



Uchwała nr 2072
Senatu Uniwersytetu w Białymstoku
z dnia 31 maja 2017 r.

w sprawie prowadzenia przez Wydział Fizyki kierunku fizyka w formie stacjonarnej w języku angielskim, na poziomie studiów pierwszego stopnia, o profilu ogólnoakademickim oraz określenia dla tego kierunku efektów kształcenia

Na podstawie § 24 ust. 2 pkt 11 Statutu Uniwersytetu w Białymstoku Senat Uniwersytetu w Białymstoku uchwała, co następuje:

§ 1


1. Senat Uniwersytetu w Białymstoku wyraża zgodę na prowadzenie przez Wydział Fizyki, począwszy od roku akademickiego 2017/2018, kierunku *fizyka*, na poziomie studiów pierwszego stopnia o profilu ogólnoakademickim, w formie stacjonarnej w języku angielskim.
2. Senat Uniwersytetu w Białymstoku określa efekty kształcenia w języku angielskim, obowiązujące od roku akademickiego 2017/2018, dla kierunku *fizyka* na poziomie studiów pierwszego stopnia o profilu ogólnoakademickim. Opis efektów kształcenia stanowi Załącznik do niniejszej Uchwały.

§ 2

1. W Uchwale nr 1545 Senatu Uniwersytetu w Białymstoku z dnia 26 marca 2014 r. *w sprawie określenia efektów kształcenia dla kierunku studiów prowadzonych w językach obcych w Uniwersytecie w Białymstoku* wprowadza się następującą zmianę:
 - Załącznik Nr 1 do Uchwały nr 1545 Senatu Uniwersytetu w Białymstoku z dnia 26 marca 2014 r. uchyla się.
2. W Uchwale nr 1546 Senatu Uniwersytetu w Białymstoku z dnia 26 marca 2014 r. *w sprawie prowadzenia przez Uniwersytet w Białymstoku kształcenia w językach obcych* wprowadza się następującą zmianę:
 - § 1 pkt 1 uchyla się.
3. Traci moc Uchwała nr 1585 Senatu Uniwersytetu w Białymstoku z dnia 28 maja 2014 r. w sprawie zmian w Uchwale nr 1545 Senatu Uniwersytetu w Białymstoku z dnia 26 marca 2014 r. *w sprawie określenia efektów kształcenia dla kierunku studiów prowadzonych w językach obcych w Uniwersytecie w Białymstoku*.

§ 3

Uchwała wchodzi w życie z dniem podjęcia.

Przewodniczący
Senatu Uniwersytetu w Białymstoku

Dr hab. Robert W. Ciborowski, prof. UwB

LEARNING OUTCOMES

Field of study: Physics first degree study programme – general academic

Field of study in area of education

The field of study Physics falls within an area of education referring to science described in the Polish Qualifications Framework in the European Higher Education Area, in accordance with the provisions of the Act of 27 July 2005 – Law on Higher Education. The field of study belongs to the area of physical sciences with elements applied in appropriate branches of services or industrial production. In the range of technical applications of physics, the education is provided in cooperation with the staff of business entities on basis of agreement with the University of Białystok.

Explanation of the symbols used:

K_XNN – learning outcomes for the field of study, where XNN is:

W – category of knowledge,

U – category of skills,

K – category of social competence,

01, 02, 03 and subsequent – number of the learning outcome.

P6S_XX – learning outcomes in the field of education in sciences for first degree study programme (level 6) according to the Polish Qualification Framework.

XX are:

WG – category of knowledge-depth and scope, **WK** – category of knowledge-context, **UW** – category of skills-using knowledge, **UK** – category of skills-communication, **UO** – category of skills-organising work, **UU** – category of skills-learning, **KK** – category of social competence-evaluation, **KO** – category of social competence-responsibility, **KR** – category of social competence-professional role.

Symbol	DESCRIPTION OF LEARNING OUTCOMES FOR THE FIELD OF STUDY Following the completion of the first degree studies in <i>Physics</i> a graduate:	Reference to learning outcomes in area of education in the field of sciences
KNOWLEDGE		
with the reference to physics and methodology of physical sciences		
K_W01	understands fundamental meaning of physics in technological, economic and civilization development	P6S_WG
K_W02	understands the role of a quantitative model of a physical object and physical phenomenon within the framework of basic areas of physics	P6S_WG
K_W03	becomes aware of the importance of an experiment as a verification means of theoretical concepts as well as experimental uncertainty	P6S_WG
K_W04	understands the structure of physics as a scientific discipline, becomes aware of connections between certain domains and theory, knows examples of faulty physical hypotheses and faulty physical theories	P6S_WG
K_W05	knows limitations of applications of chosen physical theories, models of physical objects and descriptions of physical phenomena	P6S_WG
with the reference to tools of mathematics		
K_W06	has mathematical knowledge , including differential and integral calculus, algebra as well as probability theory and statistics necessary to describe laws of physics, to model and to study selected physical systems and to analyse experimental data	P6S_WG
K_W07	understands the formal structure of basic physical theories, can use proper mathematical tools for quantitative description of phenomena from chosen areas of physics	P6S_WG

with the reference to foundations of physics		
K_W08	has knowledge within the framework of basic concepts and formalism of classical mechanics , laws of mechanics and theoretical models of chosen mechanical systems, understands fundamental character of Newton's laws	P6S_WG
K_W09	knows ways of experimental verification of physical laws and concepts, knows construction and operation rules of measuring apparatus for selected experiments regarding mechanics	P6S_WG
K_W10	knows and understands basic concepts and selected phenomena regarding electricity and magnetism – understands contents of Maxwell field equations	P6S_WG
K_W11	knows ways of experimental verification of physical laws and concepts, knows construction and operation rules of measuring apparatus for selected experiments regarding electricity and magnetism	P6S_WG
K_W12	has knowledge of basic concepts, phenomena and formalism of thermodynamics, laws of thermodynamics as well as theoretical models of chosen thermodynamic systems	P6S_WG
K_W13	knows construction and operation rules of measuring apparatus for selected experiments regarding thermodynamics	P6S_WG
K_W14	has knowledge of basic concepts and formalism of optics and physics of electromagnetic wave phenomena and theoretical models of selected optical and wave systems, knows and understands limitations of their applications	P6S_WG
K_W32	has basic knowledge of theory of electromagnetic radiation , knows theoretical approach to selected problems regarding the theory of radiation and chosen mathematical tools for their analysis in the range provided by the curriculum of a major	P6S_WG
K_W15	knows ways of experimental verification of physical laws and concepts, knows construction and operation rules of measuring apparatus for selected experiments regarding optics and physics of electromagnetic wave phenomena	P6S_WG
K_W16	has basic knowledge regarding atomic physics, molecule, solid-state physics, physics of atomic nuclei, elementary particles and basic interactions in nature	P6S_WG
K_W17	knows ways of experimental verification of physical laws and concepts, knows construction and operation rules of measuring apparatus for selected experiments regarding physics of microcosm	P6S_WG
K_W18	has basic knowledge of astronomy and knows the rules of astronomical observations in the range provided by the curriculum of a major	P6S_WG
K_W19	understands the structure of physics as a scientific discipline, acquires awareness of individual connections between particular fields of physics and physical theories in the range provided by the curriculum of a major	P6S_WG
with the reference to elements of theoretical physics		
K_W20	has knowledge of foundations of theoretical mechanics , knows theoretical approaches to the chosen problems and formulation of mechanics in the range provided by the curriculum of a major	P6S_WG
K_W21	has knowledge of foundations of classical electrodynamics , knows theoretical approaches to the chosen problems within it as well as mathematical tools for analysis in the range provided by the curriculum of a major	P6S_WG
K_W22	has knowledge of foundations of quantum mechanics , formalism and probabilistic interpretation of the theory, knows a theoretical description as well as mathematical tools for analysis of chosen quantum systems	P6S_WG
with the reference to tools of information technology		
K_W23	knows the rules of operating systems usage and the package of selected specialist application software, including environments for data analysis and symbolic computation	P6S_WG
K_W24	has basic knowledge of algorithmics and data structures	P6S_WG
K_W25	knows foundations of programming in a chosen high-level programming language	P6S_WG
K_W26	knows foundations of numerical methods used in issues of physics and their applications	P6S_WG
with the reference to technical applications of physics		
K_W27	knows construction and understands physical foundations of operations of selected analogue and digital electronic sub-assemblies in the range covered by the curriculum of a chosen major	P6S_WG
K_W28	knows the construction of selected electronic measuring devices and understands their rules of operation in the range covered by the curriculum of a chosen major	P6S_WG
K_W33	has basic knowledge of related disciplines, appropriate for a chosen major and knows their relations to physics	P6S_WG

K_W34	knows construction and operational rules of selected electronic measuring devices as well as diagnostic devices appropriate for a chosen major in the range covered by the curriculum of a chosen major	P6S_WG
K_W35	knows basic rules of metrology and its application in the range covered by the curriculum of a chosen major	P6S_WG
K_W36	has knowledge allowing to model and simulate chosen physical phenomena as well as properties of physical matter in the range provided by the curriculum of a chosen major	P6S_WG
K_W37	knows the supervision rules of contemporary devices used in research laboratories and the ones connected with selected applications of physics in the range covered by the curriculum of a chosen major	P6S_WG
moreover		
K_W38	knows the rules of protection of chosen devices against undesirable environmental impact and the rules of environmental protection against the influence of devices in the range covered by the curriculum of a chosen major	P6S_WG P6S_WK
K_W29	knows the basic rules of health and safety in laboratories corresponding to a chosen major	P6S_WK
K_W30	has basic knowledge of ethical and legal aspects of scientific and educational activity connected with practical applications of scientific achievements, including the basics of patent law in the range provided by the curriculum of a chosen major	P6S_WK
K_W39	has basic knowledge of ethical and legal aspects connected with practical applications of physics in industrial production, including non-disclosure rules and protection against competition in the range provided by the curriculum of a chosen major	P6S_WK
K_W31	knows the rules of individual entrepreneurship and commercialization of used research results	P6S_WK
SKILLS		
with the reference to structures of physics and methodology of physical sciences		
K_U01	can intelligibly present basic facts regarding known areas of physics, outline the structure of physics as a scientific discipline and show the impact of selected discoveries in the field of physics on development of technology, economy and civilization	P6S_UK
K_U02	can prepare a study, including the one addressed to wide public, regarding research in the scope of known areas of physics, using acquired knowledge as well as literature and information technology resources	P6S_UK
with the reference to tools of mathematics		
K_U03	can use known tools of mathematics to formulate and solve chosen problems within the framework of theoretical and experimental physics	P6S_UW
K_U04	can independently complete and broaden mathematical knowledge	P6S_UU
K_U05	can use computer tools for symbolic computation	P6S_UW

with the reference to foundations of physics		
K_U06	can analyse problems in the scope of mechanics , find and present their solutions on basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	P6S_UW
K_U07	can plan and do simple experiments referring to mechanics , critically analyse their results and present them	P6S_UO
K_U08	can analyse problems regarding electricity and magnetism , find and present their solutions on basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	P6S_UW
K_U09	can plan and do simple experiments referring to electricity and magnetism, critically analyse their results and present them	P6S_UO
K_U10	can analyse problems regarding thermodynamics , find and present their solutions on basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	P6S_UW
K_U11	can plan and do simple experiments referring to thermodynamics, critically analyse their results and present them	P6S_UO
K_U12	can analyse problems regarding optics and physics of wave phenomena , find and present their solutions on basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	P6S_UW

K_U13	can plan and do simple experiments referring to optics and physics of wave phenomena, critically analyse their results and present them	P6S_UO
K_U14	can analyse problems regarding microscopic structure of matter , find and present their solutions on basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	P6S_UW
K_U15	can plan and do simple experiments referring to the physics of microcosm , critically analyse their results and present them	P6S_UO
K_U16	can clearly present basic problems referring to astronomy and astrophysics , make basic astronomical observations and interpret their results in the range provided by the curriculum of a chosen major	P6S_UW
K_U17	can critically and with understanding use literature and information technology resources with the reference to foundations of physics	P6S_UU
with the reference to elements of theoretical physics		
K_U18	can present theoretical formulation of chosen issues of classical mechanics and run theoretical analysis of selected phenomena using suitable mathematical tools in the range provided by the curriculum of a chosen major	P6S_UW
K_U19	can present theoretical formulation of chosen issues of classical electrodynamic and run theoretical analysis of selected phenomena using suitable mathematical tools in the range provided by the curriculum of a chosen major	P6S_UW
K_U20	can present theoretical formulation of chosen issues of quantum mechanics , and run theoretical analysis of selected quantum systems using suitable mathematical tools in the range provided by the curriculum of a chosen major	P6S_UW
K_U21	can critically and with understanding use literature and information technology resources with the reference to issues of theoretical physics in the range provided by the curriculum of a chosen major	P6S_UU
with the reference to tools of information technology		
K_U22	can work in the environment of different operating systems and use selected application software	P6S_UW
K_U23	can write a simple computer programme in a chosen programming language, compile it and start it	P6S_UW
K_U24	can use computer programmes to solve physics and mathematical problems, data analysis as well as symbolic and numerical calculations	P6S_UW
K_U25	can find and use specialist computer software in the internet resources with respect for intellectual property and rules of use	P6S_UU P6S_WK

with the reference to technical applications of physics		
K_U26	can plan and do simple experiments referring to electronics, critically analyse their results and present them in the range provided by the curriculum of a chosen major	P6S_UW
K_U27	can critically and with understanding use literature and the internet resources with the reference to issues of electronics in the range provided by the curriculum of a chosen major	P6S_UU
K_U30	can analyse chosen problems regarding selected applications of physics on basis of the knowledge of physics and related disciplines in the range covered by the curriculum of a chosen major	P6S_UW
K_U31	can come to an agreement and cooperate with the staff of a business entity participating in the process of education in the scope of chosen issues referring to its activity in the range covered by the curriculum of a chosen major	P6S_UK
K_U32	can present operation rules as well as identify and assess dangers connected with the use of selected laboratory and diagnostic devices in the range covered by the curriculum of a chosen major	P6S_UW
K_U33	can identify and eliminate events potentially dangerous for laboratory and diagnostic devices in the range covered by the curriculum of a chosen major	P6S_UW
K_U34	can plan and take simple measurements of values specific to selected phenomena and physical properties of chosen bodies in the range covered by the curriculum of a chosen major	P6S_UO
K_U35	can optimally choose a set of tools for a measurement task in the range covered by the curriculum of a chosen major	P6S_UW
K_U36	can identify and analyse environmental dangers for selected devices and corresponding dangers for the environment in the range covered by the curriculum of a chosen major	P6S_UW

K_U37	can analyse a chosen problem referring to applications of physics on basis of the internet and literature resources and present a way of its solution in the form of a concise study in the range covered by the curriculum of a chosen major	P6S_UK P6S_UU
moreover		
K_U28	can use English at the upper-intermediate level (B2)	P6S_UK
K_U29	can use English sources of knowledge with the reference to physical sciences and their applications	P6S_UK
SOCIAL COMPETENCES		
K_K01	knows the limitations of their knowledge and understands the need of further learning, raising professional, personal and social skills	P6S_UU P6S_KK
K_K02	can work in a team performing various roles, especially a leadership role, can take responsibility for realization of a group task	P6S_UO
K_K03	understands the meaning of intellectual honesty in their own actions and actions of other people	P6S_KR
K_K04	understands the need to share knowledge, including the need of widespread presentation of achievements of physics	P6S_UK
K_K05	can independently find information in literature and the internet resources, also in foreign languages	P6S_UU
K_K06	can express opinions about fundamental issues of physics and its applications, understands social aspects of applications in physics and responsibility connected with it	P6S_KR
K_K07	can think and act in an entrepreneurial manner	P6S_KO

Remarks: There is a correspondence between Polish and English translated version of codes of the Polish Qualification Framework.

L6H_XX – learning outcomes in the field of education in sciences for first degree study programme (level 6) according to the Polish Qualification Framework.

XX are:

KS – category of knowledge-depth and scope, **KX** – category of knowledge-context, **SU** – category of skills-using knowledge, **SC** – category of skills-communication, **SO** – category of skills-organising work, **SL** – category of skills-learning, **CE** – category of social competence-evaluation, **CR** – category of social competence-responsibility, **CP** – category of social competence-professional role.