**Blekinge Institute of Technology**
Department of Technology and Aesthetics

**Revision:** 1
**Reg.no:** BTH-4.1.14-0741-2021

# COURSE SYLLABUS

## Kapacitetsanalys
## Capacity Analysis
## 7.5 credits (7,5 högskolepoäng)

**Course code:** DV2604
**Main field of study:** Computer Science, Electrical Engineering
**Disciplinary domain:** Technology
**Education level:** Second cycle
**Specialization:** A1N - Second cycle, has only first cycle course/s as entry requirements

**Language of instruction:** English
**Applies from:** 2022-01-17
**Approved:** 2021-09-01



### 1. Decision
This course is established by Dean 2020-06-16. The course syllabus is approved by Head of Department of Technology and Aesthetics 2021-09-01 and applies from 2022-01-17.

### 2. Entry requirements
Admission to the course requires completed course in Mathematics, second course, 7.5 credits and taken course in Mathematical Statistics, 7.5 credits.

### 3. Objective and content

#### 3.1 Objective
The course aims for the student to acquire knowledge in queue theory to solve dimensioning and optimization problems that arise in communication systems. In addition, the student acquires the ability to use mathematical tools to determine the number of resources (links, conversation channels, buffers, processing power, etc.). Resources that are required for a system to achieve a certain quality of service at a minimal cost to the operator and thus the customer.

#### 3.2 Content
Critical elements in the course are Probability calculation, transformers, stochastic processes Introduction to queue theory and applications Models of different queuing systems based on data about the system and the environment Different types of queuing systems: M / M / 1, M / M / m * busy system, M / M / m, M / G / 1 and the flow model, priority system and queueing network theory.

### 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:
• account for queue theoretical models for communication systems
• explain how the flow model can be used in the analysis of communication systems.
• account for dimensioning for communication systems.
• account for optimization for communication systems

#### 4.2 Competence and skills
On completion of the course, the student will be able to:
• apply queue theoretical models for communication systems
• perform dimensioning for communication systems.
• perform optimization of communication systems.
• calculate the amount of resources required in a communication system to achieve a certain quality of service.

#### 4.3 Judgement and approach
On completion of the course, the student will be able to:

- analyze and assess the dimensioning of communication systems.
- analyze and assess optimization of communication systems.

**5. Learning activities**

The teaching consists of lectures, exercises, and laboratory work. During arithmetic exercises, it is highlighted how the theory is applied to theoretical queue problems. To further explain the theory and its applications, compulsory laboratory work and assignments are included. These labs and tasks can be solved individually or in groups but are reported individually.

**6. Assessment and grading**

Modes of examinations of the course

| Code | Module | Credits | Grade |
|---|---|---|---|
| 2205 | Written examination | 3 credits | AF |
| 2215 | Laboratory session | 3 credits | GU |
| 2225 | Project assignment | 1.5 credits | AF |

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

The weighted, rounded average grade of the modules comprises the final grade on the course. If the average is exactly between two grades, the final grade is rounded downwards.

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**

Kleinrock, L. (1975). Queueing Systems, Theory. Wiley-Interscience. ISBN: 0-471-49110-1