Linnæus University

Jnr: 2018/2194-3.1.2.2

Course syllabus

Faculty of Technology
Department of Built Environment and Energy Technology

2BY001 Energi- och klimateffektivt byggande, 7,5 högskolepoäng
Energy and Climate-Efficient Construction, 7.5 credits

Main field of study
Civil Engineering

Subject Group
Building Technology

Level of classification
First Level

Progression
G2F

Date of Ratification
Approved 2011-11-28
Revised 2018-06-21 by Faculty of Technology. Review of prerequisites.
The course syllabus is valid from autumn semester 2019

Prerequisites
English 6/course B and at least 72 credits within the programme Civil Engineering Programme, Building and Construction and Building Technology Programme with specialisation in Architectural Engineering which 7,5 credits mathematics course within the program Mathematics for engineers, (1MA131) 7,5 credits, Calculus for engineers, (1MA132) 7,5 credits and/or Linear algebra for engineers, (1MA133) 7,5 credits or Computational Methods for Technical Applications (1MA112) 15 credits or similar.

Objectives

On completion of the course the students should possess the ability to:

- Understand, interpret, and describe concepts relevant for energy and material flow analysis,
- Understand and apply methods for energy and material flow analysis,
- Give an overview of energy systems for heat and electricity in the built environment,
- Perform energy calculations using computerized energy calculation program
- Perform oral and written presentation.

Content

The course provides knowledge on energy- and material flow in the built environment. Energy analysis aspects include energy use in life cycle of a building, and various fossil fuel- and biomass-based energy supply systems. Material flow aspects cover mainly the environmental implications of producing buildings with various framing materials (e.g. wood, concrete, metals). Different energy calculations programs are introduced and VIP+ energy will be used.

Type of Instruction

The teaching consists of lectures, seminars, exercises, and project work. Some parts are compulsory for students to participate, this will be shown in the schedule.

Examination

The course is assessed with the grades U, 3, 4 or 5.
The examination consists of two parts. The first part concists of a final written exam (4.5 credits, U, 3, 4, 5). The other part consists of exercises which will be presented oral and written with a computer simulated report using VIP+ energy (3.0 credits, U, 3, 4, 5).

Both parts must be approved and the weighted total grade is an average of the two parts, where the written exam stands for 60% and the exercise for 40%.

Course Evaluation

During the course or in close connection to the course, a course evaluation is to be carried out. The result and analysis of the course evaluation are to be communicated to the students who have taken the course and to the students who are to participate in the course the next time it is offered. The course evaluation is carried out anonymously. The compiled report will be filed at the Faculty.

Required Reading and Additional Study Material

Required reading

Kornelius, B., 2007. Introduction to Energy Analysis, Amsterdam, Techne Press, 256p.

Gustavsson, L. and Joelsson, A., 2007. Conversion of electric heating systems in detached houses subjected to energy conservation, Energy and Buildings, 39(6): 716-726.

Gustavsson, L. and Karlsson, Å., 2002. A system perspective on the heating of detached houses, Energy Policy 30(7): 553-574.

Dodoo A., Gustavsson L. and Sathre R., 2010. Life cycle primary energy implication of retrofitting a wood-framed apartment building to passive house standard, Resources, Conservation and Recycling, 54(12): 1152-1160.

Gustavsson L., Joelsson A. and Sathre R., 2010. Life cycle primary energy use and carbon emission of an eight-story wood-framed apartment building, Energy and Buildings, 42(2): 230–242.

Gustavsson L. and Sathre R., 2006. Variability in energy and carbon dioxide balances of wood and concrete building materials, Building and Environment, 41(7): 940-951.

Schlamadinger, B., Apps, M.J., Bohlin, F., Gustavsson, L., Jungmeier, G., Marland, G., Pingoud, K., and Savolainen, I., 1997. Towards a standard methodology for greenhouse gas balances of bio-energy systems in comparison with fossil energy systems, Biomass & Bioenergy, 13: 359-375.

Thormark, C., 2002. A low energy building in a life cycle- its embodied energy, energy need for operation and recycling potential, Building and Environment, 37 (4): 429-435.

The literature list is supplemented with recent articles and other relevant material.