# COURSE SYLLABUS

## Mjukvarubaserade nätverk
### Softwarized Networks
### 7.5 credits (7,5 högskolepoäng)

**Course code:** DV2603
**Main field of study:** Computer Science, Electrical Engineering
**Disciplinary domain:** Technology
**Education level:** Second cycle
**Specialization:** A1F - Second cycle, has second cycle course/s as entry requirements

**Language of instruction:** English
**Applies from:** 2022-08-29
**Approved:** 2022-02-24

1. **Decision**
   This course is established by Dean 2020-06-09. The course syllabus is approved by Head of Department of Computer Science 2022-02-24 and applies from 2022-08-29.

2. **Entry requirements**
   Admission to the course requires taken course Advanced Networking, 7.5 credits.

3. **Objective and content**

   3.1 **Objective**
   The aim of the course is to provide a comprehensive understanding of technologies, capabilities and applications of softwarized communication networks. The course will teach networking, switching, virtualization, algorithm, software-engineering and security concepts for softwarized communication networks, Clouds., and Network Function Virtualization (NFV).

   3.2 **Content**
   • Introduction to SDN and NFV: origin and motivations, split of data and control plane, network and service orchestration
   • Virtualization techniques and Cloud computing for SDN and NFV
   • Software engineering and open source concepts for SDN and NFV
   • SDN and NFV security: aims, vulnerabilities, opportunities, bring-your-own device, SDN- and NFV-based protection concepts
   • Hardware support and switching technologies for SDN: OpenFlow, P4, NIC support for SDN
   • SDN controllers
   • SDN in the data center
   • Software platforms for SDN and NFV
   • Algorithms and data structure for synchronization and control of SDN and NFV
   • SDN and NFV applications and environments
   • Performance, optimization and testing of SDN and NFV

4. **Learning outcomes**
   The following learning outcomes are examined in the course:

   4.1 **Knowledge and understanding**
   On completion of the course, the student will be able to:
   • describe and explain the general concept of related to softwareized networks
   • describe the relationship of SDN and Cloud systems
   • understand the hardware and software support for softwareized networks
   • understand the requirements on algorithms and data structures for SDN and NFV
   • understand software engineering for SDN and NFV
   • understand performance and security issues and capabilities for SDN and NFV

### 4.2 Competence and skills
On completion of the course, the student will be able to:
- write and present laboratory results in a short report
- select, configure and run/lunch a small-scale SDN system
- test specific security issues of SDN and NFV

### 4.3 Judgement and approach
On completion of the course, the student will be able to:
- know the main SDN and NFV technologies
- judge the advantages and disadvantages of the main networking, switching, and virtualization models for SDN and NFV
- select an appropriate software engineering concepts for SDN and NFV
- judge the performance and security of SDN and NFV

## 5. Learning activities
The course comprises lectures and laboratories including a small project which is completed by a seminar. The lectures will provide the main technical content and deepen the theoretical understanding of the students. The technical content and the theories will be applied in the labs and the project. The labs and the project are conducted in small groups.

## 6. Assessment and grading
Modes of examinations of the course

| Code | Module | Credits | Grade |
|------|--------|---------|-------|
| 2210 | Laboration | 2.5 credits | GU |
| 2220 | Project | 2.5 credits | GU |
| 2230 | Written examination[1] | 2.5 credits | AF |

[1] Determines the final grade for the course, which will only be issued when all components have been approved.

The course will be graded A Excellent, B Very good, C Good, D Satisfactory, E Sufficient, FX Fail, supplementation required, F Fail.

The information before a course occasion states the assessment criteria and make explicit in which modes of examination that the learning outcomes are assessed.

An examiner can, after consulting the Disability Advisor at BTH, decide on a customized examination form for a student with a long-term disability to be provided with an examination equivalent to one given to a student who is not disabled.

## 7. Course evaluation
The course evaluation should be carried out in line with BTH:s course evaluation template and process.

## 8. Restrictions regarding degree
The course can form part of a degree but not together with another course the content of which completely or partly corresponds with the contents of this course.

## 9. Course literature and other materials of instruction
Main literature:
P. Goransson, C. Black T. Culver: Software Defined Networks - A Comprehensive Approach. 2nd Edt., Morgan Kaufmann, 2016. Paperback ISBN: 9780128045558. eBook ISBN: 9780128045794

J. Doherty: SDN and NFV Simplified: A Visual Guide to Understanding Software Defined Networks and Network Function Virtualization (1st ed.). Addison-Wesley Professional, 2016.

Thomas Erl, Ricardo Puttini, Zaigham Mahmood: "Cloud Computing: Concepts, Technology & Architecture", 2013, Prentice-Hall, ISBN: 9780133387520.

Material provided by the Department.
Reference literature:
D. Marschke, J. Doyle, P. Moyer: "Software Defined Networking (SDN): Anatomy of OpenFlow Volume I", Lulu Publishing Services, 2015. ISBN 9781483427232

Morris, Kief. Infrastructure as code: managing servers in the cloud. " O'Reilly Media, Inc.", 2016. ISBN: 978-1-491-92435-8.

Matthias, Karl, and Sean P. Kane. Docker: Up & Running: Shipping Reliable Containers in Production. "O'Reilly Media, Inc.", 2015. ISBN: 978-1-491-91757-2.

Farcic, Viktor. The DevOps 2.0 Toolkit. Packt Publishing Ltd, 2016. ISBN: 9781523917440

James F. Kurose und Keith W. Ross: "Computer Networking: A Top-Down Approach", Prentice Hall; 7th edition, 2016. ISBN-10: 0133594149| ISBN-13: 978-0133594140

A. Tanenbaum, D. Wetherall, "Computer Networks", Pearson, 5th edition, 2010, ISBN-13: 9780133072624

Kai Hwang, Jack Dongarra, Geoffrey C. Fox: Distributed and Cloud Computing: From Parallel Processing to the Internet of Things, 2011 ISBN13: 9780123858801