

1.1 Mathematics

SYLABUS DO PRZEDMIOTU							
Field of studies: BIOTECHNOLOGY							
Course title / Nazwa przedmiotu (j. polski)				Code of the course		Year / Semester	
<i>Energy Policy / (Polityka Energetyczna)</i>				Nie uzupełniać		I	01
Type of subject:		Education Profile		The level of education		Form of studies	
obligatory		General Academic		First/Second cycle studies		stationary	
Type of subject							ECTS
Lecture	Exercises	Laboratory	Project	Seminar	Practical classes	Exam	
30	-	-	-	15			6
Subject coordinator:							
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I. SUBJECT CARD	
COURSE OBJECTIVE	
C01	Providing information on energy sources and conversion technologies
C02	Getting acquainted with fundamentals of energy management policy and its effect on global economy and Earth's environment
PRELIMINARY COURSE REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES	
1	Fundamentals of Mathematics and Physics
2	Fundamentals of Environmental Sciences and Social Sciences
LEARNING OUTCOMES	
Knowledge: student knows and understands	
EU1	Fundamental aspects of energy resources (also strategic ones) and energy conversion technologies
Skills: student is able to	
EU2	Discuss the basic issues of energy safety, policy, global interrelations and possible danger/threats
Social competences: Student is ready to	
EU3	Discuss and assess the effects of energy management policy on world's economy and environmental issues

II. COURSE CONTENT		
Course type – Lecture		Number of hours
L1-2	Introduction to energy issues – fundamentals and definitions. Energy, Exergy, Entropy. Heat, Chill and Power – needs and current production technologies and applications. CHP and chill. District heating systems.	2
L3-4	The structure and distribution of energy resources. Energy sources – renewable and non-renewable ones. Effects of geography, history, politics and future development perspectives.	2
L5-6	World industry and market. The consequences of lack of feedstock. The control of strategic resources – fossil, renewables, rare earth elements.	2
L7-8	Problems of handling, transportation and storage of gases, liquids and solids. Materials and safety. Control and measurement technologies.	2
L9-10	Energy safety – the importance and affecting factors. The country assets and means to formulate and control energy supply routes. Scenarios of energy policies for county, region and state level.	2
L11-13	Climate and energy policy in the international context. Energy safety of some selected countries (resources, production of strategic substrates, import/export, goals, interests, global politics & threats): USA, EU, Russia, China, India, Iran, Asia, Africa, South America, Australia, Scandinavia. Past, present and future.	3
L14-15	Diversification of supply and development of network infrastructure for fuel supply. Past and current priorities of energy policy for Poland.	2
L16-17	Development of energy market. The risks in the fuel and energy sectors. Companies on the open energy market. Energy safety & supply security for Poland. Optimal use of own energy resources and import/export.	2
L18-19	Electrification – opportunities and threats. Biofuels and EV market. Expansion of electricity generation and grid infrastructure. Cross-boundary issues.	2
L20-23	Resources and environmental issues: fuels, waste, UPS. Climate change (water, soil, atmosphere), wildlife, oceans. Wellbeing. Identification of unwanted substances and contaminants. Uncontrolled fires. Batteries reuse and PV. Safety issues. Recycling and circular economy.	4
L24-27	Energy efficiency and storage. Innovations. Future perspective technologies. Intelligent energy management systems. Modern buildings. Intelligent agriculture. Biomass harvesting and processing. Synthetic fuels. Nanosolids and doping. Fusion and tokamaks. Nuclear power and hydrogen.	4
L28-29	World, EU's and PEP until 2040. Policy update and monitoring. Financial framework and multi-year planning within the current political situation. Perspectives for the energy business. Urban mining. Space mining and exploration – opportunities and threats.	2

L30	Test	1
TOTAL:		30
Course type - Seminar		Number of hours
S1	Introduction. Scope and rules during the activities. Presentation of the topics to deal with and prepare by the students.	1
S2-14	Individual students' presentations and discussions on selected current topics associated with energy policy.	13
S15	Discussion, summary of student's performance, Evaluation of students' performances and seminar credit.	1
TOTAL:		15

DIDACTIC METHODS	
1.	Multimedia presentations
2.	Blackboard
3.	Literature resources: papers and reports

METHODS OF ASSESSMENTS: (F – FORMATIVE; P – SUMMATIVE)	
F01	Activity and discussion during class hours
F02	Evaluation of activities during seminars
F03	
P01	Test
P02	Evaluation of seminar presentations
P03	

III. STUDENT WORKLOAD		
L.p.	Form of activity	Numer of hours for activity
		[hours]
1. direct teaching hours:		
1.1	Hours of classes organised by university – lectures	30
1.2	Hours of classes organised by university – tutorials	0

1.3	Hours of classes organised by university – laboratory	0
1.4	Hours of classes organised by university – project	0
1.5	Hours of classes organised by university – seminar	15
1.6	Test	2
1.7	Exam	0
1.8	Consultation hours	15
Total direct hours:		62
2. Praca własna studenta		
2.1	Preparation for tutorials	15
2.2	Preparation for laboratories	0
2.3	Preparation for projects	0
2.4	Preparation for final lectures colloquium	15
2.5	Preparation for exam	0
2.6	Getting acquainted with the indicated literature & seminar work	60
Total student's self-studies:		90
Overall student workload:		152
TOTAL NUMBER OF ECTS FOR THE COURSE:		6
The number of ECTS credits which the student obtains from classes requiring direct participation of the teacher:		2.5
Number of ECTS credits to be obtained by the student through own work:		3.5

IV. PRIMARY AND SUPPLEMENTARY LITERATURE		
Primary literature		
1	Ghosh T., Prelas M., Energy Resources and Systems, Volume 2: Renewable Resources, Springer, 2011	
2	Ginley D., Cahen D., Fundamentals of Materials for Energy and Environmental Sustainability, Cambridge University Press, 2012, ISBN online No.: 9780511718786	
3	Ghosh T., Prelas M., Energy Resources and Systems: Volume 1, Springer, 2009, doi:10.1007/978-90-481-2383-4	
4	Papers and journals in Digital Libraries, particularly: International Journal of Energy Economics and Policy, PEI, Time, Energy Policy Journal, Resources, Applied Energy, Progress in Energy and Combustion Science, Fuel Processing Technology.	
5	Current and updated reports and other materials – both commercial, as well as educational	
Supplementary literature		

V. LEARNING OUTCOMES ATTAINMENT MATRIX							
Learning outcomes	In relation to the learning outcomes specified for the field of study	In relations to the learning outcomes to characteristic I and second level PRK		Objectives subject	Content of programme	Teaching tools	evaluation methods
		universal	In technical sciences and leading to engineering competence				
EU1							
EU2							
EU...							

VI. FORMS OF GRADES-DETAILS	
GRADES	EFFECTS OF LEARNING
	EU1
2,0	
3,0	
4,0	
5,0	
	EU2
2,0	
3,0	
4,0	
5,0	
	EU3
2,0	
3,0	
4,0	
5,0	
A half mark of 3.5 is given if the student has fully passed the learning outcomes with a mark	

of 3.0 but has not fully assimilated the learning outcomes with a mark of 4.0 .

A half mark of 4.5 is given in case of full credit of the LEARNING EFFECTS for a mark of 4.0 but the student has not fully assimilated the LEARNING EFFECTS for a mark of 5.0

VII. OTHER USEFUL INFORMATION ABOUT THE SUBJECT

1. Opportunity to review supporting materials and literature:

Appropriate to the type of material - in teaching classes, in the TUC Central Library.

2. Information on when and where the classes will be held

Notice board at the Faculty of Infrastructure and Environment and on the website of the Faculty of Infrastructure and Environment, MSz USOS system.

3. Information about the consultation (times + place):

The staff consultation schedule and place is available on the website of the Faculty of Infrastructure and Environment. Both P2P and on-line consultations are possible.