

Syllabus

Course description

Course title	Solarenergiesysteme
Course code	45522
Scientific sector	ING-IND/11
Degree	Master in Energy Engineering
Semester	Summer School
Year	<i>Summer School</i>
Academic year	2022/23
Credits	6 CP
Modular	<i>No</i>

Total lecturing hours	40
Total lab hours	
Total exercise hours	20
Attendance	Strongly recommended
Prerequisites	
Course page	Course Offering / Free University of Bozen-Bolzano (unibz.it)

Specific educational objectives	<p><i>The course aims to introduce students to different aspects of solar energy. The course starts with an introduction to the properties of solar radiation. Fundamental properties such as energy content and spectral distribution and air mass will be defined. From there, the course explores the different strategies to harvest this vastly abundant source of energy.</i></p> <p><i>The topics covered range from the fundamentals and latest advances in photovoltaics to the thermal uses of solar energy such as solar heating and cooling as well as concentrated solar thermal power plants. The students will learn the fundamental principles and the system design indications of the each of the covered technologies.</i></p>
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Lecturer	Dr. Morandi Federica
Scientific sector of the lecturer	ING-IND/11. Researcher at the Free University of Bozen-Bolzano. Working group: Building Physics and Building Energy Systems.
Teaching language	English
Office hours	<i>t.b.d.</i>
Teaching assistant (if any)	none
Office hours	
List of topics covered	<ul style="list-style-type: none"> Solar energy Solar Radiation Photovoltaics Passive and Active Solar heating Solar thermal power plants

Teaching format	<i>Frontal lectures, exercises, seminar talks by the students.</i>
Learning outcomes	<p><u>Knowledge and understanding</u> <i>The students will learn:</i></p> <ul style="list-style-type: none"> • <i>the fundamentals of solar radiation and the measuring techniques used to monitor these.</i> • <i>The basic working principles of a photovoltaic (PV) cell, its limitations and concepts on how to possibly overcome these problems (3rd generation PV).</i> • <i>system design for a PV plant, including shading considerations as well as tracking systems.</i> • <i>special aspects of building and product integrated PV (BIPV and PIPV).</i> • <i>the basic working principles of solar thermal collection and its different applications such as solar heating (passive vs. active), solar heat for industrial processes as well as solar cooling applications.</i> • <i>the working principles of concentrating solar thermal power plants.</i> • <i>how to estimate the efficiency for each of the covered systems as well as be introduced to different ways to simulate the respective systems.</i> <p><u>Applying knowledge and understanding</u> <i>Capability to implement the procedures and calculation methods presented in the course and to develop design and diagnostic skills.</i></p> <p><u>Making judgements</u> <i>Acquisition of critical assessment tools and critical evaluation of product specifications.</i></p> <p><u>Communication skills</u> <i>The student will be able to discuss the learned knowledge with vocabulary and technical terms of the discipline.</i></p>
Assessment	<i>Oral examination with questions aimed at verifying the knowledge and the capability to understand the topics of the course and the mastery of the technical language. The capability to transfer these competences to applicative cases and the developed autonomy of judgment will be evaluated through the discussion of the design work assigned during the course.</i>
Assessment language	<i>English</i>
Evaluation criteria and criteria for awarding marks	<i>A single final vote will take into account of the knowledge of the course content (max 15 points), of the ability of applying the learnt topic (max 5 points), of the ability to synthesize information, correctness of the technical terms and clarity (max 5 points). With reference to the</i>

	<i>developed design work, the capability to analyze the proposed problem and to formulate a cost-effective and technically advantageous solution will be taken into account (max 5 points).</i>
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Required readings	
Supplementary readings	