Module label: Photovoltaic System Technology
Module code: pre354
Credit points: 10.0 KP
Workload: 300 h

Used in course of study:
- Master's Programme European Master in Renewable Energy (EUREC) > Mastermodule

Contact person

Skills to be acquired in this module:
- After completing the module, the student will be able to:
  - Assess the system requirements for both grid connected and stand alone applications.
  - Design and develop a PV system by evaluating complex customer needs in relation to an application.
  - Critically evaluate the performance of a PV system in comparison to a theoretical model of such a system, calculating yields and efficiencies.
  - Analyse the main system losses and compare methods for minimising these for various system designs.

Module contents:
1. Basic systems design
   - Photovoltaic (PV) arrays, support structures
   - Electrical Connections and wiring issues
   - BOS components
   - Stand alone and grid connected systems
   - System sizing
2. Stand-alone systems
   - Applications
   - Performance assessment and sizing
   - Standards and regulations
3. Grid connected systems - electrical
   - Inverter systems and electrical supply issues
   - Grid connection regulations
   - Harmonic content, reactive power, and wiring issues
4. Grid connected systems - large scale
   - Design of large scale systems
   - Case studies
5. Grid connected systems - building integrated
   - System design and sizing
   - Energy in buildings and building components
   - Installation and operation
   - Case studies
6. Concentrator systems
   - Design of concentrator systems
   - Operation and maintenance
7. Monitoring and performance analysis
   - Monitoring specifications
   - Yield and performance ratio, and MTBF
   - Operational issues and maintenance
8. Standards and regulations
   - Standards for construction and operation
   - Regulations governing system design and operation
   - Health and safety issues
9. Space systems
   - Array configurations
   - Quality control and assessment
   - Design of systems
   - BOL and EOL design tradeoffs

Reader's advisory:

Journals:
- Progress in Photovoltaics
- Renewable Energy
- Various IEEE journals relating to electrical engineering

Databases and Websites:
- IEA PV Power Systems Programme (www.iea-pvps.org)
- European Photovoltaic Industries Association (http://www.epia.org/home/)
- PVGIS web site (http://re.jrc.ec.europa.eu/pvgis/)

Other Resources:
- Measurement data from system trials
- PVSyst software
**Links**

Language of instruction: English  
Duration (semesters): 1 Semester  
Module frequency: jährlich  
Module capacity: unlimited  
Module level: MM (Mastermodul / Master module)  
Module art: je nach Studiengang Pflicht oder Wahlpflicht  
Lern-/Lehrform / Type of program: Lectures, seminars  

**Vorkenntnisse / Previous knowledge**

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| Final exam of module | At the end of the semester | Written exam (60%, 3 hours)  
Written report (40%, design assignment): Feasibility report, maximum of 10 pages plus technical appendices  

**Course type**  
Seminar

**SWS**

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