Course syllabus

Faculty of Technology

Department of Built Environment and Energy Technology

4BT311 Miljöanalysmetoder, 7,5 högskolepoäng
Environmental Analysis Methods, 7.5 credits

Main field of study
Civil Engineering, Energy Technology, Environmental Engineering

Subject Group
Building Technology

Level of classification
Second Level

Progression
A1N

Date of Ratification
Approved by Faculty of Technology 2017-05-22
The course syllabus is valid from spring semester 2018

Prerequisites
General entry requirements for second cycle studies and specific entry requirements:

- 90 credits in Environmental Technology, Energy Technology, Civil Engineering, Mechanical Engineering or equivalent
- English B/ English 6 or equivalent

Objectives

After completing the course, the student should be able to:

- Critically evaluate concepts relevant to energy analysis and environmental assessment
- Reflect on the robustness of different quantitative techniques and paradigms for analysing energy and environmental systems
- Apply appropriate analysis tools and methods to evaluate the energy and environmental impact of the built environment.

Content

The course addresses various environmental paradigms and analysis tools to support environmental decisions:

- Overview of energy and environmental-related sustainability challenges on local, regional, national and global scale
- Basic industrial ecological concepts
- Life cycle assessment - overview and approach
- Analysis of carbon footprint

- Water Footprint Analysis
- Environmental impact assessment of projects

Type of Instruction
The teaching consists of lectures, seminars, practical work and project work. Practical work and project work are mandatory.

Examination
The course is assessed with the grades A, B, C, D, E, Fx or F.
The course contains of written exams and course work.
The grade A constitutes the highest grade on the scale and the remaining grades follow in descending order where the grade E is the lowest grade on the scale that will result in a pass. The grade F means that the student's performance is assessed as fail (i.e. received the grade F).

The final grade is a weighted average of assessment methods.

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.

Other
Grade criteria for the A–F scale are communicated to the student through a special document. The student is to be informed about the grade criteria for the course by the start of the course at the latest.

Required Reading and Additional Study Material
Required reading

• Bauman, Henrikke, and Ann-Marie Tillman, (2004). Hitch Hiker's Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Application. Lund, Sweden: Studentlitteratur AB. ISBN: 9789144023649. 543 pages

• Cardenas, I. C., & Halman, J. I. (2016). Coping with uncertainty in environmental impact assessments: Open techniques. Environmental Impact Assessment Review, 60, 24-39.

• Dodoo, A., Gustavsson, L., Sathre, R. (2014). Lifecycle carbon implications of conventional and low-energy multi-storey timber building systems. Energy & Buildings. 82. 194-210.

• Finnveden, G. (2000). On the Limitation of Life Cycle Assessment and Environmental Systems Analysis Tools in General. International Journal of Life Cycle Assessment 5(4): 229-238.

• Finnveden, G.; Hauschild, M. Z.; Ekvall, T.; Guinée, J.; Heijungs, R.; Hellweg, S.; Koehler, A.; Pennington, D.; Suh, S. (2009). Recent developments in life cycle assessment. Journal of Environmental Management, 91, pp. 1–21.

• Weidema, B. P., Thrane, M., Christensen, P., Schmidt, J., & Løkke, S. (2008). Carbon footprint. Journal of industrial Ecology, 12(1), 3-6.

• Frosch, R. A. (1992). Industrial Ecology: A Philosophical Introduction. Proceedings of National Academy of Science U.S.A. 89: 800-803.

• Erkman, S. (1997). Industrial ecology: an historical view. Journal of cleaner production, 5(1-2), 1-10.

• Baas, L. W., and Boons, F. A. (2004). An industrial ecology project in practice: exploring the boundaries of decision-making levels in regional industrial systems. Journal of Cleaner Production, 12(8), 1073-1085.

• Smith, R. L., Sengupta, D., Takkellapati, S., & Lee, C. C. (2015). An industrial ecology approach to municipal solid waste management: II. Case studies for recovering energy from the organic fraction of MSW. Resources, Conservation and Recycling, 104, 317-326.

• Guinee, J.; Heijungs, R.; Huppes, G.; Zamagni, A.; Masoni, P.; Buonamici, R.; Ekvall, T.; Rydberg, T. Life cycle assessment: Past, present, and future. Environ. Sci. Technol. (2010) 45, 90-96.

• Heijungs, Reinout, and Rene Kleijn. (2001). Numerical approaches towards life cycle interpretation. Int J LCA 6, no. 3: 141-148.

• Lippke, B., Oneil, E., Harrison, R., Skog, K., Gustavsson, L. and Sathre, R. (2011) Life cycle impacts of forest management and wood utilization on carbon mitigation: knowns and unknowns. Carbon Management, vol. 2: 3, pp. 303-333.

• Eccleston, C. H. (2011). Environmental impact assessment: A guide to best professional practices. CRC Press.

• Oburger, E., Jäger, A., Pasch, A., Dellantonio, A., Stampfer, K., and Wenzel, W. W. (2016). Environmental impact assessment of wood ash utilization in forest road construction and maintenance -A field study. Science of the Total Environment, 544, 711-721.

• Vanham, D. (2016). Does the water footprint concept provide relevant information to address the water–food–energy–ecosystem nexus? Ecosystem Services, 17, February, pp. 298–307.

Current articles and other relevant material.