ECTS
5

Prerequisites
None. The course must be passed before graduation.

Main purpose
The main purpose of the course is to gain a basic understanding of the organization and design of computers with a focus on the central processing unit (CPU) and the necessary logic involved in building a CPU.

Knowledge
Having completed this course, the student has gained knowledge in the below areas. Specifically, the student is able to:

- Describe and apply numbering representations, including two's complement to represent negative numbers in the binary numbering representation
- Identify the functionality of basic logic gates and be able to combine them into half- and full-adders, flip/flops, etc.
- Describe Boolean algebra and it's relation to digital circuits
- Describe the architecture of simple CPUs and how they function, explain the build and working behavior of basic building blocks of CPUs (registers, ALUs, etc.)
- Describe instruction set layout and identify memory architectures and addressing modes.

Skills
Having completed this course, the student should be able to:

- Create functioning assembler programs for microcontrollers
- Analyse ASM programs (AVR MCU) and calculate execution time
- Execute and debug assembler programs
- Analyze and describe simple logical circuits (Boolean expressions)
- Apply Boolean algebra to reduce digital circuits.

Competences
Having completed this course, students should be able to:

- Describe the functionality of the components of basic computer architectures
- Apply mathematical theory to understand low-level computer architecture and programming
- Create simple logic circuits used in CPUs
- Create applications using assembler programming
- Integrate simple I/O devices in embedded applications.

Topics

Teaching methods and study activities
The required workload for students is estimated at 137 hours where approximately 41 hours (55 lessons of 45 minutes) are in category 1 and 2 of the Student Activity Model.

CATEGORY 1
Participation of lecturer and students
Initiated by the lecturer
36 hours - 26%

- Lessons, scheduled
- Excursions
- Project guidance
- Laboratory work
- Exams and tests

CATEGORY 2
Participation of students
Initiated by the lecturer
8 hours - 6%

- Assignments, self-study
- Project and group work
- Homework and preparation for exams
- Evaluation of the teaching

CATEGORY 3
Participation of students
Initiated by students
93 hours - 68 %

- Homework and preparation for exams
- Self-study
- Project work
- Study groups
- Literature search

CATEGORY 4
Participation of lecturer and students
initiated by students
0 hours - 0 %

- Debate meetings
- Study guidance

Resources

Muhammad Ali Mazidi, Sarmad Naimi and Sepehr Naimi - The AVR Microcontroller and Embedded Systems using Assembly and C.
Other resources made available on Studynet.

Evaluation
Permit criteria for attending examination:

~~None~~2 assignments must be approved before attending the examination.

Examination
Written examination.

Duration: ~~3~~ 2 hours.

Allowed tools:

- Course literature according to the course description
- Personal notes

Internal examiner.

The course must be passed before graduation.

Grading criteria
~~Course assignments account for 25 % of final grade.~~
Examinations account for ~~75~~ 100% of final grade.

Form

Additional information
Examination is digital, and the student are required to bring a laptop that are tested and ready for use with Wiseflow and FlowLock.

Responsible
~~Christian Flincker Sandbech~~Laurits Ivar Anesen

Valid from
1.8.~~2018~~2019

Course type
ICT Engineering;Compulsory Course for all ICT Engineering;3. semester;Compulsory for the specialization Business Information Systems;Compulsory for the specialization Cross Media;Compulsory for the specialization Embedded Engineering;