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EUROPEAN UNIVERSITY FOR CUSTOMISED EDUCATION

STUDY GUIDE

INTERNET OF THINGS

Organised by

Karlstad University

1. IDENTIFYING DATA.	
· Course Name.	Internet of things - DVAD70
· Coordinating University.	Karlstad University
· Partner Universities Involved.	*N/A*
· Course Field(s).	Computer Science
· Related Study Programme.	Master of Science in Industrial Engineering and Management
· ISCED Code.	0610: Information and Communication Technologies
· SDG.	*This course contains sub-modules for different IoT application areas that relate to the connected SDGs. The course also has a specific module for energy efficiency related to the use of IoT technologies.* • *SDG2* • *SDG3* • *SDG6* • *SDG7* • *SDG9* • *SDG11* • *SDG13* • *SDG15*
· Study Level.	*Master (M)*

· Number of ECTS credits allocated.	7,5 ECTS
· Mode of Delivery.	Online live (with self-study activities)
· Language of Instruction.	English
· Course Dates.	20 January 2025 to 8 June 2025
· Schedule of the course.	
· Key Words.	Computer Science, Internet of things, IoT
· Catchy Phrase.	The course covers the Internet of Things, where communication occurs between connected free-standing devices, rather than between humans and machines.

· Prerequisites and co-requisites.	Computer Science 30 ECTS, or three years of work experience in the IT sector, or equivalent. English B2 level.
· Number of EUNICE students that can attend the Course.	*27 – 3 per partner university*

· Course inscription procedure(s).	

2. CONTACT DETAILS.	
· Department.	Computer Science
· Name of Lecturer.	Mohammad Rajiullah
· E-mail.	mohammad.rajiullah@kau.se
· Other Lecturers.	N/A

3. COURSE CONTENT.

The course covers the Internet of Things, where communication occurs between connected free-standing devices, rather than between humans and machines. The focus of the course is small, resource-saving devices such as sensors for measuring, steering of regulators, and communication between them.

The course begins with an introduction to the field and presents current areas of application. The Internet of Things comprises many different technologies, and the course covers a number of building blocks such as architectures, radio interfaces, and communication protocols. When several devices are connected, a large amount of data is produced and must be handled, and the flow of data is treated from collection to the steering of another device based on collected and analysed data.

An important aspect of connected systems is integrity and security. It is a challenge, especially for resource-constrained devices, to keep software updated and prevent unauthorised use or wiretapping.

For sensors, energy consumption is a significant factor, both in relation to long battery life and in relation to environmental concerns. The course therefore treats the influence of communication interfaces and communication protocols on energy consumption.

4. LEARNING OUTCOMES.

Upon completion of the course, students should be able to:
1. explain and discuss the Internet of Things as a concept and its typical areas of use,
2. describe the characteristics of different technology alternatives, and based on those characteristics, suitable areas of use,
3. use tools to analyse a data set from sensors,
4. explain how privacy and security can be achieved in the Internet of Things,
5. identify factors that influence energy consumption and discuss how a low level of energy consumption can be achieved, and
6. create a system solution for an IoT application scenario, and justify choices of architecture, components, and other aspects treated in the course.

5. OBJECTIVES.

6. COURSE ORGANISATION.

UNITS

1.	Areas of application: Health, smart homes, smart cities, industry 4.0
2.	Infrastructures. Online sensors, gateway connections, mesh networks. Technologies such as NB-IoT, ZigBee, 433MHz, Z-Wave, LoRa, WiFi, Bluetooth, CoAP, MQTT
3.	Data management (collection, storage, processing, analysis, automation, presentation)
4.	Privacy and security (surveillance, behavioural patterns, encryption, firmware updates, attack vectors)
5.	Energy optimisation (10 years of battery life - how can we achieve this? What can influence energy consumption?)

LEARNING RESOURCES AND TOOLS.

The course requires that the student be involved with a practical IoT project.

However, students must initiate and fund the project themselves; the university will not cover any associated costs

PLANNED LEARNING ACTIVITIES AND TEACHING METHODS.

The course includes practical/laboratory components.

7. ASSESSMENT METHODS, CRITERIA AND PERIOD.

Assessment is based on individual hand-in assignments and an oral exam

OBSERVATIONS.

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

8. BIBLIOGRAPHY AND TEACHING MATERIALS.

The course literature consists of scientific articles and literature made accessible online.