UNIVERSITY OF BORÅS

Wearable and Textile Electronics

Bärbar och textil elektronik

7.5 credits

Ladok Code: AT2BT2
Version: 4.0
Established by: Committee for Education in Technology 2022-09-02
Valid from: Spring 2023

Education Cycle: Second cycle
Main Field of Study (Progressive Specialisation): Textile Engineering (A1N)
Disciplinary Domain: Technology
Prerequisites: The student meets the admission requirements for the master's program in textile technology
Subject Area: Textile Technology
Grading Scale: Seven-degree grading scale (A-F)

Content

The course aims to provide a theoretical basis for the analysis and synthesis of electronic circuits. In addition to providing an understanding of how portable and textile electronics work together. In addition, the course also aims to provide skills for developing projects based on microcontroller prototypes.

The main content of the course includes basic laws and relationships in electricity and electronics; electrical current, electrical potential, Ohm's law, Kirchhoff's laws; electrical and electronic components, resistors, capacitors; electrical circuits, laboratory equipment, introduction to sensors and measurement technology; introduction to textile and wearable electronics and electrical characterization of materials; Arduino as an electronics development platform Arduino programming.

Learning Outcomes

After completing the course, students should have:

Knowledge and understanding
1.1 summarize basic concepts of electricity (current, voltage, power),
1.2 explain the main laws that govern currents and voltages in circuits (Ohm's law, Kirchhoff's laws, etc.),
1.3 explain textile conductivity, textile sensors and textile integration in wearable electronics environments,
1.4 explain the basics of the Arduino platform (hardware and software),
1.5 explain which environmental sustainability aspects are applicable to textiles and portable electronics.

Skills and Abilities
2.1 apply structured methods for the analysis and design of general electrical circuits,
2.2 calculate current, voltage and power in DC and AC circuits,
2.3 use laboratory instruments for various electrical measurements,
2.4 carry out a simple design task from specification to circuit design,
2.5 choose suitable sensors and measurement methods to electrically measure physical quantities,
2.6 apply Arduino in electronics projects.

Evaluation ability and approach
3.1 critically argue for selected solutions and identify deviations from theoretical models.

Forms of Teaching

Forms of teaching

- Lectures
- Laboratory work
- Project group work

The language of instruction is English.

Forms of Examination

The assessment is done through the following examination stages:

- Written exam Learning objectives, 1.1-2.2 Higher education credits: 4.0 Grading scale: Seven-point grading scale (A-F)
- Laboratory work with report, Learning objectives 2.1-2.6, 3.1 Higher education credits: 2.0 Grading scale: U/G
- Written submission task, Learning objectives 1.5, 3.1 Higher education credits: 1.5 Grading scale: U/G

  The students final grade of the course is determined by the grade on the written exam, which is issued when the student has passed all examination steps.

  If the student has received a decision/recommendation regarding special pedagogical support from the University of Borås due to disability or special needs, the examiner has the right to make accommodations when it comes to examination. The examiner must, based on the objectives of the course syllabus, determine whether the examination can be adapted in accordance with the decision/recommendation.

Student rights and obligations at examination are in accordance with guidelines and rules for the University of Borås.

Literature and Other Teaching Materials

Arduino Docs, *Tutorials*, (available online)

Keysigth Technologies (n.d.). I*mpedance Measurement Handbook A guide to measurement technology and techniques.* Application Note. (tillgänligt online)

Muthu, S. (2016). *Textile Science and Clothing Technology.* 1st ed. Singapore: Springer Singapore

Storr, W. (2013). *Basic electronics tutorials for beginners and beyond.* Free edition. electronics-tutorials.ws

If applicable, additional material is added to HB's learning platform.

Student Influence and Evaluation

The course is evaluated in accordance with current guidelines for course evaluations at the University of Borås in which students' views are to be gathered. The course evaluation report is published and returned to participating and prospective students in accordance with the above-mentioned guidelines, and will be taken into consideration in the future development of courses and education programmes. Course coordinators are responsible for ensuring that the evaluations are conducted as described above.

Miscellaneous

This course is primarily intended for students admitted to the master's program in textile technology.

This syllabus is a translation from the Swedish original.