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Modernization of Pedagogical Higher Education  
by Innovative Teaching Instruments

## CONCEPT COURSE<sup>1</sup>

<b>HIGHER EDUCATION INSTITUTION</b>		Luhansk Taras Shevchenko National University
Institute (faculty), department or other structural unit conducting the course		Institute of Physics, Mathematics and Information Technologies of Luhansk Taras Shevchenko National University, Department of Information Technologies and Systems.
<b>DESCRIPTION OF THE EDUCATIONAL DISCIPLINE</b>		
1	Course name	Gamification in the educational process of the school
2	Module code	[18PHS8], [18ICS8]
3	Cycle/level of higher education	NQF of Ukraine - 7th level, the second level of higher education
4	Degree	master
5	Branch of knowledge, training direction	01 Education, 014 Secondary education.
6	Specialty, specialization (if any)	014.09 Secondary education. Specialization Informatics. 014.08 Secondary education. Specialization Physics.
7	Name of the educational program, which includes the course	014.09 EPP Secondary Education (Informatics) of the second level of higher education 014.08 EPP Secondary Education (Physics) of the second level of higher education
8	Educational qualification	Master of secondary education, computer science teacher, teacher of higher education institutions. Master of secondary education, physics teacher, teacher of higher education.

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9	Characteristic of the course by the form of study	Full-time, part-time (using digital learning technologies)
10	Status of the course	Required (014.08 - Physics, 014.09 - Informatics), selective (for other specialties)
11	Prerequisites for the course	Disciplines to be studied earlier: Pedagogy, propaedeutics and information technologies, Informatics and computer engineering
12	Year of study, semester	1 year, 1 semester
13	The volume of the course in ECTS credits and its distribution in hours by the forms of organization of educational process and types of classes	5.0 ECTS credits. Total number of hours: 150, incl. for full-time study: 20 - lecture hours, 20 - seminars and practical classes, 20 hours of laboratory classes, 90 hours - independent work of students
14	Form of the final evaluation	Test
15	Study language	Ukrainian
16	Internet address of the permanent placement of course educational content	<a href="http://do.luguniv.edu.ua/enrol/index.php?id=26708">http://do.luguniv.edu.ua/enrol/index.php?id=26708</a>
17	Developer(s), working group (members)	Candidate of Pedagogical Sciences, Associate Professor of the Department of Information Technologies and Systems, Associate Professor Pereyaslavskaya Svitlana Oleksandrivna Candidate of Technical Sciences, Associate Professor of Information Technologies and Systems, Associate Professor Kozub Halyna Oleksandrivna

#### Brief summary of the course

The task of the course is to prepare students for the practical use of game technology (computer, quest technology, etc.) in the educational process of secondary school. Learning experience is organized into a series of lectures, practical work (training), laboratory classes and group work. In addition to these forms of activity, the student's independent work is important for the effectiveness of learning, namely the development of methodological materials for didactic games, instructions and software for its use in the educational process of the school. The peculiarity of the training is also the involvement in this course of interactive gamification technologies, the creation of an appropriate interactive learning environment. The content of the course has the following priorities: didactic game and methods of its development and conduct during the lesson; development and use of quests, age features of the game in the educational process, pedagogical and digital tools of the teacher for gamification.



Key concepts:	
Gamification, didactic game, game pedagogical technologies, computer game, educational platforms, information technologies	
Course Objective:	
formation of digital and cognitive competencies of the future teacher, skills of critical thinking, logical and creative thinking for the introduction of gamification technology in the educational process of the school	
Program competencies formed during the course	
Integral competency (IC)	<i>ICI.</i> Ability to solve complex problems and problems of secondary education with the use of gamification technology or in the learning process, which involves research and / or innovation and is characterized by uncertainty of conditions and requirements.
General competencies (GC)	<i>GCI.</i> Ability to abstract thinking, analysis and synthesis. <i>GC3.</i> Ability to conduct theoretical and applied research using digital technologies at the appropriate level. <i>GC4.</i> Ability to motivate people and move towards a common goal, work in a team of employees. <i>GC7.</i> Ability to generate new ideas (creativity).
Professional (special) competencies (PC)	<i>PC1.</i> Ability to analyze subject areas, form, analyze, model requirements and develop criteria for production processes in professional activities. <i>PC2.</i> Ability to identify, classify and describe project tasks, find rational methods and approaches to their solution. <i>PC8.</i> Ability to apply and develop fundamental and interdisciplinary knowledge to successfully solve problems of professional activity.
Intended learning outcomes <sup>2</sup>	
Professional knowledge	
To form:	
– knowledge of modern scientific achievements in the field professional activity or field of knowledge and which are the basis for original thinking and research, critical understanding of problems in the field and on the border of fields of knowledge;	

<sup>2</sup> National Qualifications Framework. Appendix to the Resolution of the Cabinet of Ministers of Ukraine of November 23, 2011 № 1341 (as amended by the Resolution of the Cabinet of Ministers of Ukraine of June 25, 2020 № 519). Access mode: <https://zakon.rada.gov.ua/laws/show/1341-2011-%D0%BF/paran12#n12>



- knowledge of modern technologies and tools for the development of complex software systems, the ability to apply them at all stages of the development life cycle;
- knowledge of the principles of administration and configuration of modern computer systems;
- knowledge of programming features for modern computer systems;
- knowledge of didactic games, classification and functions in the educational process of the school;
- knowledge of methods of development and use of didactic games;
- knowledge of modern platforms and services for creating and distributing didactic game applications.

Have knowledge about:

- basic requirements for software products used in the educational process;
- features of online resources and other Internet opportunities for the development of interactive software products for educational purposes.

Professional skills and abilities:

1. To form:

- ability to conduct research and conduct innovative activities in order to develop new knowledge in the field, independently learn new research methods, adapt to changes in scientific and research and production profile in their professional activities;
- ability to solve problems in new or unfamiliar environments in the presence of incomplete or limited information, taking into account aspects of social and ethical responsibility.

2. Be able to:

- to use in practice skills and abilities in the organization of research and design works, in cooperation with the team;
- develop didactic games and apply them in professional activities;
- to possess modern information technologies and to develop didactic game applications by IT-means.
- apply elements of gamification in the learning process.

Communication

It is clear and unambiguous to convey one's own conclusions, as well as knowledge about gamification technologies and explanations that substantiate them, to specialists and non-specialists, in particular to students.

Autonomy and responsibility

- ability managing work or learning processes that are complex, unpredictable and require new strategic approaches;
- withability to continue studies with a high degree of autonomy;
- responsibility for contributing to professional knowledge and practice and / or evaluating the performance of teams and teams.



Control of students' academic progress															
Means of diagnostics of learning outcomes	Credit, activity in a seminar or practical lesson, laboratory work, individual research task, team projects, essays, tasks for independent work, Modular tests (tests), presentation of research results														
Final evaluation	<p>The assessment system consists of the following types of educational activities:</p> <table border="1"> <tr> <td>Modular control work 1 (MC1) (evaluation of PC1)</td> <td>10%</td> </tr> <tr> <td>Modular control work 2 (MC2) (evaluation of PC1)</td> <td>10%</td> </tr> <tr> <td>Activity on practical and seminar works (PW). (evaluation of PC1; PC2, GC1, GC3) 7 practical and seminar works, (max. score of each - 5)</td> <td>35%</td> </tr> <tr> <td>Performing laboratory work (LW) (evaluation of PC2, PC8; GC1; GC3, GC4, GC7) 5 laboratory works, (max. Point of each - 5)</td> <td>25%</td> </tr> <tr> <td>Independent work (writing creative work) (InW). (evaluation of PC1, PC8) 8 topics for independent work, (max. Score of each - 5)</td> <td>10%</td> </tr> <tr> <td>Individual or group work (IW) (GC1, GC3, GC4, GC7) 8 themes of group works, (max. Point of each - 5)</td> <td>10%</td> </tr> <tr> <td>Together:</td> <td>100%</td> </tr> </table> <p>Final assessment: credit (C) is determined on the basis of the final score, which is calculated by the following formula:  <math display="block">C = 10n(\text{MC1}) + 10 * n(\text{MC2}) + n(\text{PW}) + n(\text{LW}) + 0.25n(\text{InW}) + 0.25n(\text{IW}) \leq 100\%</math> where n is the number of educational forms to be evaluated,  Thus, <math>C = 10 * 1 + 10 * 1 + 7 * 5 + 5 * 5 + 0.25 * 8 * 5 + 0.25 * 8 * 5 \leq 100</math> points.</p>	Modular control work 1 (MC1) (evaluation of PC1)	10%	Modular control work 2 (MC2) (evaluation of PC1)	10%	Activity on practical and seminar works (PW). (evaluation of PC1; PC2, GC1, GC3) 7 practical and seminar works, (max. score of each - 5)	35%	Performing laboratory work (LW) (evaluation of PC2, PC8; GC1; GC3, GC4, GC7) 5 laboratory works, (max. Point of each - 5)	25%	Independent work (writing creative work) (InW). (evaluation of PC1, PC8) 8 topics for independent work, (max. Score of each - 5)	10%	Individual or group work (IW) (GC1, GC3, GC4, GC7) 8 themes of group works, (max. Point of each - 5)	10%	Together:	100%
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Together:	100%														
Communication and feedback	Students receive the results of the final assessment on the MOODLE distance learning platform, as well as during face-to-face conversations with the teacher (consultations, laboratory and practical classes, etc. Support and assistance from participants can be obtained online) (e-mail, MOODLE distance platform) and in face-to-face meetings.														



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Higher education institution assessment scale	<b>Value on a scale of 100 points</b>	<b>Rating</b>	<b>Assessment value (exam)</b>	<b>Evaluation value (credit)</b>
	90-100	A	Perfectly	Credited
	83-89	B	Fine	
	75-82	C	Satisfactorily	
	63-74	D		
	50-62	E	Unsatisfactorily	Not credited
	21-49	FX		
	0-20	F		

### The structure of the discipline

Names of content modules and topics	Number of hours												
	Full-time						correspondence form						
	total	including					total	including					
		1	n	lab	ind	s.r.		1	n	lab	ind	s.r.	
1	2	3	4	5	6	7	8	9	10	11	12	thirteen	
<b>Content module 1</b>													
Theoretical foundations of gamification													
Topic 1. Introduction. The concept of gamification. Gamification in business, social projects and education	14	2	2			10	14	2					12
Topic 2. Didactic game. Game pedagogical technologies. Methods of developing and conducting didactic games	20	4	6			10	20						20
Topic 3. Theoretical foundations of gamification. Game mechanics, type of players and game design	16	2	2			12	16						16
Together on the content module 1	50	8	10			32	50	2					48



<b>Content module 2</b>												
Elements of gamification in the educational process of the school												
Topic 1 Psychological and pedagogical foundations of the use of elements of gamification in education. Motivation of the educational process by means of gamification	16	2	2			12	16					16
Topic 2. Analysis of game components in the educational process of the school	16	2	2			12	16					16
Topic 3. Computer game: its place and features of application in education	18	2	6			10	18		2			16
Together on the content module 2	50	6	10			34	50		2			48
<b>Content module 3</b>												
Software and technologies for the development of didactic projects with elements of gamification												
Topic 1. Software tools and services for creating projects with elements of gamification	12	2		4		6	12			4		8
Topic 2. Technology of development of didactic applications with elements of gamification	38	4		16		18	38			8		30
Together on the content module 3	50	6		20		24	50			12		38
<b>Total hours</b>	<b>150</b>	<b>20</b>	<b>20</b>	<b>20</b>		<b>90</b>	<b>150</b>	<b>2</b>	<b>2</b>	<b>12</b>		<b>134</b>
<b>Curriculum (content block)</b>												
<b>Topic</b>	<b>Topics of seminars / practical / laboratory classes (if available)</b>				<b>Approximate topics of individual and / or group tasks (if available)</b>				<b>Tasks for independent work</b>			
<b>Content module 1</b>	Theoretical foundations of gamification											
Topic 1. Introduction. The concept of gamification. Gamification in business, social	C 1.1 Gamification in education: world experience. (2 hours)								Preparation for seminar work, writing creative work on the topics:			



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<p>projects and education</p>			<ul style="list-style-type: none"> <li>- History of development of game pedagogical technologies</li> <li>- Possibilities of using gamification in online learning</li> <li>- Gamification in business</li> <li>- Application of gamification in social projects: Greenhouse of social technologies</li> <li>- Gamification and game thinking in projects</li> <li>- Errors in the introduction of gamification</li> </ul>
<p>Topic 2. Didactic game. Game pedagogical technologies. Methods of developing and conducting didactic games</p>	<p>C 2.1 Gamification and modern pedagogical technologies (2 hours)</p> <p>P 2.1 Development of a didactic game (quest) (4 hours)</p>	<p>Develop a didactic game on a topic of your choice (as an element of explaining new material, or knowledge control) (dominoes, crossword puzzles, etc.)</p>	<p>Preparation for seminar work, writing creative work on the topics:</p> <ul style="list-style-type: none"> <li>- Game technologies of junior schoolchildren.</li> <li>- Didactic game technologies</li> <li>- Problems of using game technologies in teaching</li> <li>- Classification of educational and game projects in preparation of future teachers for innovative activity</li> <li>- Technology of imitation-game training, business game</li> <li>- The effectiveness of the use of didactic games in the learning process</li> </ul>
<p>Topic 3. Theoretical foundations of gamification. Game mechanics, type of players and game design</p>	<p>C 3.1 Components of the process of gamification of learning (2 hours)</p>		<p>Preparation for seminar papers, writing creative work on the topic:</p> <ul style="list-style-type: none"> <li>- Is it possible to combine the concepts of "game pedagogical technologies" and "gamification"?</li> <li>- The contribution of game mechanics in the formation of student motivation</li> </ul>





			<ul style="list-style-type: none"> <li>- Paradigm of game design development as a type of project activity</li> <li>- Basic principles of character development in the framework of game design</li> </ul>
<b>Content module 2</b>	Elements of gamification in the educational process of the school		
Topic 1 Psychological and pedagogical foundations of the use of elements of gamification in education.	P. 1.1. Motivation of the educational process by means of gamification (2 hours)		Preparation for seminar papers, creative work: <ul style="list-style-type: none"> <li>- Problems with the use of computer games in the educational process</li> <li>- Bartle's psychotypes and audience balancing</li> </ul>
Topic 2. Analysis of game components in the educational process of the school	C. 2.1. Use of didactic games in lessons (computer science, mathematics, etc.) (2 hours)		Preparation for seminar papers, creative work: <ul style="list-style-type: none"> <li>- Features of application of didactic games at different levels of school education</li> <li>- Review of online didactic computer games</li> </ul>
Topic 3. Computer game: its place and features of application in education	P.3.1 The use of educational platforms in the gamification of learning (Classcraft, etc.) (6 hours).		Preparation for practical work, project development
<b>Content module 3</b>	Software and technologies for the development of didactic projects with elements of gamification		
Topic 1. Psoftware tools and services for creating projects with elements of gamification	L.1 Getting acquainted with the services of creating didactic games using a smartphone (Kahoot! Etc.) (4 hours)		<ol style="list-style-type: none"> <li>1. Preparation for laboratory work, project development</li> <li>2. Writing creative work: <ul style="list-style-type: none"> <li>- Creating interactive exercises,</li> <li>- Creating interactive tests</li> <li>- Creating interactive games,</li> <li>- Creating interactive crossword puzzles.</li> </ul> </li> </ol>



			- Using a database of ready-made exercises by subject and class
Topic 2. Technology of development of didactic applications with elements of gamification	<p>L.2.1. Exploring the main features of Alice (4 hours)</p> <p>L.2.2. Alice game project development (4 hours)</p> <p>L.2.3. Exploring the main features of SCRATCH. Creating effects, drawing in SCRATCH. Creating animation (4 hours)</p> <p>L.2.4. Development of the game project "Laboratory of Mathematics" (4 hours)</p>		<p>1. Development of a game project lesson - learning new material (following the example of l.r.2.4)</p> <p>2. Preparation for laboratory work, writing creative work:</p> <ul style="list-style-type: none"> <li>- Propaedeutics of ideas of parallel programming in high school using the Scratch environment</li> <li>- Project activities in the Scratch programming environment</li> <li>- Virtual laboratory workshop "Electric current"</li> <li>- Creating educational and developmental programs in mathematics in the SCRATCH environment</li> </ul>
<b>Technological and resource provision, use which provides for the discipline (if necessary)</b>			
Using the capabilities of the innovation class as part of the educational ecosystem MoPED	<p>Creative training zone (CTZ1): lectures, seminars and practical classes, presentation of educational and creative projects.</p> <p>The zone of engineering creativity and robotics (ZEC3) and the zone of 3d-modeling Z3dM2 - for practical creativity of students.</p> <p>The following material and technical support of the class is used:</p> <ol style="list-style-type: none"> <li>1. Computer work stations <u>ASUS X541UA</u> 15.6 ', HD, Intel Core i3 7100U, 4Gb, 128Gb, Intel HD</li> <li>2. Epson EH-TW5400 3LCD projector</li> <li>3. Elite Screen 120 "(16: 9) 266.7 x 150.1 (T120UWH) Black Case</li> <li>4. SMART electronic flipchart 42 complete with mobile stand</li> <li>5. Camera Canon EOS 1300D 18-55 IS Kit Black + tripod + memory card</li> <li>6. Tablet Asus ZenPad 10.1 "2 / 16Gb Black</li> </ol>		



<p>Recommended sources of information (including electronic resources)</p>	<p><b>Basic</b></p> <ol style="list-style-type: none"><li>1. Чепіль М.М. Педагогічні технології : навчальний посібник / Марія Миронівна Чепіль, Надія Зеновіївна Дудник . – Київ : Академвидав, 2012. – 222 с.</li><li>2. Дичківська І. М. Інноваційні педагогічні технології [Текст]: навч. посіб. / І.М. Дичківська. - Київ : Академвидав, 2004. - 351 с.</li><li>3. Возняк-Запур М. Механізми гейміфікації у дистанційному навчанні / Марта Возняк-Запур. – Краків : Ofi syna Wydawnicza AFM, 2018. – 59 с.</li><li>4. Kapp, Karl. The Gamification of Learning and Instruction: Game-Based Methods and Strategies for Training and Education, Pfeiffer and ASTD, 2012.</li><li>5. Kahoot: приложение для создания образовательных тестов, игр и викторин [Электронный ресурс]. — Режим доступа: <a href="https://te-st.ru/entries/kahoot-app/">https://te-st.ru/entries/kahoot-app/</a>(дата обращения: 7.03.2019).</li><li>6. Хантер Д. Вовлекай и властвуй. Игровое мышление на службе бизнеса./ Д. Хантер, К. Вербах. - М., 2014.</li><li>7. Джонг Т. Методичні рекомендації для вчителів Go-Lab / Тод де Джонг, Маттіас Гінц, Адріан Гользер, Фані Стіланіду, 2015.</li><li>8. Рындак В. Г. Проектная деятельность школьника в среде программирования Scratch: учебно-методическое пособие / В. Г. Рындак, В. О. Дженжер, Л. В. Денисова. — Оренбург: Оренб. гос. ин-т. менеджмента, 2009. — 116 с.</li><li>9. Alice 3. How to guide / Wanda Dann, Don Slater, Laura Paoletti, Dennis Cosgrove, Dave Culyba, Pei Tang, 2012.</li></ol> <p><b>Auxiliary</b></p> <ol style="list-style-type: none"><li>1. Programming with Alice and Java / J. Lewis, V. Tech, P. DePasquale , College of New Jersey. – 2008. – 360 p.</li><li>2. Adams J. Alice 3 in Action with Java / J. Adams. – 2014. – 640 p.</li><li>3. Зикерман Г. Геймификация в бизнесе. Как пробиться сквозь шум и завладеть вниманием сотрудников и клиентов / Гейб Зикерман, Джоселин Линдер. – М.: Манн, Иванов и Фербер, 2014. – 272 с.</li><li>4. Теорія та практика змішаного навчання : монографія / В.М. Кухаренко, С.М. Березенська, К.Л. Бугайчук, Н.Ю. Олійник, Т.О. Олійник, О.В. Рибалко, Н.Г. Сиротенко, А.Л. Столяревська; за ред.</li></ol>
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- В.М. Кухаренка – Харків: «Міськдрук», НТУ «ХП», 2016. – 284 с.
5. Варенина Л.П. Геймификация в образовании // Историческая и социально-образовательная мысль. - Том 6, №6, Часть 2, 2014.-С.314-317.
  6. Ермаков А.В., Бессмертный А.М., Иванов П.П. Модель оценки сценариев игрофикации в учебном процессе // Вестник СВФУ, 2014, том 11, № 6.-С.42-46.
  7. Chou Y. Octalysis Complete Gamification Framework // Yu-kai Chou & Gamification: Gamification expert & Follower of Christ. – 2013.
  8. Sheldon, L. The Multiplayer Classroom: Designing Coursework as a Game / Sheldon, L., - 1 изд. - Boston: Course Technology, 2011. - 284 p.

#### Electronic publications

1. Корнилов Ю.В. Геймификация и веб-квесты: разработка и применение в образовательном процессе [Электронный ресурс] / Корнилов Ю.В., Левин И.П. // Современные проблемы науки и образования. – 2017. – № 5. URL: <http://www.science-education.ru/ru/article/view?id=26865> (дата обращения: 17.02.2019).
2. Вербах К. Курс «Геймификация» [Электронный ресурс]. — Режим доступа: <https://www.coursera.org/learn/gamification> (дата обращения: 7.03.2019).
3. Ница А. Геймификация в образовании [Электронный ресурс]. — Режим доступа: <https://test.ru/2012/12/21/gamification-education/> (дата обращения: 7.03.2019).
4. Ярина С.Ю. Обучающие компьютерные игры // Мастерство online [Электронный ресурс]. – 2015. – 4(5). Режим доступа: <http://gipo.unibel.by/index.php?id=917> (дата обращения: 7.03.2019).

#### The system of internal quality assurance of the discipline

Survey of students on the quality of teaching the course, the results of their success.  
Feedback from independent experts on the quality of teaching the discipline.