

Environmental and Recycling Technology (M. Eng.)

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| Module – Number | 732 | Obligatory | |
| Module | Life Cycle Assessment (LCA) | | |
| Module coordinator | Dr.-Ing. Christian Borowski | | |
| Title | Life Cycle Assessment | | |
| Title of examination | Life Cycle Assessment | | |
| Semester | 1 st | | |
| Course type | Language | Lecture | English |
| Credit hours/ ECTS/ Workload | 3/1/0 | 5 | 150 |
| Formal Conditions | Bachelor of Engineering or Bachelor of Science degree | | |

1. Content and objectives

Content:

In order to approach the subject of energy, substance and environmental assessments, knowledge of the associated relationships (politics, economy, society) is necessary. It is not the raw calculation of balances, but the consideration of the correct description of the problem. In this context the setting of system boundaries is important too. In workshops, each lasting 4 hours, students will learn to recognize problems in teams and to provide solutions with the help of assessment tools (knowledge based and software).

1. Recognizing and evaluating environmental issues in the media – workshop
2. Introduction to material flows - workshop
3. Consideration and definition of boundaries - workshop
4. Energy/Substance/Environment assessments - workshop
5. Human-Environment-Future - Workshop to select the examination topic based on current environmental issues

Learning objectives:

Students will be able to recognize environmental connections in texts that do not seem to be related to environmental issues (unit 1).

After the unit 2, students will be able to recognize, classify and evaluate material flows.

Establishing system boundaries is a basic requirement for every life cycle assessment. After the workshop 3, students will know how to set system boundaries correctly.

After the workshop 4, students will be able to create the relevant assessment sheets and read data from sheets that have already been created. Students also got an insight into software for creating these assessments.

After the workshop 5 students have to choose a topic for your scientific work and explained it to the person responsible for the module.

Literatur: For preparation the following international/national standards and scientific books are recommended:

1. ISO 14001 Environmental management systems — Requirements with guidance for use
2. ISO 14040 Environmental management – Life cycle assessment – Principles and Framework
3. ISO 14041 Goal and Scope definition and inventory analysis
4. ISO 14042: Environmental management — Life cycle assessment — Life cycle impact assessment
5. ISO 14043 Environmental management — Life cycle assessment — Life cycle interpretation
6. ISO 14044 Environmental management – Life cycle assessment – Requirements and Guidelines
7. DIN EN ISO 14040 Umweltmanagement – Ökobilanz – Grundsätze und Rahmenbedingungen
8. DIN EN ISO 14044 Umweltmanagement – Ökobilanz – Anforderungen und Anleitungen
9. Klöpffer, W.; Grahl, B.: Ökobilanz (LCA): Ein Leitfaden für Ausbildung und Beruf, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim, 2009, Print ISBN:9783527320431 |Online ISBN:9783527627158
10. Frischknecht, R.: Lehrbuch der Ökobilanzierung, Springer Spektrum, 2020.
11. Klöpffer, W., Grahl, B.: Ökobilanz (LCA), Wiley-VCH, 2019.

2. Method(s) of instruction

Workshop with Lecture.

3. Requirements for attendance

There are no formal requirements for participation.

4. Usability of this module

This module is obligatory in the Master's Environmental and Recycling Technology (M. Eng. ERT) and a compulsory module in the Master's Renewable Energy Systems (M. Eng. RES).

5. Requirements for assessment

Students need to pass the module examination, which encompasses all contents of the lecture.
Type of examination written scientific report (10 pages) and Power Point Presentation (15 minutes + 5 minutes Q&A).

6. ECTS Credits

Modules are assessed by a module examination, which is credited by 5 credit points according to the ECTS (European Credit Transfer and Accumulation System).

7. Frequency of offer

The module is scheduled for the first academic year.

8. Workload

Course Participation = 20 h

Preparation and follow-up (of the lecture) = 20 h

Preparation for examination = 110 h

The entire workload encompasses 150 hours, which equals 5 ECTS credit points.

9. Duration of module

The module is held within one semester.