



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 kierunków studiów prowadzonych w językach obcych w Uniwersytecie w Białymstoku

Na podstawie art. 11 ustawy z dnia 27 lipca 2005 r. Prawo o szkolnictwie wyższym (t.j. Dz. U. z 2012 r., poz. 572, z późn. zm.), w związku z rozporządzeniem Ministra Nauki i Szkolnictwa Wyższego z dnia 2 listopada 2011 r. w sprawie *Krajowych Ram Kwalifikacji dla Szkolnictwa Wyższego* (Dz. U. Nr 253, poz. 1520), uchwała się, co następuje:

§ 1

W Uchwale nr 1545 Senatu Uniwersytetu w Białymstoku z dnia 26 marca 2014 r. w sprawie *określenia efektów kształcenia dla kierunków studiów prowadzonych w językach obcych w Uniwersytecie w Białymstoku* Załącznik nr 1 otrzymuje brzmienie określone w Załączniku do niniejszej Uchwały.

§ 2

Uchwała wchodzi w życie z dniem podpisania.

Przewodniczący
Senatu Uniwersytetu w Białymstoku

Prof. dr hab. Leonard Etel

LEARNING OUTCOMES
Field of study: Physics
first degree study programme – practical education

Field of study in the area of education

The field of study Physics falls within an area of education referring to science described in National Qualification Frameworks in the European Higher Education Area, stated in the regulations issued pursuant to the art. 9 sec. 1 point 2 of the Act of 27 July 2005 – Law on Higher Education (i.e. Journal of Laws of 2012 item 572, as amended). 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 the basis of agreement with the University of Białystok.

Explanation of the symbols used:

K (before bottom hyphen) – learning outcomes for the field of study

W – category of knowledge

U – category of skills

K (after bottom hyphen) – social competences category

X1P – learning outcomes in the field of education in science for first degree study programme

01, 02, 03 and subsequent – number of a learning outcome

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 the area of education in the field of science
KNOWLEDGE		
K_W01	understands fundamental meaning of physics in technological, economic and civilization development	X1P_W01
K_W02	understands the role of a quantitative model of a physical object and physical phenomenon within the framework of basic areas of physics	X1P_W03
K_W03	becomes aware of the importance of an experiment as a verification means of theoretical concepts as well as experimental uncertainty	X1P_W01
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	X1P_W01
K_W05	knows limitations of applications of chosen physical theories, models of physical objects and descriptions of physical phenomena	X1P_W01
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	X1P_W02
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	X1P_W02 X1P_W03

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	X1P_W01 X1P_W03
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	X1P_W05
K_W10	knows and understands basic concepts and selected phenomena regarding electricity and magnetism – understands contents of Maxwell equations	X1P_W01 X1P_W03
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	X1P_W05
K_W12	has knowledge about basic concepts, phenomena and formalism of thermodynamics , laws of thermodynamics as well as theoretical models of chosen thermodynamic systems	X1P_W01 X1P_W03
K_W13	knows construction and operation rules of measuring apparatus for selected experiments regarding thermodynamics	X1P_W05
K_W14	has knowledge about 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	X1P_W01 X1P_W03
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	X1P_W05
K_W16	has basic knowledge regarding atomic physics, molecule, solid-state physics, physics of atomic nuclei, elementary particles and basic interactions in nature	X1P_W01 X1P_W03
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	X1P_W05
K_W18	has basic knowledge about related disciplines, appropriate for a chosen major and knows their relations to physics	X1P_W01 X1P_W03
K_W19	has basic knowledge about the 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 chosen major	X1P_W01 X1P_W02 X1P_W03
K_W20	has knowledge about 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 in the range provided by the curriculum of a chosen major	X1P_W01 X1P_W02 X1P_W03
K_W21	has basic knowledge in the range of physics and related disciplines necessary for applications covered by the curriculum of a chosen major	X1P_W01 X1P_W05
K_W22	knows construction and operation rules of selected measuring devices as well as diagnostic devices appropriate for a chosen major	X1P_W05
K_W23	knows basic rules of metrology and its application covered by the curriculum of a chosen major	X1P_W04 X1P_W05
K_W24	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	X1P_W04 X1P_W05
K_W25	knows construction of selected electronic devices taking into consideration applications in the area relating to a chosen major and understands their operation rules	X1P_W01 X1P_W05
K_W26	knows construction and understands physical foundations of operations of selected analogue and digital electronic subassemblies	X1P_W01 X1P_W05

K_W27	knows the supervision rules of contemporary devices used in research laboratories and the ones connected with selected applications of physics	X1P_W01 X1P_W05
K_W28	knows the rules of protection of chosen devices against undesirable environmental impact and the rules of environmental protection against the influence of devices	X1P_W01 X1P_W05 X1P_W06
K_W29	has basic knowledge about ethical and legal conditions 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	X1P_W01 X1P_W05
K_W30	knows the rules of health and safety in laboratories corresponding to a chosen major	X1P_W06
K_W31	knows the rules of operating systems usage and the package of selected specialist application software, including environments for data analysis and symbolic computation	X1P_W04
K_W32	has basic knowledge about algorithmics and data structures	X1P_W04 X1P_W02
K_W33	knows foundations of programming in a chosen high-level programming language	X1P_W04
K_W34	knows foundations of numerical methods used in issues of physics and its applications	X1P_W04
K_W35	knows basic rules of intellectual and industrial property protection including the basics of patent law in the range provided by the curriculum of a major	X1P_W08
K_W36	knows the rules of individual entrepreneurship and commercialization of used research results	X1P_W09
SKILLS		
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	X1P_U06 X1P_U09
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	X1P_U05 X1P_U06 X1P_U08
K_U03	can use known tools of mathematics to formulate and solve chosen problems within the framework of theoretical and experimental physics in the range provided by the curriculum of a major	X1P_U01 X1P_U02
K_U04	can independently complete and broaden mathematical knowledge	X1P_U07
K_U05	can use computer tools for symbolic computation	X1P_U04
K_U06	can analyse problems in the scope of mechanics, find and present their solutions on the basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	X1P_U01 X1P_U02
K_U07	can plan and do simple experiments referring to mechanics, critically analyse their results and present them	X1P_U03
K_U08	can analyse problems regarding electricity and magnetism, find and present their solutions on the basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	X1P_U01 X1P_U02
K_U09	can plan and do simple experiments referring to electricity and magnetism, critically analyse their results and present them	X1P_U03
K_U10	can analyse problems regarding thermodynamics, find and present their solutions on the basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	X1P_U01 X1P_U02
K_U11	can plan and do simple experiments referring to thermodynamics, critically analyse their results and present them	X1P_U03

K_U12	can analyse problems regarding optics and physics of wave phenomena, find and present their solutions on the basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	X1P_U01 X1P_U02
K_U13	can plan and do simple experiments referring to optics and physics of wave phenomena, critically analyse their results and present them	X1P_U03
K_U14	can analyse problems regarding microscopic structure of matter, find and present their solutions on the basis of acquired knowledge and using known tools of mathematics run quantitative analysis and draw qualitative conclusions	X1P_U01 X1P_U02
K_U15	can do simple experiments referring to the physics of microcosm, critically analyse their results and present them	X1P_U03
K_U16	can intelligibly present basic issues regarding related disciplines, covered by the curriculum of a chosen major, do selected experiments and interpret their results	X1P_U01 X1P_U02
K_U17	can critically and with understanding use literature and information technology resources with reference to foundations of physics	X1P_U07
K_U18	can present theoretical formulation of chosen issues of electrodynamics and using appropriate tools of mathematics run theoretical analysis of selected phenomena in the range provided by the curriculum of a major	X1P_U01 X1P_U02
K_U19	can present theoretical formulation of chosen issues of quantum mechanics, and using suitable mathematical tools run theoretical analysis of selected quantum systems in the range provided by the curriculum of a major	X1P_U01 X1P_U02
K_U20	can critically and with understanding use literature and information technology resources with reference to issues of theoretical physics in the range provided by the curriculum of a major	X1P_U07
K_U21	can analyse chosen problems regarding selected applications of physics on the basis of the knowledge of physics and related disciplines	X1P_U01 X1P_U02
K_U22	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	X1P_U06 X1P_K02 X1P_K03
K_U23	can present operation rules as well as identify and assess dangers connected with the use of selected laboratory and diagnostic devices	X1P_U01 X1P_W06
K_U24	can identify and eliminate events potentially dangerous for laboratory and diagnostic devices	X1P_U01 X1P_U03
K_U25	can plan and take simple measurements of values specific to selected phenomena and physical properties of chosen bodies	X1P_U03
K_U26	can optimally choose a set of tools for a measurement task	X1P_U03
K_U27	can identify and analyse environmental dangers for selected devices and corresponding dangers for the environment	X1P_U01 X1P_U03
K_U28	can analyse a chosen problem referring to applications of physics on the basis of the internet and literature resources and present a way of its solution in the form of a concise study	X1P_U05 X1P_U07
K_U29	can work in the environment of different operating systems and use chosen application programmes	X1P_U04
K_U30	can write a simple computer programme in a chosen programming language, make it complex and start it	X1P_U04
K_U31	can use computer programmes for data analysis as well as symbolic and numerical calculations	X1P_U04
K_U32	can model and do simulations of physical properties of modern materials using information technology tools	X1P_U04

K_U33	can find and use specialist computer software in the internet resources with respect for intellectual property and rules of use	X1P_U07 X1P_K04
K_U34	can use English at the upper-intermediate level (B2)	X1P_U10
K_U35	can use English sources of knowledge with reference to physical sciences and their applications	X1P_U10
SOCIAL COMPETENCES		
K_K01	knows the limitations of their knowledge and understands the need of further learning, raising professional, personal and social skills	X1P_K01 X1P_K05
K_K02	can work in a team performing various roles, especially a leadership role, can take responsibility for realization of a group task	X1P_K02 X1P_K03
K_K03	understands the meaning of intellectual honesty in their own actions and actions of other people	X1P_K04 X1P_W07 X1P_W08
K_K04	understands the need to share knowledge, including the need of widespread presentation of achievements of physics	X1P_K06
K_K05	can independently find information in literature and the internet resources, also in foreign languages	X1P_K01 X1P_K05
K_K06	can express opinions about fundamental issues of physics and its applications, understands social aspects of applications of physics and responsibility connected with it	X1P_K06
K_K07	can think and act in an entrepreneurial manner	X1P_K07