Reg No: ELGB14/20251

Faculty of Health, Science and Technology
Electrical Engineering

Syllabus

Industrial Automation Systems

Course Code:	ELGB14
Course Title:	Industrial Automation Systems *Industriella automationssystem*
Credits:	7.5
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 2025-02-26, and is valid from the Spring semester 2025 at Karlstad University.

Prerequisites
Registered for Introduction to electrical engineering, 7.5 ECTS credits, Circuit analysis 2, 7.5 ECTS credits, and Programming Techniques, 7.5 ECTS credits, or equivalent

Learning Outcomes
The aim of the course is to provide an overview of the different types of sensors, actuators, communication systems, and operator interfaces that are used in industrial automation. The course also covers the use of modern design tools in automation.

Upon completion of the course, students should be able to:
- describe the basics of sensors, actuators, and process control,
- give an account of different types of industrial communication systems and communication protocols,
- give an account of different control methods for electric servo systems,

- describe different methods for controlling and monitoring industrial automation systems, and
- use modern design tools to create schematic drawings and perform real-time simulation in automation.

Content
The basics of automation systems with a special focus on the analysis, design, and implementation processes of measuring and control systems are discussed theoretically in lectures and then illustrated in mandatory laboratory exercises which include the design of a real-time control system for a basic automation system.

The course covers the following:
- transducers for measuring temperature, light, level, pressure, flow, and position
- actuators, sensors, and architectures for controlling electromechanical systems
- modelling elements such as electric motors, gearboxes, and robotic arms
- the use of CAD to produce schemes, drawings, and other types of documentation related to control circuits
- the use of PLC, DCS, HMI, and SCADA
- communication systems (CANbus, PROFIbus, and PROFInet) and communication protocols (TCP/IP and UDP) in automation
- industrial standards

Reading List
See separate document.

Examination
Assessment is based on a written exam, mandatory laboratory sessions, and lab reports.

If students have a decision from Karlstad University entitling them to Targeted Study 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, 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.