

Syllabus

3rd Semester Computer Science

21/08/2018

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1. The Semester in General

Welcome to the third semester.

This is an introduction to third semester and the reasoning behind.

The overall topic of the semester is design and architecture in distributed systems. Three courses are offered:

- Programming
- Technology
- System Development Methods

The courses primarily deal with the development of distributed systems from their respective perspectives. System Development Methods continues the agile system development briefly introduced at the 2nd semester.

Each course consists of several modules (See section 2).

Throughout the third semester, you also have to make a project from a reflective practice-based learning offset, which requires you to apply your theoretically acquired knowledge to a practical implementation of a distributed system. You are required to document your reflections in a *system development report* and a *technical documentation* for programming and technology. Goals and requirements regarding the project are described further in section 3.

Furthermore, the distribution of your studying activities throughout the semester should follow the outline of the Student Activity Model which can be found in the three course syllabuses.

You can read more about the *Study Activity Model* and *Reflective learning* on the UCN website here: [English](#) - [Danish](#)

2. Content of the Courses

The main subjects of the three courses are:

Programming:

- The programming language C# and the .NET platform
- Distributed programming
 - Web services
 - WCF
- Web programming

Technology:

- Networking protocols and programming
- Design goals for distributed systems

- Architecture in distributed systems
- Security
- Transactions in distributed systems
- Real time problems in network

System Development Methods:

- Agile Development Methods, using Scrum, XP and Kanban
- Idea and Product Development, generating and developing the idea for the semester project
- Quality Assurance and Architecture in relation to the project and how different companies does software development

3. Academic goals and requirements for the project

In the project you are to develop and implement a distributed system. The system is to be documented in 2 separate reports. There will be an external technology and programming exam and an internal system development exam.

You are appointed a main supervisor who is either your lecturer from technology or programming. This supervisor is primarily responsible for guiding you towards the programming and technology exam. The System Development lecturer will be your process supervisor and responsible for guiding you towards the system development exam. We expect you to use all the lecturers on the semester for academic guidance. In the beginning of the project you need to define a problem statement to guide you in your project period.

Your problem statement must be aligned with the academic goals for the semester and accepted by your supervisor.

The lecturers will initiate activities in category 1 and 2 in the student activity model to help you in your project. Furthermore, we also expect you to make activities in category 3 and 4 for your project.

The following are the main academic goals for the technology and programming project:

- The students should be able to:
 - Develop and test a client-server system in C#/Windows
 - Develop a web application that accesses the developed system
 - Develop a dedicated client
 - Identify and solve problems in developing distributed applications
 - Identify and solve problems related to concurrency
 - In *all* cases, you are required to reflect on the decisions you have made

In the project, you must describe how you have reached the academic goals. You may have additional goals. The supervisor approves your problem statement for the project. The technical documentation for the project must in total be of maximum 20 standard pages and must at least contain considerations regarding:

- Architecture and design

- Concurrency issues
- Security issues
- Middleware, communication protocols, etc.
- Implementation

See also appendix A.

The system development part of the project has the following goals:

- The student should be able to:
 - evaluate the situation for the project and based on that systematically select a usable system development method, and continuously reflect on the applied method
 - apply the theory of agile software development methods on your project, and work with it systematically.
 - Plan, reflect on and regulate the project based upon agile principles
 - adapt the agile method to the project by introducing elements from other methods (e.g. UP) if needed
 - learn about new methods and models

4. Planning the project - milestones

You will have to use an agile development method to plan your project. It is up to you how you will apply the development method in your group.

Regarding the planning of your project we have defined the following milestones:

- Project idea defined and developed and problem statement defined by the *15th of October*. Approved by the supervisors *by the end of October*.
- Considerations regarding architecture and the data model. Project broken down into tasks, development environment up and running *by the end of Sprint 0*.
- First sprint finished demonstration of running code.
- Second sprint finished, demonstration of more advanced running code
- Third sprint finished demonstration of even more advanced code.
- Fourth sprint finished demonstration of the finished product.
- **19/12/2018** - Hand in the project (technical documentation and code plus system development report). Note you must hand in two individual reports through Wiseflow.

See appendix B for a graphical overview of the semester.

5. Making groups for the project

Groups for the project are made the first week of the semester. So it is of outmost importance that you show up. We recommend groups of 4 - 5 persons. The groups are not final before everyone in the class is in a group. The groups will be made during the idea generation in system development in the *beginning of September*.

6. Examination

The third semester concludes with two oral exams:

- Programming/Technology (external)
- System Development Methods (internal)

The Programming/Technology Exam

The submitted technical documentation and the system developed (project), the programming and technology subject areas are the basis for the exam.

The exam is individual, oral and has duration of 40 minutes.

The starting point is the technical documentation for the project where we expect you to make a presentation of a key topic from the project in approximately 15 minutes. The presentation must contain demonstration of code. Afterwards an examination dialog will take place.

You are given one grade according to the 7-step scale.

Present at the exam will be the lecturers in Technology and Programming and an external examiner.

In assessing the technical documentation of the project and the oral presentation we will take the following into account:

- How deep the technical documentation of the project and presentation deals with the academic goals from the project
- How deep the technical documentation of the project and presentation deals with key topics from the computer science program
- How well you have reflected on the choices you have made and the application of relevant theory in your implementation.
- Emphasis on quality rather than quantity
- The complexity of your chosen code solution

The System Development Methods Exam

The examination is an individual internal oral examination based on the system development project. Duration is 30 minutes incl. deliberations. The mark/grade is a combination of the student's presentation and the following examination dialogue.

A. Technical Documentation

The report for technology and programming i.e. technical documentation is to involve the following topics:

- Final domain model with explanations and arguments for the result.
- A description of your chosen architecture and reflections on your decision; including pros and cons.
- A description of the design with your considerations.
- A description of security considerations
- A description of communication protocols with advantages and disadvantages
- Considerations regarding concurrency in the system and different solutions with advantages and disadvantages.
- A description of what you have implemented.

The technical documentation must be a maximum of 20 standard pages.

The report for system development must contain the following:

- Cover page with title
- Introduction
- Plan driven versus agile development elaborated through concrete methods
- Choice of method
- Main principles in planning and quality assurance
- Quality criteria and architecture
- Reflections on methods and their uses in practice
- Conclusion
- Appendices (including reference list to quoted literature)

The report must be a maximum of 20 standard pages.

Ensure to read and follow guide to report writing and note that plagiarism will not be tolerated.

B. Graphical Overview of the Semester

