

Course name: Renewable Energy Sources in Rural Areas

ECTS	6.0
Course status	<i>facultative</i>
Course final assessment /evaluation of outcomes	<i>Exam / graded credit</i>
Prerequisite	<i>Basics of physics</i>

Main field of study: Environmental Engineering

Educational profile	<i>General academic</i>
Code of studies and education level	<i>master of thesis</i>
Semester of studies	<i>winter or summer</i>
Language of instruction	<i>English</i>

Course offered by:

Name of faculty offering the course	Environmental Engineering and Land Surveying
Name of department offering the course	Department of Rural Building
Course coordinator	Jan Radoń, Ph.D., Agnieszka Sadłowska, Ph.D.

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
RES_K1	<i>how to use the solar (thermal and photovoltaic), hydroelectric, wind, geothermal energy, as well as energy from biomass; issues relevant to energy efficiency and energy storage; the potential of using renewable energy technologies as a complement to, and, to the extent possible, replacement for conventional technologies; economical, social, environmental and political conditions as well as strategies for enhancing the future use of renewable energy resources.</i>	<i>IS2_W05 IS2_W12 IS2_W17</i>	<i>T</i>
SKILLS – student is able to:			
RES_S1	<i>design and calculate parameters of systems absorbing and transforming renewable energy.</i>	<i>IS2_U05 IS2_U11</i>	<i>T</i>
SOCIAL COMPETENCIES – student is ready to:			
RES_C1	<i>correctly identify and resolve dilemmas related to engineering activities and is aware of the importance of social and ethical aspects in this activity</i>	<i>IS2_K04</i>	<i>T</i>

Teaching contents

Lectures:	15 hours
Topics	<ol style="list-style-type: none"> 1. Solar Thermal Energy (3 hours). 2. Photovoltaics (2 hours). 3. Wind Energy (2 hours).

	<ol style="list-style-type: none"> 4. Biomass (2 hours). 5. Hydropower (2 hours). 6. Wave Energy (2 hours). 7. Geothermal Energy (2 hours).
Accomplished learning outcomes	RES_K1, RES_C1
Means of verification, rules and criteria of assessment	Single-choice test, positive assessment should be given at least 50% of correct answers to given questions: <50% – insufficient (2.0); 50–60% – sufficient (3.0); 61–70% – satisfactory plus (3,5); 71–80% – good (4.0); 81–90% – good plus (4,5); 91–100% – very good (5.0). The share of the lecture grade in the final grade is 50%.
Seminars:	30 hours
Topics	<ol style="list-style-type: none"> 1. Design and basic energy and economy calculations of solar system for water heating. 2. Technical and economical analysis of photovoltaic's facility on the basis of exemplary case. 3. Analysis of economical and environmental impact of wind farm based on polish and EU examples. 4. Analysis of substitution of traditional energy sources with biomass for heating of house in rural areas. Applying of "BIOB Calculator" software for calculations. 5. Visit to hydropower plant. 6. Visit to geothermal plant/facility. 7. Review, quiz.
Accomplished learning outcomes	RES_S1
Means of verification, rules and criteria of assessment	Passing quiz – a grade from exercises is an arithmetic average of formative grades. The share of the grade for the project exercises in the final grade of the subject is 50%.

References:

Basic	<ol style="list-style-type: none"> 1. Solway A. 2009. <i>Renewable Energy Sources</i>. Heinemann-Raintree Inc., USA, pp. 223. 2. Kemp W., H. 2006. <i>The Renewable Energy Handbook</i>. Aztext Press, USA, pp. 321. 3. Craddock D. <i>Renewable Energy Made Easy</i>. Atlantic Publishing Group, Inc., USA, pp. 287.
Supplementary	<ol style="list-style-type: none"> 1. Wengenmayr R., Bührke Th. 2013. <i>Renewable Energy: Sustainable Concepts for the Energy Change</i>, Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim. 2. <i>Renewable Energy</i>. ICAR e-Course for B.Sc (Agriculture) and B. Tech (Agriculture) (www.Agrimoon.Com) 3. Zoba A. F., Bansal R. 2011. <i>Handbook of renewable energy technology</i>, World Scientific Publishing.

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	0.0 ECTS **
Area of academic study: T – technical sciences	6.0 ECTS**

Structure of student activity

Contact hours	57	hrs.	2.3	ECTS**
Including: lectures	15	hrs.		
classes and seminars	30	hrs.		
consultations	10	hrs.		
participation in research	0	hrs.		
obligatory traineeships	0	hrs.		
participation in examination	2	hrs.		
e-learning	0	hrs.	0.0	ECTS**
student own work	93	hrs.	3.7	ECTS**

*Areas of academic study in the fields of: A – the arts; H – humanities; M – medical, sport and health sciences; N – natural sciences; P – biological sciences; R – agricultural, forestry and veterinary sciences; S – social studies; T – engineering and technology

** stated with an accuracy to 0.1 ECTS, where 1 ECTS = 25–30 hours of classes