**Offered by**
ICT Engineering

**IT-CAL1**

1.1

# Computer Architecture Lab

**ECTS**
10

**Prerequisites**
Knowledge about basic computer programming.

- SDJ1

**Main purpose**
The main purpose of the course is to provide students with an introduction to computer architecture and low-level software development, including tools and theory needed to write working software for embedded systems (ASM/C).

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

- Explain numbering representations, including two's complement to represent negative numbers in the binary numbering representation
- Understand the functionality of basic logic gates, half- and full-adders, flip/flops, etc.
- Understand how Boolean expressions can be used to reduce Boolean expressions
- Explain the architecture of simple CPUs and how they function, explain the build and working behavior of basic building blocks of CPUs (registers, ALUs, etc.)
- Explain assembler programming
- Explain Clocks, instruction set layout, memory architectures, addressing modes
- Explain basic C programming artefacts and constructs
- Understand pointers and simple data structures in C
- Understand Test Driven Development (TDD)

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

- Write functioning C programs for embedded systems
- Use automated tests (Unit tests) to verify behaviour of C programs
- Use UML to document C programs
- Write functioning assembler programs for microcontrollers
- Calculate execution time of ASM programs (AVR MCU)
- Debug assembler/C programs
- Analyze and describe simple logical circuits (Boolean expressions)
- Use Boolean algebrato reduce Boolean expressions

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

- Understand and explain the functionality of the components of basic computer architectures
- Use mathematical theory to understand low-level computer architecture and programming
- Construct small applications using low-level C and assembler programming
- Be able to integrate simple I/O devices in embedded applications

**Topics**

- Problem solving
- Number systems and number representations
- Digital electronics (gates, flip/flops, etc.)
- Boolean algebra
- CPU Architecture
- Memory
- Stack
- I/O
- Buses
- Instruction set
- Assembler programming
- Subroutines, calling conventions
- Introduction to timers and interrupts (AVR MCU)

- Logical operators
- Functions
- Logical operators
- Structuring source files for C
- Arrays and simple data structures
- Pointers in C
- Abstract data types in C
- UML in embedded Applications
- Atmel AVR
- Test Driven Development (TDD)

**Teaching methods and study activities**
Activities change between theory, self-study and exercises in the lab. The mandatory course tasks will typically be done in small project groups.

Each group must deposit 600 DKK for loan of necessary equipment.

**Resources**

- The AVR Microcintroller and Embedded System – using assembly and c; Muhammad Ali Macidi, Sermad Naimi, Sepehr Naimi. Prentice Hall, ISBN 0-13-800331-9 or 978-1292042565
- On-line resources
- Hand-outs

**Evaluation**
Internal examination.

Three-hour written exam (75%) and hand-in exercises (25%) with marks according to the 7-point grading scale.

**Examination**

Three-hour written examination.

**Grading criteria**
According to the 7-point grading scale.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**
Required workload for students is estimated to 275 hours where approximately 2/3 is self-study including exercises and examination preparation.

**Responsible**
Ib Havn

**Valid from**
1.8.2017

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;Business Information Systems;Cross Media;Embedded Engineering;

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

IT-CON1

1.0

# Computer Networking

**ECTS**
5

**Prerequisites**
General admittance requirements.

- SDJ1

**Main purpose**
The main purpose of the course is to gain a basic understanding of computer networks and the protocols used in the Internet.

**Knowledge**

- Knowledge about the nuts and bolts of the Internet
- Understand layered abstractions in TCP/IP
- Understand World Wide Web
- Understand the Internet's naming system
- Understand how electronic mail systems work
- Understand addressing in a TCP/IP network

**Skills**

- Configure a small office/home office (SOHO) network based on Ethernet technology
- Analyze network traffic using packet sniffer software
- Clients/server programming with sockets

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

- Configure computers to communicate on a network
- Understand and discuss protocols on a professional level

**Topics**

- TCP/IP
- Application level protocols
- IP addressing
- Network configuration
- Socket programming

**Teaching methods and study activities**
The required workload for students is estimated at 137 hours where approximately 2/3 is self study including exercises and examination preparation. Activities change between theory, self study and exercises.

**Resources**
James F. Kurose, Keith W. Ross. Computer Networking, A Top-Down Approach; Fifth Edition (International Edition). Pearson.

**Evaluation**
Internal examination.
25% of the grade will come from a test held during the course, 75% will come from the final examination.

**Examination**
Oral examination.

The duration of the oral examination is 20 minutes, including voting and marking.

**Grading criteria**
Students will be graded according to the Danish 7-point grading scale.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for a just acceptable level of comprehension of the required competences.

**Additional information**

**Responsible**
Erland Ketil Larsen

**Valid from**
1.8.2016

**Course type**
Global Business Engineering;Compulsory Course for GBE-ICT;5. semester;
ICT Engineering;Compulsory Course for all ICT Engineering;

A.K. Petersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT
Engineering

**CSE I1**

10.0

# Communication Skills for Engineers

**ECTS**
5

**Prerequisites**
General admittance requirements

**Main purpose**
The main purpose of the course is for students to develop the study skills required to study at a higher education programme. The course will strengthen the students' skills in communicating successfully, including making project reports and giving oral presentations.

**Knowledge**

- State learning styles and personal profiles
- Understand the basic principles in intercultural communication
- Understand how to structure and deliver professional presentations
- Understand group development and group dynamics
- Understand the features of academic writing

**Skills**

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

- Analyse learning profiles and improve own learning outcome
- Communicate successfully in an intercultural context
- Demonstrate the knowledge of how to make groups successfull
- Prepare and give oral presentations
- Organise and structure reports
- Communicate correctly in accordance with basic grammar rules
- Communicate the use of an IT system using Use Cases

**Topics**
Study skills

- Learning styles
- Note-taking techniques
- Reading skills

Intercultural communication

- Relationships, social framework, time and power perception
- Communicating in a business perspective

Presentation skills

- Introduction to various presentation techniques
- Structuring presentations
- Being a presenter

Group work

- Group development, stages
- Group management
- Conflict management and prevention

Written skills

- Academic writing
- Reflective writing
- Cohesion
- Text structure

**Teaching methods and study activities**
12 weeks equalling 140 hours of work for the student. 3 compulsory written hand-in assignments. One test halfway through the semester. Class tutorials. Student presentations. Written and oral exercises.

**Resources**
Flensted and Petersen, "Box on Communicating", Malling Beck, 2006.
Scott W. Ambler, "The elements of UML 2.0 Style" chapter 4.
Online resources

**Evaluation**
Students are assessed on the basis of class attendance - at least 80 % - and compulsory class activities.

**Examination**

**Grading criteria**
Approved/not approved

**Additional information**
Elements from the syllabus in the course Communication Skills for Engineers will be assessed at the exams in SEP I1 and SEP I2.

**Responsible**
Mona Wendel Andersen

**Valid from**
1.8.2014

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;1. semester;

M.K. Petersen

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

IT-DBS1

1.2

# Database Systems

**ECTS**
5

**Prerequisites**
SDJ1 or similar

- IT-SDJ1

**Main purpose**
The main purpose of the course is two-fold. Firstly, students are to learn methods for designing, implementing and operating single-user relational databases. Secondly, students are to learn the main principles, architecture and technologies of a typical relational database management system (RDBMS).

**Knowledge**
Students will obtain theoretical knowledge on designing relational databases for practical application using a theoretical data modelling methodology. Students will obtain theoretical knowledge about relational algebra, UML notation for databases, E/R models, relational models, SQL, normalization, transaction handling and concurrency control.

**Skills**
Having completed this course, students will be able to:

- create ER-Models with UML
- understand and explain the relational model
- use Data Definition Language (DDL) to create databases
- use Data Manipulation Language (DML) to manipulate data in a database
- map ER-Models to Relational Models
- use basic SQL statements to create, replace, update and delete data in a database
- understand and use keys in relational databases
- understand and use joins
- handle the process of normalization to 3NF

**Competences**
Having completed this course, the students will be able to create database based applications using industry standard tools and methods.

**Topics**

**Teaching methods and study activities**
Lessons alternate between theory and practical exercises using the PostgreSQL relational DMBS. The course contains one or more compulsory assignments.

**CATEGORY 1**
Participation of lecturer and students
Initiated by the lecturer
55 hours- 40%

- Lessons, scheduled
- Exams and tests

**CATEGORY 2**
Participation of students
Initiated by the lecturer
50 hours - 37%

- Assignments, self-study
- Project and group work
- Homework and preparation for exams

**CATEGORY 3**
Participation of students
Initiated by students
25 hours - 19 %

- Homework and preparation for exams
- Self-study

- Study groups

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

- Project guidance

**Resources**
Connolly, Thomas and Begg, Carolyn: Database Systems (5th edition). Harlow, 2010, Pearson Education. ISBN: 987-0-321-52306-8

**Evaluation**
Permit criteria for attending examination

- Mandatory assignments handed in be-fore deadline and accepted.

Duration (grading included) app. 20 min/ 5 ECTS.

**Examination**

**Oral Examination**

Individual oral examination without preparation based upon course assignment(s).

Individual oral examination based upon a subject found by draw.

No preparation.

Allowed tools: All.

Internal examiner.

**Grading criteria**
Examinations account for 100 % of final grade.

**Additional information**

**Responsible**
Ole Ildsgaard Hougaard

**Valid from**
1.2.2018

**Course type**
Global Business Engineering;Compulsory Course for GBE-ICT;5. semester;
ICT Engineering;Compulsory Course for all ICT Engineering;2. semester;

M.K. Petersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-DNP1**

2.0

# Internet Technologies, C# and .NET

**ECTS**
5

**Prerequisites**
IT-SDJ1, IT-DBS1, IT-RWD. Or similar courses. The course must be passed before graduation.

- IT-DBS1
- IT-RWD1
- IT-SDJ1

**Main purpose**
The purpose is to qualify the student to understand and implement the basic concepts of the C# programming language and the .NET developer platform.

**Knowledge**
The student should be able to understand:

- The fundamentals of .NET development and the common type system
- The C# programming language
- Web services
- Web applications
- Object-relational mapping
- Authentication and authorization
- Client-side vs. server-side programming

**Skills**
The student should achieve the skills:

Implement console applications, web applications and web services with

- Server-side C#-programming
- Data persistence using object-relational mapping
- User management, including authentication and authorization
- Create and consume class libraries
- Consume and expose web services
- Navigate and use the managed .NET API
- Understand security concerns of .NET applications
- Apply unit testing and TDD principles to .NET applications
- Use a command-line interface (CLI) toolchain
- Deploy .NET applications

**Competences**
The student should be able to:

- Master the fundamentals of the C# programming language and the .NET developer platform
- Develop .NET applications and services as a part of a distributed system, herein account for communication protocols used

**Topics**

**Teaching methods and study activities**
The semester has 56 classroom lessons - four lessons once a week for 14 weeks. These lessons consist of exercises and teacher presentations. The total workload of the student is expected to be around 140 hours. Referring to the Study Activity Model, the workload is distributed as follows:

**CATEGORY 1**
Participation of lecturer and students

Initiated by the lecturer
42 hours - 30%

- Lessons, scheduled
- Exercises in class
- Project guidance
- Exam

**CATEGORY 2**
Participation of students
Initiated by the lecturer
42 hours - 30%

- Exercises
- Project and group work
- Homework

**CATEGORY 3**
Participation of students
Initiated by students
42 hours - 30 %

- Self-study
- Group work
- Literature search
- Preparation for exam

**CATEGORY 4**
Participation of lecturer and students
initiated by students
14 hours - 10 %

- Study guidance

**Resources**
Online material

**Evaluation**
Permit criteria for attending examination:

- Group reports including student's name handed in before deadline.

**Examination**
Oral Examination.

The examination is a joint exam with IT-SEP3 and IT-SDJ3.

Group presentation followed by individual examination.

Group presentation of the IT-SEP3 project - 5 minutes per person.

Individual examination - 35 minutes including examination in IT-SEP3, IT-DNP1 and IT-SDJ3.
Allowed tools: All
Internal exam.

**Grading criteria**
IT-SEP3 accounts for 50% of final grade.
IT-DNP1 accounts for 25% of final grade.
IT-SDJ3 accounts for 25% of final grade.

**Additional information**

**Responsible**
Jakob Knop Rasmussen (JKNR)

**Valid from**
15.8.2018

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;3. semester;

C.K. Petersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-DSP1**

1.1

# Digital Signal Processing

**ECTS**
5

**Prerequisites**
Upper level mathematics equivalent to A-levels

- CAL I1

**Main purpose**
The purpose of the course is to equip the student with basic knowledge about the fundamentals of Digital Signal Processing and its applications.

Starting from the basic definition of a discrete-time signal, we will work our way through sampling, filter design, and Fourier analysis to build a basic DSP toolset. Signal processing is one of the fundamental theories and techniques to construct modern information systems. For example, audio, speech, and image processing, computer graphics, biomedicine all apply digital signal processing. In fact, digital signal processing is used to develop algorithms that can diagnose heart disease and can even be used to detect hostile drones. The course familiarizes the student with digital signals, sampling theory, digital filtering, the Fast Fourier Transform, power spectrum, and feature extraction.

**Knowledge**
After successfully completing the course, the student will have gained knowledge about:

- The nature and recording of different types of digital signals
- Cleaning up digital signals
- Extracting useful values from digital signals
- MATLAB as a tool for development of signal processing algorithms

**Skills**
After successfully completing the course, the student will be able to:

- Record digital signals
- Apply different filters (high-pass, low-pass, band-pass, notch) to remove unwanted components of digital signals
- Use the Fast Fourier Transform to analyze the frequency content of a signal

**Competences**
After successfully completing the course, the student will have acquired competences in:

- Explain sampling processes and how to determine the correct sampling frequency
- Describe signal processing applications
- Applying digital signal processing methods to analyze and interpret engineering problems
- Develop signal processing algorithms

**Topics**

- What is a signal?
- MATLAB
- Sampling theory
- A/D conversion
- Digital filters
- The frequency domain
- The Fast Fourier Transform and power spectrum
- Feature extraction (RMS, AUC, peak detection, peak latency, peak to peak, time intervals)

**Teaching methods and study activities**
Approximately 150 hours. The course is a mixture of lectures, hands-on MATLAB exercises, and hand-ins with approximately 1/3 of the time devoted to each part. Exercises are carried out in teams of 2-3 students.

**Study Activity Model**

**Resources**
Mark Owen - Practical Signal Processing © Cambridge University Press (ISBN 978-1-107-41182-1).
The MATLAB software will be integrated into this course.

**Evaluation**
The course is evaluated via an oral exam after course completion.

Grading will be done according to teh 7-scale, using an internal examiner.

**Examination**

At the end of the semester, the students will hand-in an assignment and the final exam will be based on this assignment.

The students will present the assignment in the form of a demonstration, followed by questions about the signal processing and feature extraction methods as well as the MATLAB programming.

**Grading criteria**
According to the 7-point grading scale.

Internal examiner.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**
For more information, please contact Line Lindhardt Egsgaard (lile@via.dk).

**Responsible**
Line Lindhardt Egsgaard

**Valid from**
1.1.2017

**Course type**
ICT Engineering;6. semester;7. semester;Elective for the specialization Business Information Systems;Elective for the specialization Cross Media;Elective for the specialization Enterprise Engineering;Elective for the specialization Web Engineering;Elective for the specialization Embedded Engineering;Electives;

Cf. K. Petersen

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-ELE1**

1.0

# Basic Electronics (ICT) - 10 ECTS

**ECTS**
10

**Prerequisites**
General admittance requirements

**Main purpose**
The student should acquire knowledge about basic electronic concepts and physical laws. Furthermore, the student should learn how to plan an experiment, perform it, analyse and evaluate the results and report all of this according to the international report-writing standard (IMRAD).

Course secondary purpose:

- Introduction to measurement instruments in electronics
- Make systematic measurements and take precautions to minimize the effect of variance and error
- Analyse and visualize measured data
- Structured reports on experiments and be able to make correct conclusions

**Knowledge**
Having completed this course, students should have understanding of

- Statistics, Observation variance and error
- Ohm's, Kirchhoff's, Thevenin, Superposition and other laws used in electronics calculations
- Theory of basic analogue electronic components
- Cooling of electronic components (Heatzink, Compound)
- Filter properties
- Strain Gauges in Wheatstone Bridge
- Operation Amplifiers, Instrument Amplifier, transustor (NPN, PNP)

**Skills**
Having completed this course, students should be able to

- Simulate analogue electronic circuits using simulation software
- Construct active filters with desired property for specific application
- Build and test prototype circuits
- Perform measurements on electronic circuits, using Digital Multi Meter and Pico-scope
- Solder components and wires

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

- Design simple electronic circuits for measurement systems using amplifiers and filters
- Analyse experiment results, using statistical calculations and methods
- Write reports to document engineering experiments

**Topics**
Electronics, Soldering, Instruments, Statistic, Report writing

**Teaching methods and study activities**
Lectures by teacher, group and individual work, tests, exercises, assignments, student presentations, class discussion conducted by teacher.

During the course the students will be able to design, simulate, build, test and make report on a simple electronic circuits in the ICT Laboratory.

**Resources**

**Evaluation**
Internal examination.
To qualify for the examination, the mandatory assignment/projects must have been carried out during the semester, within the set deadlines and must have been approved.
The evaluation of the course is based on mandatory course work (50%) and the oral exam (50%) at the end of the course. Only students with approved course work will be allowed to attend the exam.
The oral examination is based on electronics syllabus and three mandatory assignment reports:
It is a prerequisite that all of the three course assignment reports have been approved to attend the oral examination.
First two assignments should be performed in groups while the third will be done individually.

**Examination**
Oral examination. All written and electronic documents as approved aids.
In total the examination lasts for 20 minutes including marking.

**Grading criteria**
Grading:
Grading is according to the 7-point grading scale.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**

**Responsible**
Poul Væggemose

**Valid from**
1.8.2016

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;4. semester;Embedded Engineering;

U. K. Petersen

VIA University College

Campus Study Administration
Chr M Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-ESB1**

2.0

# Engineering Science and Business

**ECTS**
5

**Prerequisites**
The course requires at least 1 year of studies at an IT-related programme at AP degree level and up.

**Main purpose**
The continuous efforts made within information technology (IT) not only affect a diverse array of areas within the development of modern society but also affect them in many different ways. In much the same manner, IT itself is conditioned by its historical, technological, and social contexts.

The main purpose of this course is to examine the (sometimes implicit) assumptions about knowledge and the creation of knowledge made by engineers and scientists within their field. The objective is to gain a deeper understanding of the way engineering and science is conducted, and a basic understanding of fundamentals business activities in an IT company.

In addition, the course will enable the students to:

- Clarify which consequences their scientific point of departure has for their choice of methods, and thus what this means for analysis and assessment of practice as well as to identify basic theory of science problems related to engineering science
- Account for the distinctive character of IT and its relation to other academic disciplines
- Account for what it means to be an ICT Engineer and account for their own professional identity
- Discuss which scientific and ethical consequences the profession implies
- Reflect upon the profession's content, its history, its social and business related functions.
- Finally, the students will come to understand and master the knowledge-based challenges that one meets in a modern information society.

**Knowledge**
After successfully completing the course, the student will have gained knowledge about:

**Science:**

What the profession of ICT Engineering is
What knowledge and science are
What role knowledge plays in ICT engineering and computer science
Essential theoretical problems and schools within philosophy of science
What constitutes science, pseudo-science and non-science
The concept of paradigms and paradigm shifts
**Business:**

Basic concepts of business economics in IT companies
Understanding the basic structure and contents of annual reports
Knowledge about budgeting and calculations in IT companies
Knowledge about capital budgeting.

**Skills**
After successfully completing the course, the student will be able to:

**Science:**

Relate critically to empirical-analytical theory and among other things be able to discuss what knowledge is, how it is generated and how it relates to practice
Reflect upon and enter into discussions about computer science perspectives in academic contexts
Assess the relationship between scientific knowledge and practical experience in creating new technologies
Describe types of knowledge and competences composing engineering practice
**Business:**
Discuss and understand key elements of the economic side of IT and business

**Competences**
After successfully completing the course, the student will have acquired competences in:

- Using scientific methods to solve practical engineering problems
- Using Annual Reports as a source for getting information about companies
- Understanding of aim and techniques for budgeting and calculations

**Topics**

**Teaching methods and study activities**
The mode of instruction will be classroom based and will involve short lectures by the teacher, classroom discussions, group work and student based group presentations. The students are also expected to read the literature before classes. The total workload for the student is expected be around 150 hours.

Referring to the Study Activity Model, the workload is distributed at follows:

**CATEGORY 1: 30%**
Participation of lecturer and students
Initiated by the lecturer
Lessons, scheduled
Project guidance

**CATEGORY 2: 50%**
Participation of students - Initiated by the lecturer
Assignments, self-study
Project and group work
Homework and preparation for presentations
Evaluation of the teaching

**CATEGORY 3: 20 %**
Participation of students - Initiated by students
Homework and preparation for presentations
Self-study
Project work
Study groups
Literature search

**Resources**
Science: A compilation of texts will be made available online
Business: Literature will be available in StudyNet.

**Evaluation**

Students are assessed

1) On the basis of class attendance - at least 80 % in both Business and Science;

2) On compulsory activities in Science

3) One compulsory activity in Business

If a student fails to meet one or more of the above requirements for passing the course, the student will have to do a number of written works the following semester and present this for the teachers and the other students that failed the course.

**Examination**

There is no examination as the course is evaluated based on attendance and compulsory assignments.

**Grading criteria**

**Additional information**

**Responsible**
Lars Bech Sørensen (LBS)

**Valid from**
1.8.2018

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;4. semester;Business Information Systems;Cross Media;Embedded Engineering; Software Ingeniør;Compulsory for Software Ingeniør;

A.K. Petersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-HWP1**

1.0

# Hardware Oriented programming

**ECTS**
5

**Prerequisites**

- IT-CAL1
- IT-SDJ1

**Main purpose**
The purpose of the course is:

- To provide the student knowledge about the technical details of an industrial microcontroller used for embedded systems from a programmer's point of view.
- To qualify the student to implement simple low level drivers for various hardware devices.
- To qualify the student to implement low-level software for an embedded system in C.
- To qualify the student to do Unit testing of embedded C

**Knowledge**

**Skills**

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

- have knowledge to read datasheets for electronics components
- understand the architecture of micro-controllers
- master IO-Ports
- master Interrupts
- master Timers
- master Analog input/output
- understand how to divide the software into logical abstraction layers
- be able to implement software for micro-controllers in C
- understand how to design and implement simple device drivers
- to exemplify the above topics in small applications.

**Topics**

- Architecture of industrial micro-controllers.
- Memory and IO-systems.
- Basic peripherals.
- Interfacing to the analogue world.
- Interrupts and exceptions.
- Developing software for embedded systems.
- Programming device drivers.
- Unit testing of embedded C

**Teaching methods and study activities**

Required workload for students is estimated to 137 hours. ~2/3 of the workload is self-study by the student.
Activities change between theory, tasks, programming exercises and mini projects.

During the semester 4-5 compulsory assignments will be given. The result of these assignments will lead to 25% of the final assessment grade for the student.

Each group must deposit 600 DKK for loan of necessary equipment.

**Resources**
Muhammad Ali Mazidi, Sarmad Naimi & Sepehr Naimi: The AVR microcontroller and embedded system.

Copies from various books and notes.

**Evaluation**
Internal examination.
Final grade based 25% on tuition activities selected as compulsory by the teacher carried out within the set deadlines and approved, and 75% from the oral examination.

**Examination**
The exam is oral and it takes 20 minutes per student. The exam is in two parts. First part is a presentation and questions related to the solution to an assignment made in the course. Second part is a drawn question related to the course subjects.

**Grading criteria**
Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for a just acceptable level of comprehension of the required competences. According to the 7-point grading scale. comprehension of the required competences.

**Additional information**

**Responsible**
Ib Havn

**Valid from**
1.2.2015

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;7. semester;Compulsory for the specialization Embedded Engineering;Electives;

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-INO1**

2.0

# Engineering Innovation (ICT)

**ECTS**
5

**Prerequisites**

**Main purpose**

**Knowledge**
After having successfully completed the course, the students will have gained:

An understanding of their own professional identity in and of itself, as well as contrasted and compared to other fields of engineering
An understanding of innovation and its uses within the field of engineering
Knowledge about innovative processes within the field of engineering

**Skills**
After having successfully completed the course, the students will be able to:

Engage in innovative processes in a Cross-/inter-/multidisciplinary setting in order to conceive, plan and execute their ideas
Work methodically with innovation
Apply relevant models to the implementation of product and concept development

**Competences**
After having successfully completed the course, the students will have gained competences in:

Introducing innovative ideas into project work
Assess when innovation is needed and what the value of initiating an innovative process will be
Contributing own professional skills in teams with the objective of solving problems by using innovative processes and models

**Topics**
Clarifying multidisciplinary group competencies
The history of the engineer and engineering
VIA engineering in an innovative perspective
Field research
Field trip
The 4D model: Discover, iDiate, Design and Deliver
Process reflection
Innovation competition

**Teaching methods and study activities**
Engineering Innovation is a three-week comprehensive course in which the students work partly in their own faculty (one week, see separate description) and partly cross-faculty in VIA Engineering (two weeks):

Week 49-50: Working in multidisciplinary groups in VIA Engineering (Monday December 4 – Friday December 15, 2017) .Throughout the course, the students will work in groups gaining innovative tools and using these for solving specific challenges posed by actual companies. Additional information about the content and scope of the group challenges and deliveries will be announced during week 49.

External partners from the companies who posed the challenges assess the students. The students are assessed in terms of their written deliveries and their oral presentation, emphasis being on their idea, the process described for working with the idea, and the final product and/or solution.

**Resources**

**Evaluation**
In order to qualify for an approval, the students: Must have an attendance of 100% at the Engineering Innovation during the three-week period.

**Examination**

Group presentation of project Friday December 15.

**Grading criteria**
Full participation in all activities during the course (check-in/out each day). Approved/not-approved.

**Additional information**

**Responsible**
Behnam Boujarzadeh

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;Business Information Systems;Cross Media;Embedded Engineering;

M.K. Pedersen

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-INP1**
2.0

# Engineering Internship (ICT)

**ECTS**
30

**Prerequisites**
To start an internship the student must have passed all courses, projects and workshops of the previous semesters. An application for an exemption must be submitted in writing to the study counsellor of the programme.

**Main purpose**

**Knowledge**
The student must:

- gain knowledge of theory, methodology and practice within a profession or one or more fields of study
- be able to understand and reflect on theories, methodology and practice
- be aware of non-technical – societal, health and safety, environmental, economic and industrial – implications of engineering practice

**Skills**
The student must:

- be able to apply the methodologies and tools of one or more fields of study and to apply skills related to work within the field/fields of study or profession
- be able to assess theoretical and practical problems and to substantiate and select relevant solutions
- be able to communicate professional issues

**Competences**
The student must:

- be able to handle complex and development oriented situations in study or work contexts
- be able to independently participate in professional and interdisciplinary collaboration with a professional approach
- be able to identify own learning needs and to organise own learning in different learning environments
- promote an engineering-oriented approach during the remaining semesters on the Bachelor programme
- develop personal skills required for the professional career as engineer
- form the basis for developing personal/professional network.

**Topics**
The internship aims to give students an introduction to work as an engineer.

**Teaching methods and study activities**
The internship consists of minimum 20 weeks of full time work corresponding to approx. 740 hours of work.
Furthermore, documentation, participation in workshop for coming interns etc. account for approx. 85 hours of work.

Study Activity Model:

CATEGORY 1 Participation of lecturer and students, initiated by the lecturer 5 hours/0.5%
CATEGORY 2 Participation of students, initiated by the lecturer: 75 hours/9%
CATEGORY 3 Participation of students, initiated by students: 740 hours/90 %
CATEGORY 4 Participation of lecturer and students, initiated by students: 5 hours/0.5%

**Resources**

**Evaluation**
In order to get an internship evaluated, the student must fulfil the following requirements concerning mandatory assignments:

- Expected outcome/specific learning targets for the internship position
- Company presentation
- Logbook
- Main academic assignment(s)

- Final reflections
- Recommendation letter from the company
- Participation in workshop for coming interns

**Grading criteria**
The course is evaluated by Approved/Not approved.

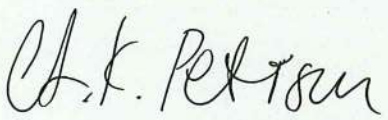
**Additional information**
Deadline for signing of an Internship agreement:

Spring internship: 15th December
Autumn internship: 1st July

**Responsible**
Karin Larsen

**Valid from**
1.8.2017

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;5. semester;



VIA University College

Campus Study Administration
Chr M Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

| | |
|---|---|
| Titel | Lego Robot Lab 1 |
| Kode | IT-LRL1 |
| Ver | 1.0 |
| Sprog | EN |
| Udbyder | ICT Engineering |
| Kursusansvarlig | Troels Mortensen |
| ECTS-point | 5 |
| Forudsætninger | General Admission Requirements |
| Interne forudsætninger | |
| Formål | Enabling the student to understand the basic concepts and techniques of embedded system development using Java to program a Lego Mindstorms robot. |
| Nøgleord | |
| Indhold | • Real world interaction<br>• Sensor input and responds to stimuli: light, pressure, ultrasound, sound, sampling, accuracy<br>• Output: motor control, sound, LCD display<br>• Searching and sorting |
| Læringsmål | |
| Viden | • Describing the elements of a Java program<br>• Understanding motors and sensors<br>• Understand how programs interact with the real world |
| Færdigheder | After having completed this course, the student should be able to:<br>• Write basic Java programs<br>• Use the Java programming language to control a robot<br>• Program a robot to react to its environment using Java<br>• Implement and use different searching and sorting algorithms |
| Kompetencer | |
| Undervisningsform og aktiviteter | Estimated workload for students is 137 hours.<br>Activities will vary between theory presented on class and practical exercises in the laboratory.<br><br>The students will build a robot and complete a programming project towards the end of the semester. |
| Evaluering | Each group must deposit 600 DKK for loan of necessary equipment.<br>To qualify for the examination, the student must show an attendance of at least 75% of the lessons during the semester. |

| | |
|---|---|
| | 25% of the grade will come from a test held during the course, 75% will come from the final examination. |
| Eksamen | Internal examination.<br>Oral exam based on the final hand-in. At the end of the semester, the students will hand-in an assignment. The students will present the assignment in the form of a demonstration, followed by questions about the programming and the logic behind the robot.<br><br>The duration of the oral examination is 20 minutes, including voting and marking.<br><br>To attend the exam it is a condition that course activities selected as compulsory by the teacher have been carried out within the set deadlines and approved. |
| Karakterbeskrivelse | According to the 7-point grading scale.<br><br>Mark 12:<br>Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.<br><br>Mark 02<br>Awarded to students for the just acceptable level of comprehension of the required competences. |
| Studieaktivitetsmodel | |
| CDIO | |
| Ressourcer | Tutorials from the following homepage:<br>http://lejos.sourceforge.net/nxt/nxj/tutorial/index.htm and hand-outs.<br><br>All students must be a part of a group and all groups must pay a deposit for the LEGO NXT equipment.<br>The LEGO NXT equipment must be handed in at a date set by the teachers. |
| Yderligere oplysninger | |
| Gældende fra | 01-08-2016 |
| Godkendt af | |
| BY | |
| BY udbud | |
| CE | |
| CE udbud | |
| CE Exchange | |
| CE Exchange udbud | |
| FI | |
| FI udbud | |
| GBE | Compulsory Course for GBE-ICT; 4. semester; Elective for the specialization Information Technology and Management |
| GBE udbud | 2018 Feb-Jun |
| GBE Exchange | |

| | |
|---|---|
| GBE Exchange udbud | |
| ICT | |
| ICT udbud | |
| ICT Exchange | |
| ICT Exchange udbud | |
| MA | |
| MA udbud | |
| ME | |
| ME udbud | |
| ME Exchange | |
| ME Exchange udbud | |
| SE | |
| SE udbud | |
| Arkiv | Nej |
| SortCourses | |
| SortCourses_GBE | |
| Efteruddannelse | Nej |
| Efteruddannelse_tid | |
| Efteruddannelse_pris | |
| SortCourses_ICT | |
| SortCourses_CE | |

Version: 11.0
Oprettet af kl. 21-08-2016 15:21 af Lis Therkildsen (LITH) | VIA
Senest ændret kl. 13-01-2018 17:08 af Lis Therkildsen (LITH) | VIA

A.K. Petersen

VIA University College

Campus Study Administration
Chr M Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

IT-PCL1

1.0

# Programming Concepts and Languages

**ECTS**
5

**Prerequisites**
Considerable programming experience with e.g. Java, C# and C.

**Main purpose**
The purpose of the course is to qualify the student to:

- Understand various programming concepts, paradigms and get knowledge about how different paradigms appear in different programming languages
- Get thorough knowledge about the functional programming paradigm
- Apply different paradigms to specific problems in different languages

**Knowledge**

**Skills**

**Competences**

**Topics**
Overview of programming concepts, paradigms and languages
Imperative paradigm with Imperative Programming in Python
Object-Oriented paradigm with Object-Oriented Programming in Scala
Concurrent paradigm with Concurrent Programming in Erlang
Functional paradigm with Functional Programming in F#
Integration of different programming paradigms in system development.

**Teaching methods and study activities**
Activities will vary between theory, programming exercises, and mini project work.

**Study Activity Model**

**Resources**
Some papers about the general programming concepts and languages.
A book about functional programming in F#.
Lesson notes.

**Evaluation**
Written programming hand-in exercises and presentations: 30 %.

**Examination**

Three-hour written examination (70 %) and hand-in exercises/presentations (30 %) with marks according to the 7-point grading scale.

External examination.

**Grading criteria**
According to the 7-point grading scale.

Mark 12 Awarded to students who have shown excellent comprehension of the below-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02 Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**
Required workload for students is estimated to 150 hours.

**Responsible**
Joseph Okika

**Valid from**
1.8.2017

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;6. semester;Electives;

C.K. Petersen

VIA University College

Campus Study Administration
Chr. M Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

Offered by
ICT Engineering

IT-PME1

1.0

# Process Management for ICT Engineering

**ECTS**
5

**Prerequisites**
Project experience from semester projects and internship.

**Main purpose**
The main purpose of the course is to provide students with the qualifications needed to understand the CMMI model and be able to transfer the CMMI level 1-2-3 knowledge into practical use in a project.

**Knowledge**
After successfully completing the course, the students will have gained knowledge about:

- How to ensure quality in projects
- How to improve your project performance
- How to handle change management in a project.

**Skills**
After successfully completing the course, the student will be able to:

- Apply techniques and results from Capability Maturity Model Integration (CMMI) to solve challenges in project processes
- Apply techniques and results from Lewin model to handle change management in project
- Apply "How to break software" to prevent making mistakes in your project
- Be able to describe and make use of testing concepts
- Use of terminology to kick-start Bachelor project.

**Competences**
To complete this course the students must make hand-in:

- "Test plan" document for a project
- "Test Specification" document for a project
- "Project relations to CMMI model" document for a project.

**Topics**
Software Process Improvement,
Software Development Strategy,
Software Testing Principles,
Improve Component Testing,
How to Break Software.

**Teaching methods and study activities**
Activities alternate between theory, self-study, group work, exercises and hands-on experiments.

Additional information:

Required workload for students is estimated at 100 hours where approximately two thirds are self-study, including exercises and preparing for the examination.

Description:
Capability Maturity Model Integration (CMMI) is a process improvement approach that helps organizations improves their performance. CMMI can be used to guide process improvement across a project, a division, or an entire organization.
CMMI in software engineering is a trademarked process improvement approach that provides organizations with the essential elements for effective process improvement.
According to the Software Engineering Institute (SEI, 2008), CMMI helps "integrate traditionally separate organizational functions, set process improvement goals and priorities, provide guidance for quality processes, and provide a point of reference for appraising current processes."

**Resources**

1.
Practical Insight into CMMI® (2nd Edition) ebrary Reader
Author: Kasse, Tim
Publisher: Artech House
Released: 2008
Subjects: Capability maturity model (Computer software) Computer software Development.

2.
How to Break Software, A Practical Guide to Testing,
Author: Whittaker James
Released: 2002
ISBN: 0-201-79619-8

3.
How to Break Software, Security
Author: Whittaker James
Released: 2003
ISBN: 0-321-19433-0

**Evaluation**
Internal examination.
The evaluation of the course is based on mandatory course work (50%) and the oral exam (50%) at the end of the course. Only students with approved course work will be allowed to attend the exam.

**Examination**

The exam is oral and it takes 20 minutes per student. The exam is in two parts. First part is a presentation and discussion of selected parts of the course work. Second part is drawn question from the theory of the course.

**Grading criteria**
Grading is according to the 7-point grading scale.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**

**Responsible**
Poul Væggemose

**Valid from**
1.2.2012

**Course type**
Global Business Engineering
ICT Engineering;6. semester;Elective for the specialization Enterprise Engineering;Elective for the specialization Embedded Engineering;Electives;

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-RIE1**

1.2

# Real-Time Programming, Interfacing and Electronics

**ECTS**
10

**Prerequisites**
Similar courses to AJP1 (especially thread programming) at your home institution. Similar courses to CAL1 (Computer Architecture and C-Programming) at your home institution.

- IT-AJP1
- IT-CAL1

**Main purpose**
The main purpose of the course is to provide students with the qualifications needed to understand central concepts and characteristics about real-time programming, and to give the students knowledge about electronics used to interface micro-controllers to a number of sensors and actuators.

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

- Understand the basic concepts of real-time programming
- Explain issues like deadlocks, priority inversion etc.
- Basic understanding of datasheets for electronics components
- Explain and understand simple electronics interfaces typically used in embedded systems
- Understand low-level protocols (Datalink- and Physical Layers).

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

- Write functioning real-time programs in C using FreeRTOS
- Analyze a simple real-time design for schedulability, deadlocks, utilization etc.
- Design and calculate components for simple electronics interfaces
- Design and implement low-level protocols.

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

- master and use simple real-time operating systems
- be able to analyze/design/describe and construct real-time programs
- understand timers and clocks, and how they are used in real-time programming
- understand synchronization avoiding dead-locks and priority inversion
- understand memory management, resource sharing and control
- be able to design and construct real-time systems using FreeRTOS and C-programming
- be able to design simple electronic hardware interfaces to sensors and actuators
- have knowledge to read datasheets for electronics components
- understand low-level protocols, CRC etc.

**Topics**
Real-time Programming:

- C Programming
- Introduction to FreeRTOS
- Real-time concepts

- Tasks
- Scheduling – RMS, DMPO, Arbitrary Deadlines, EDF
- Queues
- Timers
- Clocks
- Memory management
- Resource sharing
- Semaphores and mutexes
- Synchronization
- Priority Inversion
- Priority - static, dynamic
- Low-level protocols
- CRC
- Hamming-codes

Interfacing and Electronics:

- Introduction to understand datasheets for electronics components
- Relay drivers
- H-Bridge and Pulse Width Modulation (PWM)
- Analogue to digital and visa versa converters
- Printed Circuit board design – schematics and PCB-layout

Test:

- Unit test in C
- Simple integration test

**Teaching methods and study activities**
Activities change between theory, tasks, practical exercises and lab-work.

Each group must deposit 600 DKK for loan of necessary equipment.

**Resources**
Paul Scherz, "Practical Electronics for Inventors", 2nd edition McGraw-Hill, 2007, ISBN: 0-07-145281-8

Alan Burns and Andy Wellings, "Real-Time Systems and Programming Languages", 2009, ISBN 978-0-321-41745-9 Additional notes and on-line books

**Evaluation**
Internal examination.

**Examination**

Four hour written exam.

All non-electronic aid allowed (except simple calculators that cannot communicate).

**Grading criteria**
According to the 7-point grading scale.

Mark 12
Awarded to students who have shown excellent comprehension of the below-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**
Expected workload 11 weeks of 10 lessons per week.

Required workload for students is estimated to 275 hours where approximately 2/3 is self-study including exercises and examination preparation.

**Responsible**
Lars Bech Sørensen

**Valid from**
1.2.2018

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;6. semester;Embedded Engineering;Electives;

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-RWD1**
2.0

# Responsive Web Design

**ECTS**
5

**Prerequisites**
General admittance requirements.

**Main purpose**
The main purpose of the course is to introduce a set of theories, tools, and practicable methods in order for students to obtain a profound knowledge and practical skills of web development with the ability of creating web sites running on PC and mobile devices using basic web programming and design combined with jQuery.

**Knowledge**
The student will gain knowledge of the following topics:

- HTML5
- CSS3
- W3C Validation
- Responsive web-Design (Multiplatform)
- jQuery
- Bootstrap

**Skills**
Having completed this course, students will be able to:

- Create web sites using Hyper Text Markup Language (HTML5)
- Style web pages using Cascading Style Sheets (CSS3)
- Using responsive web-Design to design web sites that are platform independent
- Create "smart" web sites using jQuery, and Bootstrap

**Competences**
To obtain the fundamental knowledge needed to:

- Create platform independent web applications

**Topics**

**Teaching methods and study activities**
Required workload for students is estimated at 150 hours where approximately two thirds are self-study, including exercises and preparation for the examination. Activities alternate between theory, self-study, and exercises.

**CATEGORY 1**
Participation of lecturer and students
Initiated by the lecturer
55 hours - 37%

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

**CATEGORY 2**
Participation of students
Initiated by the lecturer
30 hours - 20%

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

**CATEGORY 3**
Participation of students
Initiated by students
55 hours - 37%

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

**CATEGORY 4**
Participation of lecturer and students
Initiated by students
10 hours - 6%

- Debate meetings
- Study guidance

**Resources**
[Duckett, 2011] : HTML & CSS Design and build Webstites, Jon Duckett, First Edition, ISBN: 978-1-118-00818-8

[LaGrone, 2013] : HTML5 and CSS3 Responsive Web Design Cookbook, ISBN: 978-1-84969-544-2

[Duckett, 2014] : Javascript & jQuery, Jon Duckett, First Edition, ISBN: 978-1-118-53164-8

https://www.w3schools.com/
http://getbootstrap.com/
http://jquery.com/

**Evaluation**
Permit criteria for attending examination:
* Mandatory course activities completed
* Mandatory assignments handed in before deadline and accepted.
* Attendance (75%)
The student must have an attendance of at least 75% in order to qualify for the exam. If this requirement is not met, the student will automatically fail the ordinary exam.

**Examination**

Duration: 2 hours

Digital written examination (2 parts):

Part 1: Multiple choice questions 30 minutes without aids

Part 2: Short answer questions 90 minutes (explaining and writing code) with all aids, including internet connection

Internal examiner

**Grading criteria**
**For ordinary examinations:**

Examinations account for 100 % of final grade.

**For re-examinations:**

Examination will count for 100 % of final grade.

**Additional information**

**Responsible**

10/9/2018

Line Lindhardt Egsgaard (LILE)

**Valid from**
1.2.2018

**Course type**
Global Business Engineering;Compulsory Course for GBE-ICT;4. semester;
ICT Engineering;Compulsory Course for all ICT Engineering;1. semester;
Software Ingeniør;Compulsory for Software Ingeniør;1. semester;

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-SDJ1**

2.0

# Software Development with UML and Java

**ECTS**
10

**Prerequisites**
General admittance requirements. The course must be passed before graduation.

**Main purpose**
The main purpose of the course is to provide students with the qualifications needed to understand the core object-oriented concepts and to implement smaller programs in Java from UML class diagrams.

**Knowledge**
The student should be able to understand:

- Java programming constructs
- Basic types in Java and their applicability
- The role of fields, methods, constructors, and references in Java programming
- The relationship between array, array length, indices and elements in Java
- The elements of UML class diagrams, activity diagrams and sequence diagrams.

**Skills**
The student should achieve the skills:

- Create and use objects in Java
- Implement programs in Java with
  - o Fields, constructors and methods
  - o Inheritance
  - o Association, aggregation and composition
  - o Arrays and ArrayLists
  - o File IO persistence
  - o Exceptions
  - o Simple GUI's
- Use best practices for writing and documenting Java source code

**Competences**
The student should be able to:

- Master and use the basic object-oriented concepts, including relationships, collaboration and poly-morphism
- Implement smaller programs in Java including simple GUIs
- Implement smaller systems from a UML design

**Topics**

**Teaching methods and study activities**
The semester has 110 classroom lessons. A number of tests and assignments will be given during the course. One of these tests represent 25% of the exam, see Evaluation below.

The course is held concurrently with Workshop in Basic Programming I (WS1).

**CATEGORY 1**
Participation of lecturer and students
Initiated by the lecturer
84 hours - 30%

- Lessons

- Exercises in class
- Exam

**CATEGORY 2**
Participation of students
Initiated by the lecturer
112 hours - 40%

- Exercise, assignments and hand-ins
- Group work
- Homework

**CATEGORY 3**
Participation of students
Initiated by students
56 hours - 20%

- Preparation for exam
- Self-study
- Group work
- Literature search

**CATEGORY 4**
Participation of lecturer and students
Initiated by students
28 hours - 10%

- Study guidance
- Study group meetings

NOTE: For GBE students there is only 8 lessons per week, as opposed to ICT, where there are 10 lessons per week.

NOTE: Compulsory attendance does not apply for GBE students.

**Resources**
Tony Gaddis, "Starting Out with Java - early objects", 5th edition Addison-Wesley, 2015

**Evaluation**
Permit criteria for attending examination:

Mandatory course activities completed.

The student must have an attendance of at least 75% in order to qualify for the exam. Students who do not have at least 75% attendance will automatically fail the ordinary exam.

**Examination**

* Individual oral examination based upon a subject found by draw.

* No preparation.

Oral examination where the student will pick an unfamiliar programming exercise at random. The student must explain the UML involved and demonstrate how to perform the programming task using a laptop and/or the blackboard. The time allotted for the examination is 30 minutes including assessment.

The grade for the oral examination counts for 75% of the final grade while the remaining 25% comes from an oral test conducted in the middle of the course.

* Allowed tools: All

* External examiner.

**Grading criteria**
* Examinations account for 75% of final grade.

* A test account for 25% of final grade.

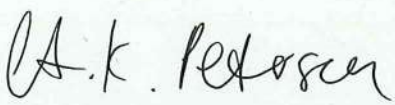
* Rexams account for 100 % of the grade.

**Additional information**

**Responsible**
Steffen Vissing Andersen (SVA)

**Valid from**
1.8.2017

**Course type**
Global Business Engineering;Compulsory Course for GBE-ICT;3. semester;Elective for the specialization Information Technology and Management;
ICT Engineering;Compulsory Course for all ICT Engineering;Project;1. semester;
Software Ingeniør;Compulsory for Software Ingeniør;1. semester;



VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

IT-SDJ2

2.1

# Software Development with UML and Java 2

**ECTS**
10

**Prerequisites**
Completed the 1st semester ICT Engineering course "Software Development with UML and Java 1" or a similar course. The course must be passed before graduation.

- IT-SDJ1

**Main purpose**
The purpose is to qualify the student to understand and master the concepts and techniques of object-ori-ented system development and programming, including Client/Server programming.
The course will provide students with the qualifications needed to understand how to:

- Implement solutions in Java using design patterns
- Implement solutions in Java using threads
- Develop client/server systems
- Test software using various testing techniques

**Knowledge**
The student should be able to understand:

- System architecture
- Different methods for testing
- Concurrency
- System deployment
- Design patterns
- Client/server structure

**Skills**
The student should achieve the skills:

- Implement design patterns in Java
- Test software using different testing techniques, including (but not limited to) JUnit testing, System testing, etc.
- Create jar files
- Implement thread-safe classes and multi-threaded programs
- Make programs communicate using client-server technologies

**Competences**
The student should be able to:

- Implement programs in Java using design patterns, and evaluate which to use
- Test software using relevant testing techniques
- Develop flexible java code using interfaces
- Implement thread-safe classes and multi-threaded programs
- Implement client-server systems

**Topics**

**Teaching methods and study activities**
The semester has 110 classroom lessons. These lessons will consist of teacher presentations and exercises.

The course will include one or more course assignment(s).

The course is held concurrently with Workshop in Basic Programming 2 (WS2).

CATEGORY 1
Participation of lecturer and students
Initiated by the lecturer
56 hours - 20%

- Lessons
- Exercises in class
- Exam

CATEGORY 2
Participation of students
Initiated by the lecturer
98 hours - 35%

- Exercise, assignments and hand-ins
- Project and group work
- Homework

CATEGORY 3
Participation of students
Initiated by students
70 hours - 25%

- Preparation for exam
- Self-study
- Group work
- Literature search

CATEGORY 4
Participation of lecturer and students
Initiated by students
56 hours - 20%

- Study guidance
- Study group meetings

**Resources**

**Evaluation**
Permit criteria's for attending examination:

Mandatory course activities completed

- A number of presentations

Course assignment handed in before deadline

**Examination**

- Individual oral examination without preparation based upon course work.
- The student will draw from a pool of previously known questions.
- The student will explain concepts and theories from the course, using the course work as reference.
- The student will start with a prepared presentation.
- External examiner.
- The course must be passed before graduation.

**Grading criteria**
Examinations account for 100% of final grade.

**Additional information**

**Responsible**
Troels Mortensen

**Valid from**

1.8.2018

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;2. semester;

C.K. Pedersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-SDJ3**

2.0

# Software Development of Distributed Systems

**ECTS**
5

**Prerequisites**
Condition for following IT-SDJ3 is that you have followed the courses IT-SDJ1 and IT-SDJ2, or similar courses at your home institution. • IT-SDJ1 • IT-SDJ2 The course must be passed before graduation.

- IT-SDJ1
- IT-SDJ2

**Main purpose**
The students should be introduced to basic theory of distributed systems and be able to design and implement a distributed system.

**Knowledge**
The students will

- be introduced to various distributed system types (e.g. client/server, peer-to-peer)
- get knowledge of the 3-tier architecture
- get knowledge of various distributed communication methods
- be introduced to examples of distributed algorithms

**Skills**
The students will be able to:

- use various middleware (e.g. Web Services)
- choose middleware for a given distributed system

**Competences**
The students will be able to

- design the architecture of a distributed system using the 3-tier model
- design and implement a distributed and on different platforms using various middleware

**Topics**

- client/server systems
- peer-to-peer systems
- 3-tier architecture
- web services middleware
- object orientation in distributed system
- concrete middleware systems
- distributed synchronization and distributed transactions

**Teaching methods and study activities**
The semester has 56 classroom lessons. These lessons consist of exercises and teacher presentations. The total workload of the student is expected to be around 140 hours.

Referring to the Study Activity Model, the workload is distributed as follows:

**CATEGORY 1**
Participation of lecturer and students
Initiated by the lecturer
42 hours - 30%

- Lessons, scheduled
- Exercises in class
- Project guidance
- Exam

**CATEGORY 2**
Participation of students
Initiated by the lecturer
42 hours - 30%

- Exercises
- Project and group work
- Homework

**CATEGORY 3**
Participation of students
Initiated by students
42 hours - 30 %

- Self-study
- Group work
- Literature search
- Preparation for exam

**CATEGORY 4**
Participation of lecturer and students
initiated by students
14 hours - 10 %

- Study guidance

**Resources**
Coulouris & Dollimore & Kindberg & Blair, Distributed Systems -- Concepts and Design, Fifth Edition, Addison-Wesley, 2012.
Notes

**Evaluation**
Permit criteria for attending examination:

- Group reports including student's name handed in before deadline.

**Examination**
**Oral Examination**

The examination is a joint exam with IT-SEP3 and IT-DNP1.

Group presentation followed by individual examination.

Group presentation of the IT-SEP3 project - 5 minutes per person.

Individual examination - 35 minutes including examination in IT-SEP3, IT-SDJ3 and IT-DNP1.

Allowed tools: All

Internal exam.

**Grading criteria**
IT-SEP3 accounts for 50% of final grade.
IT-SDJ3 accounts for 25% of final grade.
IT-DNP1 accounts for 25% of final grade.

**Additional information**

**Responsible**

10/9/2018

Ole Ildsgaard Hougaard (OIH)

**Valid from**
1.8.2018

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;3. semester;

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

IT-SEP1

2.0

# Semester Project: Single User System

**ECTS**
5

**Prerequisites**
General admittance requirements.

**Main purpose**
The purpose is to develop and document a single user system as well as demonstrate an acquisition of process skills.

**Knowledge**
The student should be able to understand:

- The Waterfall method as a software development process
- Requirements, use case modelling and activity diagrams in relation to the analysis stage
- Class diagram and sequence diagrams in relation to the design stage
- Basic use case testing
- Group roles

**Skills**
The student should achieve the skills to:

- Design and describe an object oriented model using UML
- Practice implementing smaller software systems in Java
- Create a website
- Present considerable skills for presentation, both written and oral
- Present a project report in a well-structured manner
- Describe a project in a process report
- Solve a specific task in collaboration with group members

**Competences**
The student should be able to:

- Analyse, design, implement and document a single user system from a case story
- Create small software systems with UML according to the object-oriented method
- Control and structure a project as it progresses
- Reflect on the group and individual leaning processes

**Topics**

**Teaching methods and study activities**
Lessons, input, meetings, project work, facilitation.
**CATEGORY 1**
Participation of lecturer and students
Initiated by the lecturer
14 hours -10%

- Lessons
- Project facilitation, meetings with supervisors
- Exam

**CATEGORY 2**
Participation of students
Initiated by the lecturer
28 hours -20 %

- Hand ins
- Project work
- Homework

**CATEGORY 3**
Participation of students
Initiated by students
70 hours - 50 %

- Preparation for exam
- Self-study
- Project work
- Literature search

**CATEGORY 4**
Participation of lecturer and students
Initiated by students
28 hours -20 %

- Supervisor meetings

**Resources**
Online resources.

**Evaluation**
Qualifying criteria for attending examination:

Group reports including students´ name handed in before deadline.

**Examination**

The basis of the examination is the project report which should be done as a group project. First the entire group presents the project (5 minutes per person). Then a group examination will follow in accordance with the guidelines . It must be stated in the report which parts and subjects each member is responsible for.

**Grading criteria**
100% of the grade is based on a total assessment of the written materials, oral presentation and individual performance at the examination.

**Additional information**

**Responsible**
Steffen Vissing Andersen (SVA)

**Valid from**
15.8.2017

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;Project;1. semester;
Software Ingeniør;Compulsory for Software Ingeniør;1. semester;

H. K. Pedersen

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-EOS1**

1.0

# Embedded Operating Systems

**ECTS**
5

**Prerequisites**
Basic understanding of Programming, computer architecture and electronics. Practical experience with computer networking is an advantage.

- IT-CAL1
- IT-ELE1
- IT-SDJ1

**Main purpose**
Demands for computing power in embedded systems are increasing. At the same time, a shorter development time is required to be competitive. This calls for a way to reuse off-the-shelf components in a quick and easy way to build advanced applications. In this course, students will learn to use powerful open source components to build advanced embedded systems.

**Knowledge**
Having completed this course, students should have understanding of:

- Advantages and disadvantages of Linux as operating system in embedded systems.
- I/O structure in Linux.
- Electronic interfaces for digital and analogue signals

**Skills**

- Use basic features of Linux
- Configure the operating system and utilities to tailor the system's needs
- Write C/C++ programs to control sensors and actuators
- Cross-compile programs to run in an embedded system.

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

- Determine which kind of embedded systems the Linux operating system is suitable for
- Identify tools needed for developing embedded systems
- Interface sensors and actuators in software as well as hardware
- Configure communication between development- and target system
- Control the target system, using Linux commands and utilities
- Build simple Linux based embedded systems.

**Topics**
Embedded Linux. 32-bit Microcontrollers. Teamwork and project management.

**Teaching methods and study activities**
Estimated workload is approximately 137 hours.
Mix between theory and practical exercises. Students will work in groups on developing a simple embedded system based on a 32-bit hardware platform with Linux as operating system.

Each group must deposit 300 DKK for loan of necessary equipment.

**Resources**
Derek Molloy: Exploring BeagleBone – Tools and Techniques for Building with Embedded Linux. BeagleBone Black circuit board.

**Evaluation**
Internal examination.
The evaluation of the course is based on mandatory course work (50%) and the oral exam (50%) at the end of the course. Only students with approved course work will be allowed to attend the exam.

**Examination**
The exam is oral and it takes 20 minutes per student. The exam is in two parts. First part is a presentation and discussion of selected parts of the course work. Second part is drawn question from the theory of the course.

**Grading criteria**
Grading:

Grading is according to the 7-point grading scale.

Mark 12: Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02: Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**

**Responsible**
Erland Ketil Larsen

**Valid from**
1.2.2016

**Course type**
ICT Engineering;6. semester;Compulsory for the specialization Embedded Engineering;Electives;

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel +45 8755 0020

**Offered by**
ICT Engineering

**IT-SMP1**

1.0

# Stochastic Modelling and Processing

**ECTS**
5

**Prerequisites**
Upper level mathematics equivalent to A-levels. Calculus.

**Main purpose**
The ubiquitous presence of uncertainty and noise in the engineering sciences makes it mandatory to understand and quantify random phenomena. To achieve this goal the course will provide a solid introduction to the theory of stochastic processes. Special attention is given to applications and the student will model and analyse complex stochastic situations as encountered in practice. The applications include examples from various engineering fields such as information technologies and communications, signal processing, and more.

**Knowledge**
After successfully completing the course, the student will have gained knowledge about:

- The main working tools and concepts of stochastic modelling
- Probability theory and distributions
- Inferential statistics

**Skills**
After successfully completing the course, the student will be able to:

- Apply results from basic probability theory including conditional probability
- Use probability density and distributions functions of one and two variables
- Account for random variables and random processes
- Account for the processing of random signals in linear systems
- Calculate and interpret auto- and cross-correlation functions for random signals
- Calculate and interpret power density spectra and coherence functions
- Calculates and estimate errors and uncertainties.

**Competences**
After successfully completing the course, the student will have acquired competencies in:

- Planning experiments and state hypothesis
- Presenting statistical results from experiments
- Modelling experimental data with regression
- Analysing experimental results and test hypotheses.

**Topics**

- Experiments and the concepts of probability
- Calculations of probability
- Often encountered probability density and distribution functions
- Random variables and random processes
- Auto- and cross-correlation functions and correlation coefficients
- Power density spectra and coherence functions
- Analysis of errors in experiments
- Design of statistical experiments
- Creating hypotheses and confidence intervals
- Presentation of statistical data
- Linear and exponential regression
- Analysis of variance

**Teaching methods and study activities**
Approximately 150 hours. The course is a mixture of lectures, problem solving and computer/laboratory exercises with approximately 1/3 of the time devoted to each part.

**Study Activity Model**

**Resources**
Montgomery, D.C. & Runger, G.C. *Applied Statistics and Probability for Engineers*, 4th edition Wiley (obtained from library)
Cooper, G.R. & McGillem, C.D. *Probabilistic Methods of Signal and System Analysis*, 3rd edition. Oxford University Press (electronic version will be made available).

**Evaluation**
Grading will be done according to the 7-scale, using an internal examiner.

**Examination**

The final exam is a 3 hour written exam and takes place at Campus Horsens. Supplementary materials and aids are allowed. All supplementary materials and aids are allowed, e.g. using a computer as a reference work. Communication of any sort is not allowed during the exam and will lead to expulsion of all involved parties from the exam.

**Grading criteria**
According to the 7-point grading scale, interrnal examiner.

Mark 12:
Awarded to students who have shown excellent comprehension of the above-mentioned competences. A few minor errors and shortfalls are acceptable.

Mark 02:
Awarded to students for the just acceptable level of comprehension of the required competences.

**Additional information**
For more information, please contact Richard Brooks (rib@via.dk)

**Responsible**
Richard Brooks

**Valid from**
1.8.2016

**Course type**
ICT Engineering;6. semester;7. semester;Electives;

A.K. Petersen

VIA University College

Campus Study Administration
Chr. M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020

**Offered by**
ICT Engineering

**IT-BPR2**

1.0

# Bachelor Project 2

**ECTS**
20

**Prerequisites**
BPR1, general conditions for ECTS credits.

- BPR1

**Main purpose**
The purpose of the Bachelor Project 2 is to evolve the student's ability to solve a relevant ICT Engineering problem and document the solution. In a group, students must be able to analyse, design, implement and test complex problems and be able to carry out well-documented and tested solutions.

**Knowledge**
After having completed this course, the students must master the knowledge about:

- Searching and scoping relevant project information
- Project and team work planning
- Communication and documentation skills
- Testing

**Skills**
After having completed this course, the student must master to:

- Identify and justify problems and their context
- Select and argue for choice of method and reflect critical and said methods
- Find and assess relevant literature within the problem domain
- Present the result for an audience of engineers

**Competences**
After having completed this course, the students must be able to:

- Describe and delimit a large ICT Engineering Project
- Select and use relevant theories and methods to solve the problem
- Plan and structure the project within the BPR2 time frame
- Initiate the preliminary steps in a system development process, leading to a clearly defined requirements capture, use cases as well as object and behavior analysis.
- Work successfully in a project group with the objective of solving a well-defined engineering problem.

**Topics**
The Bachelor Project (BPR2) is based on an ICT Engineering problem with a project description made in the BPR1 course.
The BPR2 project must contain:

- Data collection
- Brainstorm techniques
- Project methods
- Reference/citation model and literature search
- Document version control
- Requirements: How can you test the requirements, which test results do you expect for each test case.
- Analysis: Risk analysis (technology challenges, error implementations, Data loss, delays in order fulfillments), Actor/persona description, Use cases
- Design: System architecture, Class diagram, Layer model, Mockup model, Usability, GUI, Exceptions
- Implementation: Coding of project
- Test: Unit test, Integration test, System test, GUI test
- Automatic build servers – including automated tests
- Project results
- Evaluation/discussion of project results

- Time schedule and milestones
- Work flow management
- Group dynamics
- Report writing
- Presentation techniques

**Teaching methods and study activities**
Supervision, theory and independent work, project documentation and presentation.

**Resources**
To be announced on Studynet.

**Evaluation**
External examination.
The basis of the evaluation is the reports, the solution of the ICT Engineering problem, and the oral examination. The student's ability to express oneself (in writing and orally) and to spell is part of the evaluation.

**Examination**
Oral examination.
Group presentation of the project (20 minutes). Individual examination of each member of the group (20 minutes).

The individual examination typically starts from topics in the report and may involve all the topics from 1st to 7th semester.

**Grading criteria**
Grades are given according to the ECTS scale.

12: For an excellent performance displaying a high level of command of all aspects of the relevant material, with no or only a few minor weaknesses.

10: For a very good performance displaying a high level of command of most aspects of the relevant material, with only minor weaknesses.

7: For a good performance displaying good command of the relevant material but also some weaknesses.
4: For a fair performance displaying some command of the relevant material but also some major weaknesses.
02: For a performance meeting only the minimum requirements for acceptance.
00: For a performance which does not meet the minimum requirements for acceptance.

-3: For a performance which is unacceptable in all respects.

If a project is assessed as "failed" (00 or -3), a written justification for the assessment is worked out by the supervisor and the external examiner.

**Additional information**
The Project Report must have the following extent: 20-30 pages per student plus appendices.

**Responsible**
Poul Væggemose

**Valid from**
2.2.2017

**Course type**
ICT Engineering;Compulsory Course for all ICT Engineering;Project;7. semester;Compulsory for the specialization Business Information Systems;Compulsory for the specialization Cross Media;Compulsory for the specialization Embedded Engineering;

Ch. K. Pedersen

VIA University College

Campus Study Administration
Chr M. Østergaards Vej 4
8700 Horsens
Tel. +45 8755 0020