



# LTH

FACULTY OF  
ENGINEERING

*Course syllabus*

## Projektering avseende energi, luft och fukt i nya byggnader Design concerning Energy, Air Movements and Moisture in New Buildings

**VBFN10, 7,5 credits, A (Second Cycle)**

**Valid for:** 2023/24

**Faculty:** Faculty of Engineering, LTH

**Decided by:** PLED V

**Date of Decision:** 2023-03-21

### General Information

**Elective for:** V4-hb, V4-bf

**Language of instruction:** The course will be given in Swedish

### Aim

To give the student a basic capability to evaluate and choose building technology and building services in a constructive and critical manner to fulfil the functional demands when new buildings are designed.

To give the student knowledge to create buildings which fulfil demands from society and clients concerning energy requirements, moisture safety, thermal comfort, healthy indoor environment while reducing the environmental impact.

### Learning outcomes

*Knowledge and understanding*

For a passing grade the student must

- be able to analyse the functioning demands for different kinds of buildings and activities on basis of human health, comfort, needs and building physics.
- be able to use analytical and numerical calculation methods when designing building components and buildings to work as well as separate units as a system.

- from a holistic point of view be able to design and construct a sustainable building composed of interacting components of different building techniques, building materials, building services, automatic control and the user.

#### *Competences and skills*

For a passing grade the student must

- be able to apply calculation methods, simple as well as advanced, concerning moisture safety, thermal bridges, power and energy requirement for heating and cooling, energy absorbing ability, flow control and distribution in pipes and ducts, active heat capacity and how this is influenced by different boundary conditions, convection and heat- and moisture balances.
- be able to orally and in written describe, discuss and evaluate different technical solutions.
- choose and handle known computer programs to solve partial problems and know the programs range of application and restrictions and how to interpret and present results.

## Contents

- Different kinds of heat transfer and how it affects humans.
- Theory for interchange of heat including thermal calculations, flow arrangements and temperature efficiency.
- Heating systems including pressure and flow distribution and hydronics.
- Manual and numerical moisture calculations including moisture criteria, critical moisture state, impact of moisture on energy consumption, moisture transport, moisture balance, surface condensation, moisture convection and moisture diffusion.
- Analytic models for manual calculation concerning power, energy requirement and temperature distribution
- Energy balance calculation with computer programs including influence from advanced thermal bridges.
- Component design and dimension for actual solutions.

## Examination details

**Grading scale:** TH - (U,3,4,5) - (Fail, Three, Four, Five)

**Assessment:** Written examination with a theoretical part and a calculation part. To pass the course the students also must complete and pass the project exercise, do laboratory work and computer exercises. A well done project exercise can raise the final grade.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

#### **Parts**

**Code:** 0111. **Name:** Written Examination.

**Credits:** 5. **Grading scale:** TH. **Assessment:** Written examination with a theoretical part and a calculation part. **Contents:** The entire course.

**Code:** 0211. **Name:** Handling in Exercises.

**Credits:** 2,5. **Grading scale:** TH. **Assessment:** Approved written report and oral presentation of project exercise and oppose. Approved computer and laboratory exercises. **Contents:** Construction and analyses of a office building concerning thermal indoor climate, heating system, ventilation system and moisture safety.

# Admission

## Admission requirements:

- VBFF01 Energy Efficiency and Indoor Environment

**Assumed prior knowledge:** VBFN05 Energy, Air Movements and Moisture at Rebuilding and Administration

**The number of participants is limited to:** No

**The course overlaps following course/s:** VBF050

## Reading list

- L Jensen: Värmeväxling. Avd. för Installationsteknik, 2007.
- L Jensen: Injustering. Avd. för Installationsteknik.
- Arfvidsson J, Harderup L-E, Samuelson I: Fuktteknik, Praktik och teori. Svensk Byggtjänst, 2017, ISBN: 978-91-7333-823-3.
- Harderup, L-E: Övningsuppgifter med lösningar till Fukt. LTH.
- Claesson, J, Nevander, LE, Sandin, K: Kompendium i Värme (utdrag ur). LTH, 1984.
- Harderup, L-E: Övningsuppgifter med lösningar till Värme. LTH.
- Hansen & Kjerulf-Jensen & Stampe: DANVAK Grundbog. Varme- og klimatteknik, 2. udgave, 1. oplag, kap 1., utdrag ur. Danvak ApS 1997, ISBN: 87-982652-8-8.
- Jensen, L, Warfvinge, C: Hydronik. , Flödesfördelning i rörsystem. LTH, 2005.
- Jensen, L, Dahlblom, M: Injustering av ventilationssystem. LTH, 2007.
- Dahlblom M, Jensen L, : Handledning för laboration. LTH, 2013.
- C Warfvinge, M Dahlblom, L Jensen, B Nordquist: Övningsuppgifter i Installationsteknik med lösningar.

## Contact and other information

**Course coordinator:** Birgitta Nordquist, Birgitta.Nordquist@hvac.lth.se

**Course coordinator:** Stephen Burke, stephen.burke@byggtek.lth.se

**Course homepage:** <https://canvas.education.lu.se/>