## CONTENT

## 1. OPTIONAL COMPONENTS OF THE CYCLE OF CORE COURSES

*Optional component1*

*Course:* **Web design in Python**
*Intensity of the Course:* 5 academic credits
*Module Code:* *DTSE 503/1*
*Module Name:* Digital technologies in science and education
*Prerequisites:* AR and VR in education
*Purpose:* Formation of practical skills in designing, developing and implementing web scripts in Python.
*Short Description:*Web 2.0 Application Basics. HTML and CSS basics. A practical introduction to the Python programming language for Django. Development of modern web applications in the Python programming language using Django. Web forms in Django. Validation. JavaScript. The administrative section of Django. Authentication and authorization in Django. Using databases in Django. SQLite. Models in Django. Development of an online project.
*Learning Outcomes in EP (LOP):*
LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work
LOP 6- Develops software products, mobile and web applications used in professional and practical activities
*Learning Outcomes in Course (LOC):*
LOC 1 - creating programs in high-level programming languages
LOC 2 - project development using network technologies
LOC 3-design, development of web scripts in Python
*Post requisites:*Computer modeling of applied problems

*Optional component2*

*Course:* **High-level programming**
*Intensity of the Course:* 5academic credits
*Module Code:* *DTSE 503/2*
*Module Name:* Digital technologies in science and education
*Prerequisites:* Pedagogical management and educational marketing
*Purpose:* formation of skills for building programs in high-level programming languages.
*Short Description:* Basic language syntaxes. Modern methods and technologies of programming. Building programs using a programming language. Configuration and testing of the developed software product. Analysis of the results obtained. Building programs in high-level programming languages.
*Learning Outcomes in EP (LOP):*
LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work
LOP 6- Develops software products, mobile and web applications used in professional and practical activities
*Learning Outcomes in Course (LOC):*
LOC 1 - creating programs in high-level programming languages
LOC 2 - project development using network technologies
LOC 3-design, development of web scripts in Python
*Post requisites:*Computer modeling of applied problems

*Optional component 1*

*Course:* **AR and VR in education**
*Intensity of the Course:* 4 academic credits
*Module Code: PTCS 501/1*
*Module Name:* Problems of Teaching Informatics
*Prerequisites:* Leadership in Science anf Education
*Purpose:* Formation of skills for using the possibilities of virtual and augmented realities.
*Short Description:*Virtual reality. Augmented reality. Representation of the subject area of education in a multidimensional system. The use of virtual reality in education. Application of augmented reality in education. The safety of using virtual reality and augmented reality in education. The use of virtual and augmented reality (VR and AR) technologies.
*Learning Outcomes in EP (LOP):*
LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work
LOP 5- Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems
LOP 6- Develops software products, mobile and web applications used in professional and practical activities
*Learning Outcomes in Course (LOC):*
LOC 1 - Development of a digital educational resource
LOC 2 - Mobile and Web application development
*Post requisites:*Development of educational Smart applications

*Optional component 2*

*Course:* **Modern problems of pedagogical technologies**
*Intensity of the Course:* 4 academic credits
*Module Code: PTCS 501/2*
*Module Name:* Problems of Teaching Informatics
*Prerequisites:* no
*Purpose:* Formation of skills for using the possibilities of virtual and augmented realities
*Short Description:* The essence of pedagogical technologies. Implementation and management of curricula and projects. Evaluation of training programs and projects. Information management and training. Automated and electronic systems for ensuring the educational process of the organization. Current trends and problems in primary education. Current trends and problems in secondary education. Modern trends and problems in higher education. The main problems of the introduction of pedagogical technologies. Organization of independent work. Development of creativity. Formation of a communicative culture. Support of the teacher's activities. Development of pedagogical technologies.
*Learning Outcomes in EP (LOP):*
LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work
LOP 5- Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems
LOP 6- Develops software products, mobile and web applications used in professional and practical activities
*Learning Outcomes in Course (LOC):*

LOC 1 - Development of a digital educational resource
LOC 2 - Mobile and Web application development
*Post requisites:*Development of educational Smart applications

## 2. OPTIONAL COMPONENTS OF THE CYCLE OF MAJOR COURSES

*Optional component1*

*Course:* **Pedagogical management and educational marketing**
*Intensity of the Course:* 6academic credits
*Module Code: ISE 504/1*
*Module Name:* Integration of science and education
*Prerequisites:*no
*Purpose:* Formation of skills in management, marketing activities in an educational organization.
*Short Description:*Marketing as a direction of management activity. The concept of educational marketing. The essence and features of marketing in the field of education. Subjects and objects of marketing of an educational organization, their functions. Marketing environment of educational organizations. Management of marketing activities in an educational organization. Competitive position of educational organizations in the market of educational services. The model of marketing monitoring of the labor market of teachers. The program of consumer monitoring of the quality of education at the university.
*Learning Outcomes in EP (LOP):*
LOP 2 - To present the theoretical and methodological foundations for the development of the science of pedagogy and psychology, the management and knowledge processes, the nature and content of psychological and pedagogical research
LOP 5 - Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems
*Learning Outcomes in Course (LOC):*
LOC 1- Organization and management of educational and creative activities of students
*Post requisites:*Modern problems of pedagogical technologies

*Optional component 2*

*Course:* **Leadership in Science and Education**
*Intensity of the Course:* 6academic credits
*Module Code: ISE 504/2*
*Module Name:* Integration of science and education
*Prerequisites:* no
*Purpose:* Formation of leadership functions of the head of education
*Short Description:* Theoretical and practical problems of leadership in education and science. Analysis of approaches to leadership as a tool for personal development of teachers and researchers. Leadership in education as a kind of social type of leadership. Leadership functions of the head of education. Styles of activity of leaders in education. Formal and informal leadership in the practice of education. The head of the education system, the educational institution as a leader. Requirements for leaders in education and science. Conditions for the development and realization of the individual's leadership potential in education and science.
*Learning Outcomes in EP (LOP):*

LOP 2 - To present the theoretical and methodological foundations for the development of the science of pedagogy and psychology, the management and knowledge processes, the nature and content of psychological and pedagogical research

LOP 5 - Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems

*Learning Outcomes in Course (LOC):*

LOC 1- owns teaching methods

LOC 2 - uses advanced pedagogical technologies

*Post requisites:*Modern problems of pedagogical technologies

*Optional component 1*

*Course:* **Development of educational Smart applications**

*Intensity of the Course:* 6 academic credits

*Module Code: PTCS 504/1*

*Module Name:* Problems of Teaching Informatics

*Prerequisites:*High-level programming

*Purpose:* Formation of skills for the development and implementation of a training application project on a different platform

*Short Description:*The concept of mobile learning and features of its use. Analysis of the subject area of creating training applications on mobile platforms. Study of existing approaches to the use of training applications in the educational process. A method of consolidating previously acquired knowledge using training applications on a mobile platform. Development and implementation of the project of the training application on the mobile platform. Requirements for training applications to consolidate previously acquired knowledge. Description of the training application and the training process. Application development stages. Testing applications

*Learning Outcomes in EP (LOP):*

LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work

LOP 6- Develops software products, mobile and web applications used in professional and practical activities

*Learning Outcomes in Course (LOC):*

LOC 1- Develops digital educational resources

LOC 2 - Develops software products, mobile and web applications

*Post requisites:*Digital transformation of education

*Optional component 1*

*Course:* **Creating and using of digital educational and Internet resources**

*Intensity of the Course:* 6 academic credits

*Module Code:* **DTSE 502/1**

*Module Name:* Digital technologies in science and education

*Prerequisites:*AR and VR in education

*Purpose:* Formation of skills for the development and implementation of a training application project on a different platform

*Short Description:*The concept of mobile learning and features of its use. Analysis of the subject area of creating training applications on mobile platforms. Study of existing approaches to the use of training applications in the educational process. A method of consolidating previously acquired

knowledge using training applications on a mobile platform. Development and implementation of the project of the training application on the mobile platform. Requirements for training applications to consolidate previously acquired knowledge. Description of the training application and the training process. Application development stages. Testing applications

*Learning Outcomes in EP (LOP):*

LO 3. Performs research activities using digital technologies, computer modeling and various methods of data analysis.

LO 7- simulates applied tasks in the field of computer technology critically evaluating the results of scientific work in this field through data mining

*Learning Outcomes in Course (LOC):*

LOC 1- Develops digital educational resources

LOC 2 - Develops software products, mobile and web applications

*Post requisites:*Digital transformation of education

*Optional component 2*

*Course:* **Digital technologies in scientific research**

*Intensity of the Course:* 6 academic credits

*Module Code:* **DTSE 502/2**

*Module Name:* Digital technologies in science and education

*Prerequisites:* Scientific research seminar

*Purpose:* Formation of skills of work in the information and educational space, preparation of research papers, processing of research results.

*Short Description:* The concept of pedagogical design. Analysis of the needs of the target audience, its competence and expected results of training. Determination of goals and objectives of the educational material. Analysis and structuring of materials in accordance with the objectives. Selection of resources and methods of academic work. Creation of elements, style and visual design of the course. Development of tests and tasks, environment control and information collection. Creation of a course with the help of appropriate instruments, the task of the command's members to develop specific elements. Download the course in the management training system (LMS). Development of methods for evaluating the results and effectiveness of materials. Development of solutions for further improvement of educational content.

*Learning Outcomes in EP (LOP):*

LOP 3 - Performs research activities using digital technologies, computer modeling and various methods of data analysis.

LOP 7- simulates applied tasks in the field of computer technology critically evaluating the results of scientific work in this field through data mining

*Learning Outcomes in Course (LOC):*

LOC 1- Performs research activities using digital technologies

LOC 2 - evaluates the results of scientific work

*Post requisites:*Undergraduate research work

*Optional component 1*

*Course:* **Online platforms in education**

*Intensity of the Course:* 6 academic credits

*Module Code:* *DTSE 504/1*

*Module Name:* Digital technologies in science and education

*Prerequisites:*Development of elective courses in computer science

*Purpose:* Formation of skills for creating online courses, training courses, user management.

*Short Description:*Overview of platforms and services for online learning in education and their capabilities. Tools for creating online courses. Content support, creation of online courses. User management. Online learning platforms: Coursera, khanacademy, Bilim media Group, Daryn Online, Opiq, NIS Play, Atameken Academy, Blended learning. Using online services to create a training course.

*Learning Outcomes in EP (LOP):*

LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work

LOP6 -Develops software products, mobile and web applications used in professional and practical activities

*Learning Outcomes in Course (LOC):*

LOC 1- - Develops elective courses in computer science

LOC 2 - Develops software products, mobile and web applications

*Post requisites:*Digital transformation of education

*Optional component 2*

*Course:* **Digital transformation of education**

*Intensity of the Course:* 6 academic credits

*Module Code:* *DTSE 504/2*

*Module Name:* Digital technologies in science and education

*Prerequisites:* Scientific research seminar

*Purpose:* Formation of skills to work with updated educational content, digital transformation of education.

*Short Description:* Digital transformation of education: prospects and challenges. Updating the content of education.Key aspects of digital transformation of education. Digital transformation of education: world and domestic experience. A model of digital transformation of an educational organization.Universal principles and schemes.«Mass personal» education. Transformable activities at school.Digital educational environment.Stages of digital transformation.Digital gaps.

*Learning Outcomes in EP (LOP):*

LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work

LOP 6 -Develops software products, mobile and web applications used in professional and practical activities

*Learning Outcomes in Course (LOC):*

LOC 1- Develops elective courses in computer science

LOC 2 - Develops software products, mobile and web applications

*Post requisites:*нет

*Optional component 1*

*Course:* **The CLIL method in computer science training**

*Intensity of the Course:* 5 academic credits

*Module Code:* PTCS 503/1

*Module Name:* Problems of Teaching Informatics

*Prerequisites:*Modern problems of pedagogical technologies

*Purpose:* Formation of skills of using CLIL technology, organization of subject-language activities of students in an integrated educational process

*Short Description:*Theoretical foundations of CLIL technology. Modern methods and technologies of integrated training and diagnostics. Issues of organizing students' cooperation aimed at the development of subject-language activities in the integrated educational process. Creative abilities for diagnostics, evaluation of the quality of the educational process. Formation of the educational environment, implementation of the tasks of innovative educational policy. Solutions to research problems.

*Learning Outcomes in EP (LOP):*

LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work

LOP 5- Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems

*Learning Outcomes in Course (LOC):*

LOC 1- uses advanced pedagogical technologies and products of innovative systems

LOC 2 - Organizes educational and creative activities of students

*Post requisites:*Digital transformation of education

*Optional component3*

*Course:* **Digital technologies in inclusive education**

*Intensity of the Course:* 5 academic credits

*Module Code: PTCS 503/2*

*Module Name:* Problems of Teaching Informatics

*Prerequisites:* Modern problems of pedagogical technologies

*Purpose:* Formation of skills in the use of digital technologies to support inclusive education.

*Short Description:* Types of digital technologies used in inclusive education. The benefits of using digital technologies to support inclusive education. Analysis of the policy of using digital technologies in inclusive education. International legislation. Implementation of the digital technology policy at the state level. Policy recommendations for the use of digital technologies to support inclusive education. Support for teachers and students. Development of curricula for inclusive education.

*Learning Outcomes in EP (LOP):*

LOP 4- Develops digital educational resources for blended and online learning in high-level programming languages through individual or team work

LOP 5- Organizes educational and creative activities of students using advanced pedagogical technologies and products of innovative systems

*Learning Outcomes in Course (LOC):*

LOC 1- uses digital educational resources

LOC 2 - uses advanced pedagogical technologies in individual or team work

*Post requisites:*Digital transformation of education

*Optional component2*

*Course:* **Computer modeling of applied problems**

*Intensity of the Course:* 5 academic credits

*Module Code: PTCS 502/1*

*Module Name:* Problems of Teaching Informatics

*Prerequisites:*High-level programming

*Purpose:* Formation of skills in the organization of computer experiments, the use of computer modeling.

*Short Description:*Concepts of model and modeling. Classification of abstract models. The concept of a computer model. Basic definitions and types of models. The concept of numerical and mathematical modeling. Areas of application of computer modeling. Stages and goals of computer modeling. Formalization and algorithmization of computer models. Fundamentals of computer-aided design systems. Organization of computer experiments. Some programming techniques in modeling**.**

*Learning Outcomes in EP (LOP):*

LOP 3 - Performs research activities using digital technologies, computer modeling and various methods of data analysis.

LOP 7- simulates applied tasks in the field of computer technology critically evaluating the results of scientific work in this field through data mining

*Learning Outcomes in Course (LOC):*

LOC 1- Performs research activities using computer modeling

LOC 2 - simulates applied problems in the field of computer technology

*Post requisites:*Digital technologies in scientific research

*Optional component2*

*Course:* **Technology of organizing research work of students**

*Intensity of the Course:* 5 academic credits

*Module Code: PTCS 502/2*

*Module Name:* Problems of Teaching Informatics

*Prerequisites:* Scientific research seminar

*Purpose:* Formation of the skills of organizing and conducting research activities of students

*Short Description:* Organization and conduct of research activities of students. The role of research in a person-centered approach to learning. Research work of students within the framework of the implementation of state standards. Organization of research activities. Stages of research activity. Selection of the research topic. Research work. The reporting and presentation stage. The reasons for the decrease in the creative activity of students. The problem of attracting students to engage in research activities.

*Learning Outcomes in EP (LOP):*

LOP 3 - Performs research activities using digital technologies, computer modeling and various methods of data analysis.

LOP 7- simulates applied tasks in the field of computer technology critically evaluating the results of scientific work in this field through data mining

*Learning Outcomes in Course (LOC):*

LOC 1- organizes the research activities of students

LOC 2 - evaluates the results of scientific work

*Post requisites:*Undergraduate research work