Master study course Renewable Energy Systems (M. Eng.)

Module – No.		856		Mandatory module
Module name		**Life Cycle Analysis of Renewable Energy Systems**		
Module coordinator		Prof. Dr.-Ing. Joachim Fischer		
Title		Life Cycle Analysis of Renewable Energy Systems		
Title of examination		Life Cycle Analysis of Renewable Energy Systems		
Semester		2		
Course type	Language	Lecture including exercises	English	
SWS/ ECTS/ Workload		4 V	5	150
Requirements for attendance		Successfully completed technical study course (e.g. Bachelor of Engineering)		

1. Content and objectives

Objective

This lecture deals with the methodological basics and application of various environmental assessment tools in the field of renewable energy systems

Module contents:

- Introduction to Sustainability Concepts and Life Cycle Analysis
- Methods: material flow analysis, risk assessment, carbon footprint and life cycle assessment
- Risk and Life Cycle Framework for sustainable energy systems (Introduction, Risk, Environmental Risk Assessment)
- Overview of LCA Methodology - Goal Definition, Life Cycle Inventory, Life Cycle Impact Assessment, Life Cycle Interpretation, LCA Software tools - UMBERTO)
- Life Cycle Assessment – Detailed Methodology and ISO Framework
- Life Cycle Inventory and Impact Assessments (Unit Processes and System Boundary, Data Quality, Procedure for Life Cycle Impact Assessment, LCIA in Practice with Examples, Interpretation of LCIA Results)
- Case Studies

On-line Lecture notes and training material will be made available.

Recommended Literature:

Michael Z. Hauschild, Ralph K. Rosenbaum, Stig Irving Olsen: Life Cycle Assessment: Theory and Practice, Cham: Springer International Publishing, 2018.

Learning goals:

After attending the lecture, students know environmental assessment tools, such as material flow analysis, risk assessment, and life cycle assessment. They can identify and apply the appropriate tool in a given situation. In addition, they are able to assess critically existing studies. They understand the general background of the methods as well as the basics of the corresponding tools. Furthermore, they also have knowledge on the limitations of the methods.

2. Method(s) of instruction

Interactive lecture in combination with exercises, using the LCA software UMBERTO.

3. Requirements for attendance

No Course specific requirements

4. Usability of this module

The module is offered as mandatory course in the master study course „Renewable Energy Systems“ (M.Eng.) as well as elective course in the master course „Energiesysteme“ (M. Eng.).

5. Requirements for assessment

Assessment is performed either as written examination (90 minutes) or oral examination. Students need to pass the module examination, which encompasses all contents of the lecture.

6. ECTS credits

- 5 ECTS credits

7. Frequency of offer

- Annually in the autumn semester

8. Work load

150 h of total work load, therefrom - 80 h of presence at lectures/exercises - 40 h of self-study - 30 h preparation for examination
9. Duration of module
1 semester