,
- describe and use IO units,
- design software for analysing sensor signals and control of actuators, and
- use modern design tools for real-time simulation and free form fabrication of regulators.

Content

Basic theory of embedded systems and mechatronics systems. Basic components. Static systems and dynamic systems. Safety issues. Scheduling algorithms and scheduling operability. Synchronising mechanisms. Basic theory of micro-processor architectures. Cache and pipeline. Distributed multi-processor model. Basic theory of real-time control systems. Properties for control system development: support for time operations, specially adapted hardware, managing overload, and so on. Fault tolerance and fault management.

Reading List

See separate document.

Examination

Assessment is based on mandatory laboratory exercises and a written exam.

If students have a decision from Karlstad University entitling them to special pedagogical support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

Grades

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For students in Engineering programmes, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

Quality Assurance

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

Course Certificate

A course certificate will be provided upon request.

Additional information

The local regulations for studies at the Bachelor and Master levels at Karlstad University stipulate the obligations and rights of students and staff.