# Module PRE760
## Introduction to Energy Meteorology

This module is associated to the following degrees

Master > Renewable Energy Online > Mandatory Module

Abstract:

This module introduces the concepts of solar and wind energy meteorology. The solar part includes solar radiation basics, atmospheric interaction and solar radiation modelling. The wind part explains atmospheric flow and the properties of the atmospheric boundary layer. Furthermore, the fundamentals of solar and wind resource assessment are covered.

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| Duration: | 1 semester | Teaching form: | Theoretical-practical seminar: e-learning. |
| Cycle: | Winter Semester | Language: | English |
| Type of module: | Mandatory | Credit points: | 6 ECTS |
| Level: | MM (master module) | Workload: | 180 hours |
| Max. No. of students: | 30 | Pre-requisites: | none |
| Weblink: | n/a | Associated with the module(s) | n/a |

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| Lecturer(s):<br>Indradip Mitra | Mentor(s):<br>- |
| Designer(s) of the module:<br>Detlev Heinemann, Tanja Behrendt, Adnan Shihab | Examiner(s):<br>Indradip Mitra |

Objective of the module / learning outcomes:

After successful completion of the module students should be able to:

- explain the availability and connection between solar and wind energy
- identify the problems and challenges of energy supply due to fluctuating energy resources with varying and seasonal load profiles
- relate the solar irradiance conversion process as well as the atmospheric radiation balance of the earth to Wind Energy Meteorology

Forms of learning:

The learning process will be predominantly based on reading material (self-learning) and applying new knowledge in practical online exercises. The students will be supported by lecturers and mentors using forums, messages and video conferences for active discussions and constant contact to address questions and any type of difficulties.

Helpful previous knowledge:

n/a

Content of the module:

Part I: Solar Energy Meteorology

- Radiation Laws
- Solar Geometry
- Atmospheric Interaction
- Solar Radiation Modelling
- Satellite-Derived Solar Irradiance

Part II: Wind Energy Meteorology

- Atmospheric Flow
- Atmospheric Boundary Layer
- Wind Resource Assessment

Useful literature:


- Iqbal, M. 1984: An Introduction to Solar Radiation, Academic Press, Toronto
- Liou, K.-N. 2002: An Introduction to Atmospheric Radiation, Academic Press: 2nd edition
- Peixoto, J.P. & Oort A.H. 2007: Physics of Climate Book, Surge Publishing
- Rasmussen, B. 1988: Wind Energy, 2, Routledge: 1st edition
- Sathyajith, M. 2006: Wind energy: fundamentals, resource analysis and economics, Springer
- Stull, R.B. 1988: An Introduction to Boundary Layer Meteorology, Springer 1st edition


Requirements for awarding the credit points

Portfolio: Online exercises on wind and solar energy meteorology.

Examination periods:

Submission of online exercises during the lecture period.

Comments:

none

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| Registration procedure: | C3LLO | Last update: | 02.08.2019 |