



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Energieffektivitet och inomhusmiljö

Energy Efficiency and Indoor Environment

VBFF01, 7,5 credits, G2 (First 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 comprehensive view on how a building functions as a climatic system and to give comprehensive technical knowledge to be able to create or evaluate a building concerning energy requirements, moisture safety, comfort and healthy indoor environment.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- Understand how a building is functioning as a climatic system.
- Describe and explain how to design systems on a room level for temperature and ventilation to fulfil all functioning demands.
- Identify and analyse all parts in an energy balance.
- Quantitatively be able to judge the moisture safety for a building.
- Explain how all the components in a moisture balance influences the moisture safety for the building and its building components.

Competences and skills

For a passing grade the student must

- Apply existing computer programs for calculation of energy balance, power requirement and thermal bridges.

- Apply existing computer programs for determination of air flow demand, ventilation attachment and moisture protection of concrete slab on ground
- Design building components and join them together to a functioning building regarding energy application, moisture proofing, comfort and healthy indoor environment.
- Design and dimension ventilation system and solve the co-ordination with framework and building envelope.

Contents

Building physical: design of building elements, connections, services entry unit and other details to create moisture proof and energy efficient buildings. Information about methodology for moisture design, critical moisture levels and healthy buildings.

Building services engineering: survey of demands of technical solutions in a building, possibilities and limitations with different combinations of heating system, air treatment system and comfort cooling system, co-ordination of systems with lay-out and construction.

As a climate system: fundamental knowledge about demands on thermal climate and air quality. Stationary air-, energy- and moisture balances are established, and with great emphasis on understanding which items that are of importance in the balances.

Project exercise is a fundamental element in the course where the coupling between building envelope, building services, combination of materials, indoor climate technique, control point system, acoustics and economy are dealt with.

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 fulfil and pass the project exercise, the computer exercises. A well accomplished 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: 0110. **Name:** Written Examination.

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

Contents: The entire course.

Code: 0210. **Name:** Handing in Exercises.

Credits: 2,5. **Grading scale:** TH. **Assessment:** Approved written report and oral presentation of project exercise. Approved computer exercises.

Admission

Admission requirements:

- VBFA01 Building Technology and Building Services
- VBMA30 Building Materials

Assumed prior knowledge: VBEA10 The Construction Process

The number of participants is limited to: No
The course overlaps following course/s: VBF055

Reading list

- Abel E, Elmroth A: Byggnaden som system. Studentlitteratur, 2016, ISBN: 978-91-44-11588-7.
- Arfvidsson, J., Harderup, L-E, Samuelson, I.: Fukthandbok, Praktik och teori. Utg 4. Svensk Byggtjänst, 2017, ISBN: 978-91-7333-823-3.
- Bergsten, Bengt; Aronsson, Stefan: Energieffektivisering i komfortkylsystem. Effektiv, 2001, ISBN: 91-7848-876-1.
- Jensen, Lars: Utetemperaturberoende årsenergibehov, Teoridel. Avdelning för Installationsteknik, 2008.
- Svensson, Anders: Ventilationsteknik. Avdelning för Byggnadsfysik, LTH, 1995.

Contact and other information

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Course coordinator: Ulla Janson, ulla.janson@hvac.lth.se

Course homepage: <http://www.hvac.lth.se>

Further information: Integrated multi disciplinary exercises concerning a multi-storey building are used which will lead to an understanding about the entire building process.