

## **Module: Renewable Energy**

Level	Bachelor	Short Name	REN
Responsible Lecturers	Töbermann, JChristian, Prof. DrIng		
Department, Facility	Electrical Engineering and Computer Science		
Course of Studies	Elektrotechnik - Energiesysteme und Automation, Bachelor		
Compulsory/elective	Compulsory	ECTS Credit Points	5
Semester of Studies	6	Semester Hours per Week	4
Length (semesters)	1	Workload (hours)	150
Frequency	SuSe	Presence Hours	60
Teaching Language	English	Self-Study Hours	90
he following section is filled onl	y if there is <b>exactly or</b>	ne module-concluding exam.	
Exam Type	Written Exam	Exam Language	English
Exam Length (minutes)	120	Exam Grading System	One-third Grades
	system, the ele	ectrical grid, and the energy trans	
	system, the ele can explain an energy genera can analyze ar installations, w turbines. know definition analyze and even the energy transbusiness processing. apply methods generation plans	ectrical grid, and the energy trans d evaluate selected technologies	sition. s of renewable ergy generation ms and wind nd sector coupling ities arising from ructures and on the electrical
Participation Prerequisites	system, the ele can explain an energy genera can analyze ar installations, w turbines. know definition analyze and even the energy transbusiness processing. apply methods generation plans	ectrical grid, and the energy trans d evaluate selected technologies tion. Ind assess specific renewable en- rith focus on photovoltaics system as and concepts of smart grids an valuate challenges and opportun- nistion and sector coupling on stresses in the energy industry and and procedures for the integrations into the electrical power grid	sition. s of renewable ergy generation ms and wind nd sector coupling ities arising from ructures and on the electrical
· · · · · · · · · · · · · · · · · · ·	system, the ele can explain an energy genera can analyze ar installations, w turbines. know definition analyze and ex the energy trar business proce grid. apply methods generation plan power system	ectrical grid, and the energy trans d evaluate selected technologies tion. nd assess specific renewable en- rith focus on photovoltaics system as and concepts of smart grids an valuate challenges and opportun nsition and sector coupling on stresses in the energy industry and and procedures for the integrati ints into the electrical power grid in a purposeful manner.	sition. s of renewable ergy generation ms and wind nd sector coupling ities arising from ructures and on the electrical
The previous section is filled onl	system, the ele  can explain an energy genera  can analyze ar installations, w turbines.  know definition  analyze and evenergy transhusiness procest grid.  apply methods generation planshower system  y if there is exactly on	ectrical grid, and the energy trans d evaluate selected technologies tion. nd assess specific renewable en- rith focus on photovoltaics system as and concepts of smart grids an valuate challenges and opportun nsition and sector coupling on stresses in the energy industry and and procedures for the integrati ints into the electrical power grid in a purposeful manner.	sition. s of renewable ergy generation ms and wind nd sector coupling ities arising from ructures and on the electrical
he previous section is filled onl	system, the ele  can explain an energy genera  can analyze ar installations, w turbines.  know definition  analyze and evenergy transhusiness procestid.  apply methods generation planshower system  use of gender-ne	ectrical grid, and the energy trans d evaluate selected technologies tion.  Indicate a specific renewable entitle focus on photovoltaics systems and concepts of smart grids an valuate challenges and opportunt estion and sector coupling on stresses in the energy industry and and procedures for the integration and procedures for the integration and purposeful manner.	sition. s of renewable ergy generation ms and wind and sector coupling ities arising from ructures and on the electrical con of renewable and the electrical
The previous section is filled onl	system, the ele  can explain an energy genera  can analyze ar installations, w turbines.  know definition  analyze and evenergy transhusiness procestid.  apply methods generation planshower system  y if there is exactly on  Use of gender-new  Target group spe	ectrical grid, and the energy trans d evaluate selected technologies tion.  Indicate a specific renewable entitle focus on photovoltaics systems and concepts of smart grids anyaluate challenges and opportunt esition and sector coupling on stresses in the energy industry and and procedures for the integration and procedures for the integration and purposeful manner.	sition. s of renewable ergy generation ms and wind and sector coupling ities arising from ructures and on the electrical con of renewable and the electrical
The previous section is filled onl	system, the ele  can explain an energy genera  can analyze ar installations, w turbines.  know definition  analyze and evenergy transhusiness procestid.  apply methods generation planshower system  y if there is exactly on  Use of gender-new  Target group spe	ectrical grid, and the energy trans d evaluate selected technologies tion.  Indicases specific renewable enrith focus on photovoltaics systems and concepts of smart grids anyaluate challenges and opportunation and sector coupling on stresses in the energy industry and and procedures for the integrations into the electrical power grid in a purposeful manner.  The module-concluding exam.  The energy industry and in a purposeful manner.	sition. s of renewable ergy generation ms and wind and sector coupling ities arising from ructures and on the electrical con of renewable and the electrical



## **Module Course: Renewable Energy (Lecture)**

(of Module: Renewable Energy)

edition)  Further literature will be announced in the lecture.					
Participation Limit Group Size Workload (hours) Teaching Language English Presence Hours Study Achievements ("Studienleistung", SL) SL Length (minutes) SL Grading System The following section is filled only if there is a course-specific exam.  Exam Type Exam Language Exam Language Exam Learning Outcomes Participation Prerequisites The previous section is filled only if there is a course-specific exam.  Contents  Contents  - Energy industry, electrical energy system and electrical grid - Climate Change and energy transition - Solar Radiation - Photovoltaic - Solar thermal and concentrated solar - Wind turbines - Hydro power - Prognosis of renewable energy - Grid and system integration of renewable energy - Fundamentals of sector coupling  Literature  V. Quaschning: "Renewable Energy and Climate Change" (most recent edition) - Further literature will be announced in the lecture.	Course Type	Lecture	Form of Learning	Presence	
Group Size   Workload (hours)   120  Teaching Language   English   Presence Hours   45  Study Achievements ("Studienleistung", SL)   Self-Study Hours   75  St. Length (minutes)   St. Grading System    The following section is filled only if there is a course-specific exam.  Exam Type   Exam Language	Mandatory Attendance	no	ECTS Credit Points	4	
Teaching Language English Presence Hours 45  Study Achievements ("Studienleistung", SL)  SL Length (minutes) SL Grading System  The following section is filled only if there is a course-specific exam.  Exam Type Exam Language  Exam Length (minutes) Exam Grading System  Learning Outcomes  Participation Prerequisites  The previous section is filled only if there is a course-specific exam.  Contents  • Energy industry, electrical energy system and electrical grid • Climate Change and energy transition • Solar Radiation • Photovoltaic • Solar thermal and concentrated solar • Wind turbines • Hydro power • Prognosis of renewable energy • Grid and system integration of renewable energy • Fundamentals of sector coupling  Literature  V. Quaschning: "Renewable Energy and Climate Change" (most recent edition) Further literature will be announced in the lecture.	Participation Limit		Semester Hours per Week	3	
Study Achievements ("Studienleistung", SL)  SL Length (minutes)  SL Grading System  The following section is filled only if there is a course-specific exam.  Exam Type  Exam Language  Exam Length (minutes)  Learning Outcomes  Participation Prerequisites  The previous section is filled only if there is a course-specific exam.  Contents  Energy industry, electrical energy system and electrical grid  Climate Change and energy transition  Solar Radiation  Photovoltaic  Solar thermal and concentrated solar  Wind turbines  Hydro power  Prognosis of renewable energy  Grid and system integration of renewable energy  Fundamentals of sector coupling  Literature  V. Quaschning: "Renewable Energy and Climate Change" (most recent edition)  Further literature will be announced in the lecture.	Group Size		Workload (hours)	120	
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Exam Length (minutes)  Learning Outcomes  Participation Prerequisites  The previous section is filled only if there is a course-specific exam.  Contents  Energy industry, electrical energy system and electrical grid Climate Change and energy transition Solar Radiation Photovoltaic Solar thermal and concentrated solar Wind turbines Hydro power Prognosis of renewable energy Grid and system integration of renewable energy Fundamentals of sector coupling  Literature  V. Quaschning: "Renewable Energy and Climate Change" (most recent edition) Further literature will be announced in the lecture.	SL Length (minutes)		SL Grading System		
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Remarks	Literature	edition)	<i>5,</i>	ange" (most recent	
	Remarks	_			

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## **Module Course: Renewable Energy (Practical Training)**

(of Module: Renewable Energy)

Course Type	Practical Training	Form of Learning	Presence
Mandatory Attendance	yes	ECTS Credit Points	1
Participation Limit		Semester Hours per Week	1
Group Size	12	Workload (hours)	30
Teaching Language	English	Presence Hours	15
Study Achievements ("Studienleistung", SL)	Practical Training	Self-Study Hours	15
SL Length (minutes)		SL Grading System	Pass
The following section is filled on	ly if there is a course-s	specific exam.	
Exam Type		Exam Language	
Exam Length (minutes)		Exam Grading System	
Learning Outcomes			
Participation Prerequisites			
The previous section is filled on	y if there is a course-s	pecific exam.	
Contents	During the practical trainings, students apply what they have learned in the lecture to selected tasks and application scenarios, e.g. analyzing the behavior of photovoltaic systems and wind turbines, performing a grid integration study		
Literature	See lecture.		
Remarks			

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