

SYLLABUS FOR

Exergy Analysis

7.5 ECTS

CODE
TER719

APPROVAL

Approved 2009-06-24 by The Faculty Board at Gotland University, revised 2010-xx-xx. Valid as from spring term 2011.

SUBJECT AND LEVEL

Energy engineering advanced level A1F.

LEARNING OUTCOMES

After completion the student should be able to:

- Analyze real energy and material conversion systems from an exergy point of view.
- Reflect on the sustainable use of physical resources.

CONTENT

Unit 1. Exergy Analysis Fundamentals, 2.5 ECTS: Exergy concepts and methods, Life Cycle Analysis, Energy Systems, Life Cycle Exergy Analysis (LCEA), sustainable resource use.

Unit 2. Exergy Analysis Applications, 2 ECTS: Exergy analyses of different systems and process.

Unit 3. Individual Project Report, 3 ECTS: Exergy analyses of real or realistic systems.

ENTRANCE REQUIREMENTS

At least Exergy 7.5 ECTS or equivalent.

TYPE OF TEACHING

Internet based with compulsory assignments, discussions and report.

EXAMINATION AND GRADES

Units 1 and 2 are examined by assignments and unit 3 by a report. Grades on units and course are Pass with distinction (VG), Pass (G), and Fail (U). The grade Pass requires Pass or higher on all units. The grade Pass with distinction requires in addition Pass with distinction on unit 2 and 3.

LITERATURE

Cutler J. Cleveland, *Net Energy From the Extraction of Oil and Gas in the United States* 17 p.

http://www.bu.edu/cees/people/faculty/cutler/articles/Net_%20Energy_US_Oil_gas.pdf

Gong, M. and G. Wall, *On Exergy and Sustainable Development, Part II: Indicators and Methods* (2001) 17 p. <http://www.exergy.se/ftp/gw2exij.pdf>.

Muילerman and Blonk, *Towards a sustainable use of natural resources* (2001) 18 p. <http://ec.europa.eu/environment/enveco/waste/pdf/muילerman.pdf>.

The Eco-indicator 99 A damage oriented method for Life Cycle Impact Assessment (2000) 144 p. http://www.pre.nl/download/EI99_methodology_v3.pdf.

The Exergoecological Portal,

http://www.exergoecology.com/excalc/index_html/new_calc_exergy.

Zvolinschi, Anita. *On exergy analysis and entropy production minimisation in industrial ecology*, (2006) 216 p. PhD Theses, NTNU, <http://ntnu.diva-portal.org/smash/record.jsf?pid=diva2:122541>.

Gotland University
SE-621 67 VISBY
SWEDEN
TEL VXL: +46 498-29 99 00
FAX: +46 498-29 99 62
E-MAIL: info@hgo.se
<http://www.hgo.se>

- Wall, G. and M. Gong, *On Exergy and Sustainable Development, Part I: Conditions and Concepts* (2001) 18 p. <http://www.exergy.se/ftp/wg1exij.pdf>.
- Wall, G., *Exergy Flows in Industrial Processes*, Energy, Vol. 13, No. 2, pp. 197-208 (1988) <http://www.exergy.se/ftp/paper3.pdf>, <http://www.exergy.se/ftp/paper3fig52.pdf>, and <http://www.exergy.se/ftp/paper3fig62.pdf>.
- Wall, G., *Exergetics* (2009) 151 p. <http://www.exergy.se/ftp/exergetics.pdf>.