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

Module – No.		859		Mandatory module
Module name		**Solar Thermal Laboratory**		
Module coordinator		Dr.-Ing. Pascal Leibbrandt		
Title		Solar Thermal Laboratory		
Title of examination		Solar Thermal Laboratory		
Semester		2		
Course type	Language	Lecture / Laboratory	English	
SWS/ ECTS/ Workload		4	5	150
Requirements for attendance		none		

1. Content and objectives

Content:

1. Solar collectors, components and systems
   - Collector types, characteristics
   - Collector loop, operating mode
   - Heat storage, heat exchanger, controls
2. System design, economics
   - System types, characteristics
   - Solar heat costs, economics
3. Laboratory experiments
   - Collector front glazing – STL 1
   - Collector test (QDT) – STL 2
4. Current research

Learning goals:

The students have knowledge about the various solar thermal collector types, design and function. They can dimension various solar loop types and design them using typical key figures. The economic viability of the investments and the basics of investment calculation is known to the students. By using typical and standardizes test methods (test rig design, data acquisition and evaluation) the students are able to test solar collectors and solar loop components in laboratory.

2. Method(s) of instruction

The module consists of a lecture with integrated exercises and an active involvement of the students in the laboratory.

3. Requirements for attendance

There are no formal requirements for participation. Basics in physics, mathematics and mechanics are recommend-ed. Basic knowledge in renewable energies and heat transfer is useful.

Literature:

[1] Duffie; Beckman: Solar Engineering of Thermal Processes. 4th Edition. Wiley & Sons, Hoboken (2013)

[2] Schabbach; Leibbrandt: Solarthermie – Wie Sonne zu Wärme wird. Springer, Berlin (2017)

[3] Nellis; Klein: Heat Transfer. 1st Edition. Cambridge University Press, Cambridge (2008)

[4] Wesselak, Schabbach; Link; Fischer: Regenerative Energietechnik. Springer Vieweg, Berlin (2017)

4. Usability of this module

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

5. Requirements for assessment

Assessment is performed as written examination (120 minutes).

6. ECTS credits

5 ECTS credits

7. Frequency of offer

The module is lectured annually in the autumn semester

8. Work load

The total workload for this module is 150 hours; this corresponds to 5 ECTS credits. This workload results from the presence at the lectures with an active participation of the students in the laboratory

(about 45 hours). As part of the self-study, the lecture material should be reworked (about 55 hours). The preparation and execution of the examination is about. 50 hours.
9. Duration of module
The module is lectured in one semester