

Kraków, 01 CZE. 2021

Stamp of the Institute of Physics

Program specjalności Fizyka materiałów funkcjonalnych i inteligentnych  
2021/2022/2023  
PROGRAMME OF SPECIALITY FUNCTIONAL AND SMART MATERIALS  
PHYSICS

Studia II stopnia stacjonarne / Masters studies 2021/2022/2023

Kierunek/Field: Fizyka / Physics

Specjalność / SPECIALITY: Fizyka materiałów funkcjonalnych i inteligentnych / Functional and Smart Materials Physics

Studia realizowane w Uniwersytecie Pedagogicznym im. Komisji Edukacji Narodowej w Krakowie wspólnie w porozumieniu z Uniwersytetem Narodowym im. Olesia Gonczara, Dnipro, Ukraina/ Studies realized at the Pedagogical University of National Education Commission in Krakow as common studies with the National University of Oles Honchar, Dnipro, Ukraine on the base common agreement.

Uniwersytet Narodowy im. Olesia Gonczara, Dnipro, Ukraina / DNIPRO NATIONAL UNIVERSITY, Ukraine:

Kierunek/Field: Nauki przyrodnicze / Natural Sciences

Specjalność/Speciality: *Fizyka z astronomią, Program edukacyjny Materiały funkcjonalne i inteligentne / Physics with Astronomy. Educational Programme: Functional and Smart Materials*

approved by the Faculty Council of Physics, Electronics and Computer Systems in <b>DNIPRO NATIONAL UNIVERSITY, Ukraine</b>	unit code	
approved by the Council of the Institute of Physics in Cracow Pedagogical University, Poland		

Unit plan name	Functional and Smart Materials P hysics
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ECTS points	120
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## QUALIFICATIONS AND PROFESSIONAL PRIVILEGES:

Uzyskiwane kwalifikacje oraz uprawnienia zawodowe:

A master of Physics has professional qualifications to work in research institutions, diagnostic laboratories, research and development centers in the field of physics with particular emphasis on the possibility of applying to the Doctoral School. He can work as a specialist in the field of advanced technologies of functional and intelligent electronic materials, metamaterials. He has the qualifications necessary for the work of a specialist for the design of new functional or nanoelectronic devices.

In addition, a graduate of the second cycle studies knows a foreign language at the B2 + level of proficiency in the European System for the Description of Language Education of the Council of Europe, along with preparation for the use of specialist terminology in the field of study. The graduate is prepared to start third cycle studies.

According to Ukrainian Educational and Professional Program graduates (a master of Physics) can work in primary positions in the professions defined by the National Classification of Ukraine (Classifier of Professions DK 003:2010) in the fields of general, specialized, higher education, namely:

- Professionals in Physics, Mathematics and technical sciences;
- Professionals in physics, astronomy, meteorology and chemistry;
- Professionals in Physics and Astronomy;
- Researchers (physics and astronomy);
- Engineers.

## LEARNING OUTCOMES

KNOWLEDGE	
W01	A master knows mathematical methods and information technologies for research and innovation in physics of functional and smart materials.
W02	A master has a basic knowledge in general and theoretical physics.
W03	A master knows theoretical models of condensed matter physics.
W04	A master knows the most important achievements and actual problems in condensed matter physics and in the field of modern physical materials science
W05	A master knows technological foundations of a modern material science.
W06	A master has the advanced knowledge of the optical phenomena in various mediums.
W07	A master knows a basic methods of information processing in optical and optoelectronic systems based on functional and smart materials
W08	A master knows principles of operation of experimental equipment for physical researches.
W09	A master knows how to determine the characteristics of metamaterials, dielectrics, sensors, functional and smart materials and parameters of devices.
W10	A master has a basic knowledge in the issues of the prevention of accidents during physical experiments.
SKILLS	



U01	A master is able to plan and carry out theoretical and / or experimental studies of functional and smart materials (single crystals, nanomaterials, glass and ceramics) based on understanding and skills of practical use of knowledge of theoretical physics and solid state physics, as well as special mathematical methods and information technologies.
U02	A master is able to plan and carry out the scientific researches and possesses the ability to collect and analyze experimental data in the study of functional and smart materials, including the assessment of possible errors and uncertainties.
U03	A master is able to determine the characteristics of functional electronics materials.
U04	A master is able to use knowledge obtained to develop new devices for functional, nano- and optoelectronics.
SOCIAL ABILITIES	
K01	A master has the creativity and the ability to conceptual thinking.
K02	A master is able to present and justify the personal point of view.
K03	A master is able to present research results to professional and non-professional audiences.
K04	A master is aimed to expand personal knowledge and skills.
K05	A master has the legal erudition.
K06	A master concerned about the environmental safety of physical experiment.

#### VERIFICATION OF LEARNING OUTCOMES:

	E – learning	Educational games	Recitation	Fieldwork	Labs	Individual projects	Common projects	Discussion	Essay	Oral exam	Writing exam/ tests	Other
W01			x		x	x	x	x	x	x	x	
W02			x		x	x	x	x	x	x	x	
W03			x			x	x	x	x			
W04			x		x	x	x	x	x	x	x	
W05			x			x	x	x	x			
W06			x		x	x	x	x	x	x	x	
W07			x			x	x	x	x			
W08			x			x	x	x	x	x	x	
W09			x									
W10			x		x		x					
U01			x		x	x	x	x	x	x	x	
U02			x			x	x	x	x			
U03			x		x	x	x	x	x			
U04			x			x	x	x	x	x	x	
K01			x			x	x	x				
K02			x			x	x	x				
K03			x			x	x	x				

K04			x			x	x	x				
K05						x	x	x				
K06			x			x	x	x				
K07			x			x	x	x				

  
Z-ca DYREKTORA  
Instytutu Fizyki

pieczęć i podpis Dyrektora / Director's signature  
*dr Dawid Natęcz*

