OPTIONAL COMPONENTS OF THE CYCLE OF MAJOR COURSES

Optional component 1

Course: **Commercialization of research and development**
Intensity of the Course: 5 academic credits
Module Code: PM-2
Module Name: Basic module-1
Prerequisites: POSR 5207 Planning and organization of scientific research
Purpose: Increasing the ability of doctoral students to organize scientific and technical activities and commercialize the results of scientific research.
Short Description: The discipline studies the methodological foundations of evaluating the effectiveness of projects in the educational environment submitted for implementation, the content of the stages of commercialization of research results, technical features of business planning, the organization of the main scientific and technical activities, issues related to the protection of intellectual property and the right to use them in the process.
Learning Outcomes in EP (LOP):
LOP 3 – Interprets the results of scientific and pedagogical research, evaluates the limits of their applicability, possible risks of their implementation in the scientific, educational and sociocultural environment, the prospects for further research;
LOP 4 – Organizes the work of the research team in the field of scientific and pedagogical physics;
LOP 5 – Designs and implements the educational process and the program of additional professional education in accordance with the needs of the employer;
LOP 7 – To conduct an analysis of scientific and educational activities.
Learning Outcomes in Course (LOC):
LOC 1 – applies the acquired knowledge to increase its commercial potential;
LOC 2 – defines the goals and objectives of the commercialization of scientific research;
LOC 3 – Masters the creation and use of intellectual property objects in the process of commercialization of the results of scientific and pedagogical research.
Post requisites: RP Research practice.

Optional component 2

Course: **Methodological foundations of differentiated teaching of physics at school**
Intensity of the Course: 5 academic credits
Module Code: PM-2
Module Name: Basic module - 1
Prerequisites: MTPhHS 5301 Methods of teaching physics in high school, MISGPhC 6303 Methods of in-depth study of the General physics course
Purpose consider the methodological foundations of the differentiated teaching of physics at school by students
Short Description: The discipline studies the problems of teaching methods of physics in the profile direction, improving the effectiveness of teaching physics based on internal differentiation at all stages of education, systematization of methodological techniques for mastering theoretical material, improving the level of pedagogical skills and professional competence of the teacher, developing individual strategies and teaching methods at the level of capabilities, abilities, characteristics of students.
Learning Outcomes in EP (LOP):
LOP 1 – Owns the methodology and methods of scientific and pedagogical research;
LOP 5 – Designs and implements the educational process and the program of additional professional education in accordance with the needs of the employer;
LOP 6 – It uses educational technologies, methods and means of training and education in order to ensure the planned level of personal and professional development;
LOP 8 – Demonstrates readiness for teaching on the main educational programs of higher education in the field of physics.
Learning Outcomes in Course (LOC):
LOC 1 – applies the acquired knowledge in his research work;
LOC 2 – defines the goals and objectives of scientific research;

LOC 3 – organizes the search for information, data collection; draws up results; works with literature; compiles the results of research work; plans, prepares and conducts presentations.

Post requisites: PP Pedagogical practice.

Optional component 3

Course: **Didactics of teaching physics in higher and secondary schools**

Intensity of the Course: 5 academic credits

Module Code: PM-2

Module Name: Basic module-1

Prerequisites: MTPhHS 5301 Methods of teaching physics in high school, MISGPhC 6303 Methods of in-depth study of the General physics course

Purpose: The purpose of the discipline is to develop and improve the pedagogical thinking of doctoral students, to analyze the problems of didactics of higher and secondary schools, based on the principle of continuity of scientific knowledge.

Short Description: Doctoral students can formulate and systematize the principles of secondary and higher school didactics, analyze the goals, objectives and content of teaching physics in different educational institutions

Learning Outcomes in EP (LOP):

LOP 6 – It uses educational technologies, methods and means of training and education in order to ensure the planned level of personal and professional development;

LOP 7 – To conduct an analysis of scientific and educational activities;

LOP 8 – Demonstrates readiness for teaching on the main educational programs of higher education in the field of physics.

Learning Outcomes in Course (LOC):

LOC 1 – applies the acquired knowledge in his research work;

LOC 2 – defines the goals and objectives of scientific research;

LOC 3 – organizes the search for information, data collection; draws up results; works with literature; compiles the results of research work; plans, prepares and conducts presentations.

Post requisites: PP Pedagogical practice

Optional component 4

Course: **Innovative technologies in physical education and scientific research**

Intensity of the Course: 5 academic credits

Module Code: PM-2

Module Name: Basic module-1

Prerequisites: MTPhHS 5301 Methods of teaching physics in high school, TPhUDR 5302 Teaching physics using digital resources

Purpose: The purpose of the discipline is the analysis of modern technologies in the field of education and science, scientific and pedagogical activity and the integration of innovative technologies.

Short Description: Doctoral students can apply innovation in practice, contribute to the development of new conceptual approaches in physical education and information technology, introduce innovative management in science.

Learning Outcomes in EP (LOP):

LOP 3 – Interprets the results of scientific and pedagogical research, evaluates the limits of their applicability, possible risks of their implementation in the scientific, educational and sociocultural environment, the prospects for further research;

LOP 4 – Organizes the work of a research team in various fields of physics;

LOP 8 – Demonstrates readiness for teaching on the main educational programs of higher education in the field of physics;

LOP 9 – Possess high-level critical and creative thinking skills, are capable of self-regulation and reflection to solve professional tasks;

LOP 10 – Demonstrate knowledge and compliance with ethical and legal norms in research and the use of digital technologies. Apply security measures when working with digital information and data protection, promote active, safe and ethical use of digital resources.

Learning Outcomes in Course (LOC):

LOC 1 – Plans and conducts analytical and numerical calculations, theoretical and experimental tasks, scientific work in the field of theoretical, experimental and applied physics;

LOC 2 – Conducts experiments of varying complexity in the field of physics on equipment, instruments and devices;

LOC 3 Processes information using modern programs, tools and methods of computer and information technology.

Post requisites: PP Pedagogical practice