Curriculum part 4 - 2014

Course Descriptions
IT Network and Electronics Technology

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1.   Project (11 ECTS) – electronics study programme

Preface
This course description provides a brief description of the subject project on IT Network and Electronics Technology programme's 1st and 2nd semester at the Business Academy Aarhus.

Contents
The purpose of this course is to provide students with knowledge of some of the working methods used in electronic projects development, and thereby assist the student to develop skills to work in practical projects, both in groups and independently.
We work with different project working models, agile as well as not agile.

ECTS credits
11 ECTS
(5 ECTS in the 1st semester, given by: electronic systems (1 ECTS), embedded systems (1 ECTS) communications systems (2 ECTS) and software development (1 ECTS).
6 ECTS in the 2nd semester, given by: management (1 ECTS), electronic systems (1 ECTS) and embedded systems (4 ECTS).

The learning objectives of this course come from the courses which have delivered ECTS credits for the course.

Learning goals (the curriculum)

Knowledge
The student has knowledge and understanding of
- Innovation
- Project

Skills
The student can
- Communicate and document tasks and solutions for businesses and customers.
- Communicate in writing and orally.
- Use innovative methods having focus on user needs.

Competencies
The student can
- Manage documentation and presentation of projects.
- Participate in practical development processes.
- Manage both independent and team-based assignments.
- Independently conduct technical project management.

The following are the items contained in the subject, in order to provide the student with the above knowledge, skills and competencies

Topics 1st semester
- Project development methods
- Project planning
- Block diagramming
- Interface

- Implementation
- Documentation

Topics 2nd semester
- Use of agile methods
- Implementation of a project using agile project model.

Teaching
The course will include several different types of teaching. There will be classroom teaching introducing new material and then the actual practical project, which will focus on work in project groups.

Tools
Various notes.

Study activity and participations obligation

It is expected that the group is committed to the project and ensure that everyone in the group gets something out of the work. Projects end with a presentation of the results of the project.

During the second semester, a project covering all subjects in the 2nd semester is made. The project is done in groups. This project is part of the first year examination.
The curriculum defines which study activities is required for you to fulfil mandatory study activity and participations obligation. Some of these study activities are in the project and is following.

Study activities 1st semester
- 1 project presentation of a report.

Study activities 2nd semester
- 1 project presentation of a report, this project is also part of the 1st year examination.

Exams
After the first semester, there is an internal examination. All courses in the first semester may be included.
The internal examination will be evaluated to be passed or failed.
The project subject is examined in the 1-year examination held after the 2nd semester. The description of this exam can be found in the institutional part of the Curriculum.

2.   Electronic systems (6.5 ECTS) – electronics study programme

Preface
This course description contains a short description of the course Electronics on the IT Network and Electronics Technology programme's 1st semester at Business Academy Aarhus.

Content
This course contributes to the student's ability to participate in electronics development processes. In addition, the course helps the students learn to master the fundamentals of electrical engineering, analog and digital technology. This course is taught in basic electronics and the development of basic analog and digital systems, including measurement and testing.
There will also be taught the use of circuit simulation tools.

ECTS points
7.5 ECTS (1 ECTS point given to the subject Project) = 6.5 ECTS.

Study Goals
Knowledge
The student develops knowledge about:
- Interfacing techniques
- Technical mathematics

Skills
The student develops the ability to:
- Evaluate technical solutions based on the company's and customer's needs
- Communicate and document the tasks and solutions for those who need to carry out the technical task
- Use tools and equipment related to the design, development and testing of hardware

Competencies
The student develops the ability to:
- Communicate, document, present and support for internal and customer-facing relationships
- Handle documentation and presentation of projects
- Participate in realistic development processes
- Acquire skills and new knowledge within electronic systems.

The following are the items contained in the subject, in order to provide the student with the above knowledge, skills and competencies

Topics
Analogue
- Quantities & Units. (K2)
- Voltage, Current & Resistance. (K1, K2)
- Ohms law and basic Circuit theory. (K1, K2)
- Power & Energy. (K1, K2)
- Tools for design and simulation. (K1, K2, S4)
- Series circuits. (K1, K2)
- OpAmp. (K1, K2, S1)
- D/A Converter Design assignment. (K1, K2, S1, S2, S3, S4, C1, C2, C3, C4)
- Test, measurement & documentation. (K2, S2, S3, S4, C1, C2, C3)

Digital
- Binary numbers. (K1, K2)
- Boolean algebra. (K1, K2)
- Truth tables. (K1, K2)
- Logic gates. (K1, K2)
- Combinatorial logic – intro. (K1, K2)
- Decoder Design assignment. (K1, K2, S1, S2, S3, S4, C1, C2, C3, C4)
- Test, measurement & documentation. (K2, S2, S3, S4, C1, C2, C3)

Teaching Forms

The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.
The semester time plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools
We use the Circuit simulation program Proteus.

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities
The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course:

- Study Activity 1st semester: Electronics – 1 Assignment + presentation.

Litterature
Analoque: Floyd – Principle of Electric Circuits, Conventional current version 9th ed.

Digital: http://www.allaboutcircuits.com/vol_4/index.html or similar

Exam
- Concluding 1st semester there is an internal test
- The class is also examined in the 1st year exam concluding 2nd semester

3.   Communication systems (5.5 ECTS) – electronics study programme

Preface
This course description is a short description of the course Communication Systems on the IT-Technologist educations 1st semester at Business Academy Aarhus.

Content

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IT Network and Electronics Technology

This course will make the students acquire knowledge, skills and competencies in handling communications systems, including analysis, setup, configuration, diagnostics, testing and servicing the relevant technology.

The course is organized to make the students solve relevant tasks and projects of increasing difficult. This means carrying out development, setup, configuration, tuning and testing.

ECTS points
7.5 ECTS (2 ECTS given to the subject Project) = 5.5 ECTS.

Study Goals
Knowledge
The student will acquire knowledge about
- Communications Systems (V1)

Skills

The student will acquire skills that will allow
- Evaluate technical solutions towards company and customer requirements (F1)
- Present and document assignments and solutions for subcontractors(F2)
- Present and document assignments and solutions for customers and companies (F3)
- Use tools and equipment's for design and test of Communication Systems(F4)

Competencies
Den student will acquire competencies that will allow
- Communication, documentation, presentation and support concerning internal- and customer relations (K1)
- Handle documentation and presentations of projects (K2)
- Take part in practical development processes (K3)
- Acquire skills and knowledge within the subject Communication Systems (K4)

The subject consists of the following items, for the student to acquire knowledge, skills and competencies as mentioned

Topics
- Number systems (binary, hexadecimal, octal, decimal)(V1)
- Transmission media(V1)
- Simple network topologies(V1)
- Network Protocols as (V1
  - HTTP
  - DHCP
  - SSH

- Layered Protocols as TCP/IP(V1)
- byte Protocols as.(V1)
  - UART
  - I2C
  - SPI

Administration configuration and test of (F1,F2,F3,F4,K1,K2,K3)
- Network services as: http, ssh

- Tcp/ip network interfaces
- Simple byte protocols
- Design and explain simple master slave protocols

Teaching Forms
The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.
The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools
Operating Systems, protocol sniff programs, oscilloscope, embedded systems, PC's, and other tools.

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!
Attendance is compulsory.

Mandatory activities in Communication Systems 1st semester
- 1 Hand In, including a presentation (May be done in a group)
- Topics from the Course Communication Systems will be tested at the end of 1.semester

Exam
- Concluding 1st semester there is an internal test
- The class is also examined in the 1st year exam concluding 2nd semester

4.   Software development (4 ECTS) – electronics study programme

Preface
This course description gives a brief description of the subject software development on IT Network and Electronics program with specialisation Network. Software development will be completed in 1st semester.

Content

The course software development must ensure that students gain skills and acquire knowledge in software development, including transferring a specific task to a technical solution.
The subject should also help the student to use tools and equipment in connection with the design, development and testing of software.
Finally, the course should give the students' knowledge on how to document software.
Most of the time in this course is used by students programming small tasks and lecturer giving help.
The programming language used is C and C #.
In addition to programming, the course contains program design - the art of making good programs.

ECTS credits
5 ECTS (1ECTS is given to the 1st semester project) = 4 ECTS

Learning goals (from the curriculum)

Knowledge
The student has knowledge of:
- Programming Technique

Skills
The student can:
- Use tools and equipment related to the design, development and testing of software

Competencies

The student can:
- Communicate, document, present and support for internal and customer-facing relationships [1]
- Manage documentation and presentation of projects[2]
- Acquire new knowledge and skills in software development

The following are the topics contained in the subject, in order to provide the student with the above-mentioned knowledge, skills and competencies

Topics
- Development systems
- Program development
- Variables and data types
- Program structures
- Functions and parameters
- Program documentation
- Debugging
- Basic Object Oriented Programming
- Visual programming
- Hardware Oriented Programming

Teaching
The course will include several different types of teaching.

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[1] See Course description Project 1st semester
[2] See Course description Project 1st semester

New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Priority will be also be on flipped classroom where the students prepare at home and make tasks in class.
Finally there will be exercises and assignments that you will be working with in pairs or in groups. Prgramming-tasks are done as pair programming.
The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with. Additional study materials and assignments will uploaded on Fronter regularly

Tools
The programming language used is C and C# and the development environment Visual Studio.

Study activity and obligation to participate
In the curriculum the study activity is defined

Study activity
- Skills test at the end of the course
- Program development is part 1st semester activity.

Exam
Software development is part of 1st year's exam at the end of 2nd semester.
The description of the 1st year's exam is in the curriculum.

5.   Business (9 ECTS)– electronics study programme

Preface
This course description contains a description of the course Business (Management1 and Management2) on the IT Network and Electronics Technology programme's 1st and 2nd semester at Business Academy Aarhus

Content
This class is intended to develop the student's competencies regarding participation and management of technical projects.
The class focuses on teaching in Project Management, Business Understanding, Documenting and Team Understanding.

ECTS points
10 ECTS (5 ECTS on 1st semester and 4 ECTS on 2nd semester) 1 ECTS is given to the subject project = 9 ECTS

Study Goals

Knowledge
The student develops knowledge about:

- Innovation
- Project Management

- Business Understanding
- Advisory and Consultancy functions

Skills
The student develops the ability to:
- Communicate orally as well as in writing
- Use innovative methods with a focus on user needs

Competencies
The student develops knowledge about:
- Handle both independent as well as team-based assignments
- Acquire skills and knowledge in the business area
- Handle technical project management tasks independently

Below are the items contained in the class, in order to provide the student with the above mentioned knowledge, skills and competencies

Topics 1st semester
- Teams – understanding of, roles, learning styles and collaboration (K2, S1, C1, C3) [3]
- Communication – writing of journals and reports, presentation and creation of a CV (S1, C1, C3)
- Project Management – basic terms (K2, K3, K4, C1, C1, C2, C3)
- Project planning based on the Work Breakdown Structure (K1, S1, C1, C2, C3)

Topics 2nd semester
- Innovative methods – when what and why is more important than how (K1, S2)
- Business understanding - strategies, key figures and calculations (K3, K4)
- Agile methods – as opposed to specification-controlled project management (K2, K3, S2, C1, C2, C3)
- Organizational processes – How to manage and improve (K2, K3, K4, S1, S1, S2, S3)

Teaching forms
The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.
The semester-plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools
- We use the application Project Libre for Project Management
- We use the application FreeMind for mind-mapping (WBS and PBS).

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that

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[3] Covered in the class Project on 1st semester

everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities
The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course Business:
- Study Activity 1st semester: Management1 – 1 activity
- Study Activity 2. semester: Management2 - 1 activity

Literature
PDF's on Fronter

Exam
- Concluding 1st semester there is an internal test
- The class is also examined in the 1st year exam concluding 2nd semester

6.   Electronic systems (19 ECTS) – electronics study programme

Preface
This course description contains a short description of the course Electronics on the IT Network and Electronics Technology programme's 2nd and 3rd semester at Business Academy Aarhus.

Content
These courses contribute to the student's ability to cope with a development of an electronic system. The student will have a thorough knowledge of analog components, circuit boards, and measurement and testing of these. The course helps the students learn to master complex analog technical elements. There will also be taught the use of circuit simulation tools.

ECTS points
20 ECTS (10 ECTS points in 2nd semester and 9 ECTS points in 3rd semester) 1 ECTS point given to the subject Project in 2nd Semester = 19 ECTS.

Study Goals
Knowledge
The student develops knowledge about:
- Electronics Technology and Electronics Design
- Production Engineering and Production Management

Skills

The student develops the ability to:
- Apply relevant CAE and simulation tools
- Assess and select appropriate development model
- Build and use test systems.

Competencies

The student develops the ability to:
- Handle design, development, construction, testing, testing of prototypes
- Manage product development of prototypes
- Handle documentation of electronic systems
- Handle analysis, diagnosis, testing and servicing of the technology involved in business-it with electronic systems, taking into account economic, environmental and quality requirements.

The following are the items contained in the subject, in order to provide the student with the above knowledge, skills and competencies

Topics 2nd Semester

Analogue
- Voltage- and current generators – Ideal and real. (K1, S1, S3, C1)
- Components. (K1, S1, S3, C1)
- AC Voltage and current. (K1, S1, S3, C1)
- Capacitance. (K1, S1, S3, C1)
- Impedances & complex numbers. (K1, S1, S3, C1)
- Induction. (K1, S1, S3, C1)
- AC- non sinus. (K1, S1, S3, C1)
- OpAmp - Small Signal Properties (K1, S1, S3, C1)
- Analysis & Design. (K1, K2, S1, S2, S3, C1, C2, C3, C4)

Digital
- Flip Flops. (K1, S1, S3, C1)
- Sequential logic (K1, S1, S3, C1)
- Programmable logic (Technology, Components, Tools) (K1, S1, S3, C1)
- Analysis & Design. (K1, K2, S1, S2, S3, C1, C2, C3, C4)

Topics 3rd Semester
- Power electronics
  - Power supplies – liear and switching. (K1, S1, S3, C1)
  - Switching Power transistors. (K1, S1, S3, C1)
  - Heatsinks. (K1, S1, S3, C1)
- Feedback
  - Amplifier specifications. (K1, S1, S3, C1)
  - S-plane. (K1, S1, S3, C1)
- Analysis & Design. (K1, K2, S1, S2, S3, C1, C2, C3, C4)

Teaching Forms

The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.

The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools
We use the Circuit simulation program Proteus.

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities
The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course:

- Study Activity 2nd semester: Electronics – 1 Assignment
- Study Activity 3rd semester: Electronics – 1 Assignment

Litterature
Analogue: Floyd - Principle of Electric Circuits, Conventional current version 9th ed.

Exam
The course is included in the 1-year examination held after the 2nd semester.
The description of this exam can be found in the institutional part of the curriculum.
There will be an internal examination after the 3rd semester covering all subjects in the semester.

7. Embedded systems (20 ECTS) – electronics study programme

Preface
This course description provides a brief description of the course Embedded Systems 1st, 2nd and 3rd semester at the Academy.

Content
This course will give students the knowledge, skills and competencies in working with embedded systems, including analysis, design, programming, diagnostics, testing and servicing of the relevant technology.

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In this course, students learn to solve relevant problems and exercises of increasing difficulty, this involves developing software and hardware, in which a specific task is translated into technical solution.

ECTS points
25 ECTS.
In the first semester 1 of 5 ECTS credits is given to the course project, 4 ECTS are left.
In the second semester 4 of 15 ECTS credits is given to the course project, 11 ECTS are left.
On the 3rd semester there is 5 ECTS points = 20 ECTS

Study Goals (from the curriculum)
Knowledge
The student acquire knowledge and understanding of
- Embedded systems (V1)

Skills
The student is able in relation to embedded systems:
- Assess and select appropriate development model (F1)
- Build and use test systems (F2)

Competencies
The student is able to:
- Manage the design, development, construction, testing, and documentation of embedded systems (K1)
- Manage the analysis, design, diagnosis, testing and servicing of the technology involved in the embedded systems, taking into account financial, environmental and quality requirements (K2) * See Note

Topics
Topics 1st Semester 4 credits (+1 ECTS project)
- Classes will be based on an embedded system with an operating system (V1)
- Programming implementing and testing a simple program that handles binary inputs and outputs (K1)
- Programming implementing and testing a simple webuserinterface (K1)
- Programming implementing and testing hardware, actuators and sensors, which are connected to the embedded system (V1, F1, F2)
- Gain skills so that students will be able to contribute to the design of an embedded system that solves a given task (V1, F1, F2, K1, K2)

Topics 2nd semester 11 ECTS (+1 ECTS project)
- Choose between diferent types of embedded systems (V1, K2)
- Programming of microcontroller (K1)
- ANSI-C programming (K1)
- Use hierarchical chart (K1)
- Use flowcharts / Nassil-schniedermann charts. (K1)
- Use of microcontroller software development (IDE) (F2)
- Perform Debugging (F2)
- Designing Libraries / driver / demons (K2)
- Apply Interrupt (V1)
- Manage Peripherals in the microcontroller (V1)

- Know how to deal with contact bounce / noise issues (V1)
- Use analog input and output (V1)

Topics 3rd Semester 5 ECTS
- The student must be able independently to perform problem description, design, construction, building, programming and testing of a certain task, taking into account financial, environmental and quality issues. (the solution must focus on an embedded system) (V1, F1, F2, K1, K2)

Teaching Forms
The course contains different teaching forms: New topics are typically presented using classroom teaching while lab work typically will be done as group work. Finally there will be exercises and assignments that you will be working with in pairs or in groups.
The semester plan for the course can be found on Fronter. This will inform you about which topics are covered during the semester. Here you can also find more detailed information about the topics, necessary literature, exercises and assignments.

Tools
1st semester: Raspberry Pi PC software: putty, WinSCP and more.
2nd semester: PIC processor, PC software: mplab and more.

Study Activities and Compulsory Attendance
During the courses you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the courses you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!
Attendance is compulsory.

Mandatory assignments in Embedded Systems
- 1 Hand In, including a presentation (May be done in a group)
- Topics from the Course will be tested at the end of 1.semester

Exam
After the first semester, there is an internal multiple-choice test. All courses in the first semester are tested at the semester examination and will be evaluated to be passed or failed.
The courses are examined in the 1-year examination held after the 2nd semester. The description of this exam can be found in the curriculum.
After 3rd semester there is an exam held in the same way as in 1st year exam.

* Note Competence goal K2 part1 interpreted as:

Manage the analysis, design, diagnosis, testing and servicing of the technology involved in working with embedded computerized systems, taking into account financial, environmental and quality issues (K2)

8.   Electronic systems (7.5 ECTS) – network study programme

Preface
This course description contains a short description of the course Electronics on the IT Network programme's 1st semester at Business Academy Aarhus.

Content
This course contributes to the student's ability to participate in electronics development processes. In addition, the course helps the students learn to master the fundamentals of electrical engineering, analog and digital technology. This course is taught in basic electronics and the development of basic analog and digital systems, including measurement and testing.
There will also be taught the use of circuit simulation tools.

ECTS points
7.5 ECTS

Study Goals
Knowledge
The student develops knowledge about:
- Interfacing techniques
- Technical mathematics

Skills
The student develops the ability to:
- Evaluate technical solutions based on the company's and customer's needs
- Communicate and document the tasks and solutions for those who need to carry out the technical task
- Use tools and equipment related to the design, development and testing of hardware

Competencies
The student develops the ability to:
- Communicate, document, present and support for internal and customer-facing relationships
- Handle documentation and presentation of projects
- Participate in realistic development processes
- Acquire skills and new knowledge within electronic systems.

The following are the items contained in the subject, in order to provide the student with the above knowledge, skills and competencies

Topics
Analogue
- Quantities & Units. (K2)
- Voltage, Current & Resistance. (K1, K2)
- Ohms law and basic Circuit theory. (K1, K2)
- The Transistor used as a switch (K1, K2, S1)
- Sensors and actuators (K1,K2, S2, S3, S4, C1, C2, C3)
- Test, measurement & documentation. (K2, S2, S3, S4, C1, C2, C3)
Digital
- Binary numbers. (K1, K2)

- Boolean algebra. (K1, K2)
- The Set/Reset Latch (K1, K2, S1, S2, S3)
- Test, measurement & documentation. (K2, S2, S3, S4, C1, C2, C3)

Embedded Systems

- Simple programming(K1, K2, S1, S2, S3)
- Web interface(K1, K2, S1, S2, S3)
- Physical interface(K1, K2, S1, S2, S3)
- Test, measurement & documentation. (K2, S2, S3, S4, C1, C2, C3)

Teaching Forms

The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.

The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools

We use the Circuit simulation program Proteus.

Study activities and compulsory attendance

During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities

The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course:

- Study Activity 1st semester: Electronics – 1 Assignment + presentation.

Litterature

http://www.allaboutcircuits.com or similar

Exam

- Concluding 1st semester there is an internal test
- The class is also examined in the 1st year exam concluding 2nd semester

9. Communication systems (7.5 ECTS) – network study programme

Preface
This course description contains a description of the course Communication Systems on the IT Network and Electronics Technology programme at Business Academy Aarhus.

Content
This class is intended to develop the student's competencies regarding understanding, design, supporting and documenting electronic communication systems.

ECTS points
7.5 ECTS points

Study goals

Knowledge
The student develops knowledge about:
- Communications techniques (K1)

Skills
The student develops the ability to:
- Communicate verbally and in writing (S1)
- Evaluate technical solutions based on the needs of businesses as well as customers (S2)
- Present and document the technical solution to those who will implement it (S3)
- Present and document problems and solutions to businesses and customers (S4)
- Handle tools and equipment in connection with design and test of communication systems (S5)

Competencies
The student develops the ability to:
- Communicate, document, present and support in connection with internal as well as external customer relations (C1)
- Handle documentation and presentation of projects (C2)
- Participate in practical development processes (C3)
- Acquire new skills and knowledge regarding Communication Systems (C4)

Below are the items contained in the class, in order to provide the student with the above mentioned knowledge, skills and competencies

Topics

- Account for different number systems (binary, hexadecimal, octal and decimal) (K1)
- Account for various transmission media (K1)
- Account for simple network topologies (K1)
- Account for network protocols (HTTP, DHCP, SSH) (K1)
- Account for layered protocols (OSI and TCP/IP) (K1)
- Account for basic networking equipment (wire, hub, switch, bridge, router) (K1)
- Account for the BIOS system as well as different Operating Systems (S4)
- Account for the boot process (S4)
- Account for network addressing (MAC and IP)
- Subdividing of networks (subnetting) (C1)

- Documentation of network topologies (S3)
- Test networks using sniffing tools (Wireshark) (S5)
- Configuration of various Operating Systems (C3)
- Configuration of Users and Permissions on various Operating Systems (C3)

Teaching forms

The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.

The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools

- Various Operating Systems (Windows Server, Ubuntu)
- Network tools (ping, ARP, Wireshark)
- Visio (drawing of network topologies etc.)

Study activities and compulsory attendance

During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities

The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course:

- Communication Systems – 1 activity (hand-in of project report)

Litterature

- Network Fundamentals, CCNA Exploration Guide, Cisco Press, ISBN 978-1-58713-208-7
- Upgrading and Repairing PCs, Scott Mueller, ISBN 978-0-7897-4710-3
- Configuring Windows Server 2008 Network Infrastructure, 2nd Edition, Microsoft Press ISBN 978-0-7356-5160-9

Exam

- 1st semester test (multiple choice test). Participation in this test requires approved hand-in of project report.
- 1st year exam (concluding the 2nd semester) will include exam questions targeting this class.

10. Software development (5 ECTS) – network study programme

Preface
This course description gives a brief description of the subject software development on IT Network and Electronics program with specialisation Network. Software development will be completed in 1st semester.

Content
The course software development must ensure that students gain skills and acquire knowledge in software development, including transferring a specific task to a technical solution.
The subject should also help the student to use tools and equipment in connection with the design, development and testing of software.
Finally, the course should give the students' knowledge on how to document software.
Most of the time in this course is used by students programming small tasks and lecturer giving help.
The programming language used is C and C #.
In addition to programming, the course contains program design - the art of making good programs.

ECTS credits
5 ECTS

Study goals (from the curriculum)

Knowledge
The student has knowledge of:
- Programming Technique

Skills
The student can:
- Use tools and equipment related to the design, development and testing of software

Competencies

The student can:
- Communicate, document, present and support for internal and customer-facing relationships
- Manage documentation and presentation of projects
- Acquire new knowledge and skills in software development

The following are the topics contained in the subject, in order to provide the student with the above-mentioned knowledge, skills and competencies

Topics
- Development systems
- Program development
- Variables and data types
- Program structures
- Functions and parameters
- Program documentation
- Debugging
- Basic Object Oriented Programming

- Visual programming
- Hardware Oriented Programming

Teaching
The course will include several different types of teaching.

New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Priority will be also be on flipped classroom where the students prepare at home and make tasks in class.
Finally there will be exercises and assignments that you will be working with in pairs or in groups.
Prgramming-tasks are done as pair programming.
The semester plan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with. Additional study materials and assignments will uploaded on Fronter regularly

Tools
The programming language used is C and C# and the development environment Visual Studio.

Study activity and obligation to participate
In the curriculum the study activity is defined

Study activity
- Skills test at the end of the course
- Program development is part 1st semester activity.

Exam
Software development is part of 1st year's exam at the end of 2nd semester.
The description of the 1st year's exam is in the curriculum.

11.   Business (10 ECTS) – network study programme

Preface
This course description contains a description of the course Business (Management1 and Management2) on the IT Network and Electronics Technology programme's 1st and 2nd semester at Business Academy Aarhus

Content
This class is intended to develop the student's competencies regarding participation and management of technical projects.
The class focuses on teaching in Project Management, Business Understanding, Documenting and Team Understanding.

ECTS points
10 ECTS (5 ECTS on 1st semester and 5 ECTS on 2nd semester)

Study Goals

Knowledge
The student develops knowledge about:

- Innovation
- Project Management
- Business Understanding
- Advisory and Consultancy functions

Skills
The student develops the ability to:
- Communicate orally as well as in writing
- Use innovative methods with a focus on user needs

Competencies
The student develops competencies to:
- Handle both independent as well as team-based assignments
- Acquire skills and knowledge in the business area
- Handle technical project management tasks independently

Below are the items contained in the class, in order to provide the student with the above mentioned knowledge, skills and competencies

Topics 1st semester

- Teams – understanding of, roles, learning styles and collaboration (V2, F1, K1, K3)
  Communication – writing of journals and reports, presentation and creation of a CV (F1, K1, K3)
- Project Management – basic terms (V2, V3, V4, F1, K1, K2, K3)
- Project planning based on the Work Breakdown Structure (V1, F1, K1, K2, K3)

Topics 2nd semester
- Innovative methods – when what and why is more important than how (V1, F2)
- Business understanding - strategies, key figures and calculations (V3, V4)
- Agile methods – as opposed to specification-controlled project management (V2, V3, F2, K1, K2, K3)
- Process improvement management, ex Lean – intro (V2, V3, V4, F1, K1, K2, K3)

Teaching forms
The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.
The semester timeplan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools
- We use the application Project Libre for Project Management
- We use the application FreeMind for mind-mapping (WBS and PBS).

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that

everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities
The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course Business:

- Study Activity 1st semester: Management1 – 1 activity
- Study Activity 2. semester: Management2 - 1 activity

Literature
PDF's on Fronter

Exam

- Concluding 1st semester there is an internal test
- The class is also examined in the 1st year exam concluding 2nd semester

12. Network system (35 ECTS) – network study programme

Preface
This course description contains a short description of the Network Systems courses (NET1, NET2,SRV, DB, and NET3) for the it-technologist education, network line. These courses are held during the 1st, 2nd, and 3rd semesters at Business Academy Aarhus.

Content
The goal of the network systems course is that the student develops a wide theoretical and practical foundation in the design and application of network and server technologies used in IT infrastructures today. The course stretches over three semesters and is split into 5 main modules.
NET1 is first semester network systems course and introduces the student into common technologies in a small LAN situation.
The second semester is split into three main modules: Network Technology (NET2), Server Technology (SRV), and Database systems (DB).
NET2 focuses on common networking topics found in a LAN deployment , including wireless technologies, vlan, routing, and network security. SRV deals with topics such as virtualization, storage, and business continuity. DB deals with database design, database interaction, and database administration.
NET3 is the third semester module. This is an advanced level course focusing on WAN technologies and connecting networks, and network security, including cryptography, firewall design, server hardening, and penetration testing.

ECTS points

BUSINESS ACADEMY AARHUS
IT Network and Electronics Technology

35 ECTS (5 ECTS during 1ˢᵗ semester, 20 ECTS during 2ⁿᵈ semester, 10 ECTS during 3ʳᵈ semester)

Study goals (from the curriculum)
Knowledge
The student has knowledge and understanding of

- Server technologies (K1)
- Database systems (K2)
- Network security (K3)

Skills
The student develops the ability to:

- apply the knowledge of network technologies in connection with design, planning, and implementing of complex network solutions. (S1)
- apply the knowledge of network technologies in connection with administration, operation, and monitoring of complex network solutions. (S2)
- apply relevant and modern tools in the construction of, test, and maintenance of database systems. (S3)

Competencies
The student develops competencies to:
- handle analysis, requirements discovery, development of alternative solutions, design, and development of a requirements specification for network and security solutions for all phases of a project. (C1)
- Handle project management and planning of network and security solutions (C2)

Below are the topics that are part of the Network Systems course in order to support the described knowledge, skills, and competencies.

Topics 1st semester (5)
NET1
- Implementation, test and troubleshooting of common services and protocols in a business network, including

  o DHCP

  o DNS

  o Web Servers

  o File Servers
- User and group management
- Server Virtualization
- Network and server monitoring

Topics 2nd semester (20, 4 **are used for a project)**
NET2(6)
- Routing technologies - implement, configure and troubleshooting of simple routing deployments using static and dynamic routing protocols.
- Wireless networks systems - topologies, standards, and security mechanisms.
- VLAN technologies
- IT security goals and controls

- Basic network security - implement and troubleshoot network security with segmentation, firewalls and NAT

SRV(8)
- Enterprise virtualization - installation, configuration, and management
- Enterprise storage systems, including calculating storage requirements for a given case
- Advanced user and group management
- Directory Services
- IT Policy Management
- Business continuity - evaluate, discuss, and design a backup and recovery solution for a given situation.
- Data valuation
- Plan and carry out tests
- Calculate and benchmark performance

DB (4)
- Database design
- Normalization
- SQL programming - CRUD, joins
- Database interfacing
- Database server administration

Topics 3rd semester (10 ECTS point)
NET3
- Network

  - Advanced routing systems - implement, configure and troubleshoot
  - Multi area routing and external routing protocols
  - Fault tolerant and highly available systems
  - WAN connectivity and transmission Lines
  - Remote Access and VPNs
- Security

  - Needs analysis
  - Cryptography and certificates
  - Authentication, Authorization and Access control
  - Server hardening
  - Malware prevention
  - Network security controls
  - Vulnerability scanning
  - Intrusion Detection and prevention
  - Penetration Testing
  - x.800 framework

Teaching Forms
In the NET courses you will learn about different components of an IT infrastructure. Teaching is a mixture of theoretical presentations and practical exploration. New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups. The knowledge, skills, and competences learned in the NET course will form the technical foundation for the Project course.

The semester plan for the course can be found on Fronter. It describes the topics, literature, and exercises that will be worked with in the lessons.

Tools
In NET you will work with the analysis, design, implementation, and test of simple to complex network and server systems. You will be working with Linux and Windows based operating systems. The hardware such as servers, switches and routers necessary to complete the assignments will be provided by the school. Additional tools that will be used are:
- vmWare Workstation/Fusion for virtualization on your laptop (provided by the school)
- Wireshark for network analysis (free download)
- other software for specific exercises will be listed in the semester plan and made available.

It is the students responsibility to provide a laptop that can run vmWare Workstation / Fusion.

Study activities and compulsory attendance
During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!.

Mandatory Assignments 1. sem.
- 1 hand in NET01

Mandatory Assignments 2. sem.
- 1 hand in DB
- 1 hand in SRV
- 1 hand in NET02
- Exam project covering all courses in 2nd semester

Mandatory Assignments 3. sem.
- 2 hand ins NET03

Exam
After the first semester, there is an internal multiple-choice test. All courses in the first semester are tested at the semester examination and will be evaluated to be passed or failed.
The course is also included in the 1-year examination held after the 2nd semester.
After 3rd semester there is an exam held in the same way as in 1st year exam.
A description of the exams can be found in the curriculum.

13. Advisory and consultant roles (10 ECTS) – network study programme

Preface

This course description contains a description of the course Advisory and consultant roles on the IT Network and Electronics Technology programme's 2nd and 3rd semester at Business Academy Aarhus

Content

This class is intended to develop the student's competencies in using the network technological knowledge associated with advisory and consultancy roles, designing relevant network solutions.

ECTS points

10 ECTS (5 ECTS on 2nd semester and 5 ECTS on 3rd semester)

Study goals

Knowledge

The student develops knowledge about:

- Network design

Skills

The student develops the ability to:

- Apply knowledge of network technology in the design and estimation of costs of complex network solutions
- Evaluate and communicate the appropriateness of technical network solutions in relation to the company and the customer

Competencies

The student develops competencies to:

- Manage complex network solutions and systems in relation to internal and customer related advisory and consultancy services, both strategic and technical
- Manage, coordinate, quality assure and control resource implementation and commissioning of network and security solutions
- Manage and coordinate in relation to the administration, operation, monitoring, maintenance and problem-solving of networks
-

Below are the items contained in the class, in order to provide the student with the above mentioned knowledge, skills and competencies

Topics 2nd semester

- Network diagram (K1,S1,S2)
- Network traffic benchmark (S1,S2)
- Technical strategy (C1,C2)
- Network logistics (C1,C2)
- Logical Network Design (k1, S1,S2,C1)
- Physical Network Design (k1,S1,S2,C3)

Topics 3rd. Semester

- ITIL – organization of consultancy services (C1,C2,C3)
- Administration, operation, monitoring, maintenance and problem-solving of networks Testing, Optimizing, and Documenting Your Network Design (C3)
- It strategy (S1,S2,C1)
- Complex network solution (C1,C3)
- Quality assurance (S2,C1,C2,C3)
- Contract and supplier management

Teaching forms

The course contains different teaching forms: New topics are typically presented using classroom teaching while project work is typically done as group work in project groups. Finally there will be exercises and assignments that you will be working with in pairs or in groups.

The semester courseplan for the class can be found on Fronter. This will tell you about which topics are covered when during the semester. Here you can also find more detailed information about the topics, the necessary literature, exercises and assignments we work with.

Tools

Study activities and compulsory attendance

During the semester you will be presented to different types of deliveries:

Projects: Larger interdisciplinary assignments which are done in project groups. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Projects normally end with a presentation for the class.

Exercises: Exercises are a natural part of the daily teaching and supports the understanding of the actual topics by giving the students a hands-on experience. It is expected that everyone works focused and committedly so that everybody gets an acceptable learning outcome. Selected exercises are presented on class.

Assignments: During the semester you will be presented to a number of assignments which are normally mandatory and must be handed-in in due time!

Mandatory activities

The Academic Regulations describes the minimum activities that you have to do to meet the requirements regarding your study activity. Two of these activities can be found in the course

- Study Activity 2nd semester: Consultant – 1 activity
- Study Activity 3rd. semester: Consultant - 1 activity

Literature

PDF's on Fronter

Exam
- The first part of the class is examined in the 1st year exam concluding 2nd semester
- The second part of the class is examined in the 3rd semester exam.