MODULE DESCRIPTION

Module code	full-time studies:	**Z-ZIP1-E-204**
	part-time studies:	**Z-ZIPN1-E-204**
Module name	**Physics II**	
Module name in Polish	**Fizyka II**	
Valid from academic year	**2019/2020**	

MODULE PLACEMENT IN THE SYLLABUS

Field of study	**MANAGEMENT AND PRODUCTION ENGINEERING**
Level of education	**1st degree**
Studies profile	**General**
Form and method of conducting classes	**Full-time and Part-time**
Specialisation	**All**
Unit conducting the module	**Department od Mathematics and Physics**
Module co-ordinator	**Medard Makrenek, PhD, DSc**
Approved by:	**Dariusz Bojczuk, PhD, DSc**

MODULE OVERVIEW

Type of subject / group of subjects	**Basic**
Module status	**Compulsory**
Language of conducting classes	**English**
Module placement in the syllabus - semester	**Semester II**
Initial requirements	**No requirements**
Examination (YES/NO)	**NO**
Number of ECTS credit points	**3**

Method of conducting classes		**Lecture**	**Classes**	**Laboratory**	**Project**	**Other**
Per semester	full-time studies:	**15**	**15**	**15**		
	part-time studies:	**9**	**9**	**9**		

TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Category	Symbol	Learning outcomes	Assignations to the directional learning outcomes
Knowledge	W01	A student has knowledge of principles of thermodynamics, ideal gas model, as well as knowledge about necessary mathematical methods such as calculus and differential equations.	ZIP1_W02
	W02	A student has knowledge of Brownian motion and thermodynamical paradoxes.	ZIP1_W02
	W03	A student has knowledge about temperature scales.	ZIP1_W02
Skills	U01	A student is able to analyse simple thermodynamic processes, uses the ideal gas equation of state.	ZIP1_U17
	U02	A student is able to analyse all thermodynamical processes.	ZIP1_U17
	U03	A student is able to compute entropy.	ZIP1_U17
	U04	A student is able to estimate usefulness of thermodynamic analysis to solve simple thermodynamical problems.	ZIP1_U19
	U05	A student applies the principles and regulations of occupational health and safety	ZIP1_U16
Social competences	K01	A student understands the need of permanent follow-up of her/his knowledge of foundations of physics.	ZIP1_K01

TEACHING CONTENTS

Method of conducting classes	Teaching contents
Lecture	General information, elements of vector calculus, basic notions of classical thermodynamics and statistical physics. Irreversible processes and ideal gas model. Fluctuations and Brownian motion, examples. Mean free path. Principles of thermodynamics. Entropy. The Clapeyron equation. Thermodynamical paradoxes, examples.
Classes	Repetitions of vector calculus. Thermodynamical paradoxes, examples. State of equilibriursible processes.mas the most probable state. Irreversible processes. Assumptions of the ideal gas model. Fluctuations. Brownian motions. Maen free path. The zeroth law of thermodynamics. Absolute scale of temperature. The first law of thermodynamics. Entropy.

Laboratory	Introduction to the calculus of errors. Mechanical Laboratory (two laboratory exercises to choose from): – Study of uniformly varying motion using the Atwood machine – Determination of the Young's modulus – Determination of the Cp / Cv ratio by the Clement Desormes method – Determination of the specific heat of solids, determination of the heat of melting of ice – Hooke's Law. Harmonic oscillations – Determining the acceleration of gravity with the help of Kater's physical pendulum – Determination of the viscosity coefficient of liquids using a Hoppler viscometer

METODS OF ASSESSING TEACHING RESULTS

Symbol	Methods of checking the learning outcomes *(select X)*					
	Oral exam	Written exam	Test	Project	Statement	Other
W01			X			
W02			X			
W03			X			
U01			X			X
U02			X			X
U03			X			X
U04			X			X
U05			X			X
K01			X			X

FORM AND CONDITIONS OF PASSING

Form of classes	Form of credit	Passing conditions
Lecture	Credit with grade	Obtaining at least 50% of test points during the class.
Classes	Credit with grade	Obtaining at least 50% of test points during the class.
Laboratory	Credit with grade	Obtaining a positive evaluation from six laboratory exercises

STUDENT WORKLOAD

Balance of ECTS points												
No.	Type of student's activity	Student's workload										Unit
		full-time					part-time					
1.	Participation in the activities	Lc	C	Lb	P	O	Lc	C	Lb	P	O	h
		15	15	15			9	9	9			
2.	Other (consultation, exam)	2	2	2			2	2	2			h
3.	**Number of hours of a student's assisted work**	**51**					**33**					h
4.	**Number of ECTS credit points which are allocated for assisted work**	**2,0**					**1,3**					ECTS
5.	**Number of hours of a student's unassisted work**	**24**					**42**					h
6.	**Number of ECTS credit points which a student receives for unassisted work**	**1,0**					**1,7**					ECTS
7.	**Work input connected with practical classes**	**50**					**50**					h
8.	**Number of ECTS credit points which a student receives for practical classes**	**2,0**					**2,0**					ECTS
9.	**Total number of hours of a student's work**	**75**					**75**					h
10.	**Punkty ECTS za moduł** *1 ECTS=25 hours*	**3**										ECTS

LITERATURE

1. Brown R.G. (2013), *Introductory Physics I - Elemenytary Mechanics*, Durham USA.
2. Tripler P.A., Llewellyn R.A. (2008), *Modern physics*, W. H. Freman and Company, New York USA (https://web.pdx.edu/~pmoeck/books/Tipler_Llewellyn.pdf)
3. *Physics - High school* (2020), OpenStax Rice University, Houston USA (https://d3bxy9euw4e147.cloudfront.net/oscms-prodcms/media/documents/Physics-WEB_Sab7RrQ.pdf)