

## **Course Description**

### Applied Photovoltaics

Session at "Ansbach Summer School"

### Course of Studies: Applied Engineering Sciences

Credits: 5 ECTS

2,5 ECTS subject-specific session

2,5 ECTS intercultural communication session

### Exam

Subject-specific:

- Lab reports
- Presentation and discussion of test results
- Written exam (60 min.), admissible examination aids: experiment documentation, lab reports

Intercultural:

- Written report on insights gained by participating in the program (3-5 pages in English)

### Module coordinator for the subject-specific session

Prof. Dr.-Ing. Georg Rosenbauer

### Course objectives

- Students deepen their knowledge in the field of photovoltaics. They learn to assess the influence of orientation, temperature, partial shading and other mismatch mechanisms.
- The session is conducted in English. Students train their ability to communicate using the English terminology.
- Experiment results will regularly be presented and discussed in plenary sessions. Thus the students' ability to give presentations will be improved.
- The session will be rounded off by a technical excursion introducing the students to further practical aspects of applied photovoltaics.

### Technical skills acquired

- All learning assets are based on self-conducted experiments and investigations executed partly in labs, partly as outdoor research. Students not only learn to use different lab measuring devices but also how to handle typical measurement tools that are in practical use with photovoltaics industry.
- Students learn to design a simple software-based plant layout and evaluate its economic efficiency. They get familiar with widely-used software in the field of photovoltaics.
- By conducting a typical analysis of measuring data based on MS Excel students learn how to handle large data pools.

### Social skills acquired

All parts of the session are conducted in small groups of German and international students. Thus the following skills are trained:

- Team work
- Intercultural communication and cooperation

### Contents

The main contents of the single practical experiments are:

- Solar insolation, Three-Component-Model

- Measurement of U-I curves using different methods
- Analysis of the effects of partial shadowing scenarios
- Evaluation of potential locations for application
- Plant design with regard to technical and economical aspects
- Evaluation of data gained from a commercial photovoltaic plant, fault analysis
- IR based fault analysis of single modules

#### Prerequisites

- Basics of electronics (e.g. Electrical Engineering seminar and lab)
- Theoretical knowledge about photovoltaics (e.g. lecture on decentralised energy systems)
- Acquaintance with MS Excel

#### Recommended reading

- Mertens, K.: Photovoltaik. 2. Aufl., Hanser, 2013
- Mertens, K.: Photovoltaics: Fundamentals, Technology and Practice. Wiley, 2014
- Lab handouts (will be provided for pre reading)