DISCIPLINE SYLLABUS
«Computers and computer technologies»

Higher Education Degree - Bachelor
Specialty 192 "Construction and civil engineering"
Educational program "Construction and Civil Engineering"
Year of study __1__, semester __1, 2__
Form of education ___ full-time __ _(full-time, part-time)
Number of ECTS credits__7__
Language of instruction Ukrainian_(Ukrainian, English, German)

Lecturer of the discipline	**Nesvidomin Viktor**
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	https://elearn.nubip.edu.ua/course/view.php?id=2754
Course page in eLearn	**https://elearn.nubip.edu.ua/course/view.php?id=2155**

DESCRIPTION OF THE DISCIPLINE

Computers and computer technologies are a scientific discipline that studies the principles of construction and functioning of computers, the organization of computing processes on personal computers, their algorithmization, PC software, as well as the effective use of modern information and communication technologies in construction activities.

The purpose of discipline is to obtain students theoretical knowledge of the basics of computer technology, to acquire practical skills in working on personal computers using existing CAS and CAD technologies on a PC in solving engineering problems in construction.

The study of the discipline will allow you to know:
1. elements of programming in a programming language, to form and solve engineering problems using modern computer mathematics systems;
2. work on a PC with modern computer graphics systems.

As a result of studying the discipline, the specialist should be able to:
3. decompose the task and implement program codes for their recording on the PC, implement numerical methods;
4. use the capabilities of computer graphics systems in the formation of 2 D and 3 D-models of building structures.

Acquisition of competencies:
- integral competence (IC):

IC - Ability to solve complex specialized problems of construction and civil engineering in the learning process, which involves the use of a set of theories and methods for determining strength, stability, modeling, strengthening of building structures; further safe operation, reconstruction, erection and installation of buildings and engineering structures; application of computer-aided design systems in the field of construction.

- General competencies (GC):

1 – Ability to abstract thinking, analysis and synthesis.

2 – Knowledge and understanding of the subject area, understanding of the professional activities of the construction industry.

4 – Ability to communicate in a foreign language.

5 – Ability to use information and communication technologies.

6 – Ability to apply knowledge in practical situations.

7 – Ability to evaluate and ensure the quality of work performed.

- Professional (special) competencies:

4 – Ability to select and use appropriate equipment, materials, tools and methods for the design and implementation of technological processes of construction production.

5 – Ability to apply computerized design systems and specialized application software to solve engineering problems of construction and civil engineering.

6 – Ability to engineering activities in the field of construction, preparation and use of technical documentation.

7 – Ability to take responsibility for the development and decision-making of architecture and construction in unpredictable work contexts.

11 – Possess methods of design, modeling and construction using computer-aided design and calculation of building structures of buildings and engineering structures of industrial, agro-industrial, transport and civil objects.

- Program learning outcomes:

1 – Demonstrate knowledge of fundamental and general engineering disciplines at the level necessary to understand the processes of design, construction, operation and reconstruction of construction objects.

3 – Present the results of their own work and argue their position on professional issues to specialists

6 – Apply modern information technologies to solve engineering and management problems of construction and civil engineering.

7 – Collect, interpret and apply data, including through the search, processing and analysis of information from various sources.

STRUCTURE DICIPLINS

Theme	h. (lectures, lab., himself)	Results teaching	Task	Evaluation (lab.+lessons+counter. +himself.+test)
Semester 1				
Meaningful module 1				
Topic 1. Hardware	2/2/4	**Understand** the structure and functioning of PC hardware	**Lab. 1.** **By oneself. 1.** Hardware and software analysis	3+3
Topic 2. Software	2/2/4	**Understand** the multivariate nature of existing software and its choices	**Lab. 2.** **By oneself. 1.** Units of measurement of information	3+3+3
Topic 3. Basics of algorithmization	2/2/4	**Be able to** create linear algorithms for solving problems	**Lab. 3.** **By oneself. 2.** Linear algorithms	3+3+3+10
Topic 4. Computer Mathematics Systems	2/2/4	**Be able to** create branched and cyclic algorithms	**Lab. 4.** **By oneself. 3.** Branched and cyclic algorithms	3+3+3+5
Topic 5.		**Be able to** write	**Lab. 5.**	3+3+3+10

Maple operators	2/2/4	programs mate. Computing in the Maple environment	**By oneself. 3.** Writing programs of linear, branched and cyclic algorithms	
Topic 6. Functions and procedures in Maple. 2D graphics	2/2/4	**Be able to** write user functions solving mat. problems	**Lab. 6.** **By oneself. 4.** Writing a program for constructing plane curves	3+3+3+5
Topic 7. 3D graphics. Animation	2/2/4	**Be able to** write graphing functions on a plane and in space	**Lab. 7.** **By oneself. 4.** Writing a surface building program	3+3+3+10
Total per module	14/14/28			**100**
Meaningful module 2				
Topic 8. Vector computing in Maple	2/2/4	**Be able to** write vector computing programs	**Lab. 8.** **By oneself. 5.** Writing procedures with vector operations	3+3
Topic 9. Matrix computing in Maple	2/2/4	**Be able to** write matrix calculation programs, solving systems of linear equations	**Lab. 9.** **By oneself. 5.** Writing procedures with matrix operations	3+3+3
Topic 10. Data processing. Interpolation	2/2/4	**Be able to** write numerical data processing programs	**Lab. 10.** **By oneself. 6.** Data processing. Interpolation	3+3+3+10
Topic 11. Approximation	2/2/4	**Be able** to process numerical data by approximation methods	**Lab. 11.** **By oneself. 6.** Approximation	3+3+3+5
Topic 12. Approximate methods for solving problems	2/2/4	**Be able to** write procedures for an approximate solution of nonlinear equations	**Lab. 12.** **By oneself. 7.** Analysis of functions. Solving nonlinear equations	3+3+3+10
Topic 13. Programming differential and integral calculus	2/2/4	**Be able to** write procedures for an approximate solution of differential and integral equations	**Лаб. 13.** **Сам. 7.** Approximate diff methods. and integral calculus	3+3+3+5
Topic 14. Optimization	2/2/4	**Be able to** write procedures for one-dimensional methods optimization	**Лаб. 14.**	3+3+3+10
Total per module	14/14/28			**100**
In just a semester				**70**
Passed				**30**

Semester 2				
Meaningful module 1				
Topic 1. Types of graph	2/4	**Understand** the properties of graphs – vector and pixel	**Lab. 1.** **By oneself. 1.** Pipe connection execution	3+3
Topic 2. Systems comp. Graphics. Autodesk packages	2/4	**Understand the** Autodesk Inventor interface	**Lab. 2.** **By oneself. 1.** Thumbnails of connection fittings	3+3+3
Topic 3. Three-dimensional graphics	2/4	**Be able to** create models of parts with basic operations	**Lab. 3.** **By oneself. 1.** Models of connection parts	3+3+3+10
Topic 4. Elements of parts	2/4	**Be able to** set the elements of parts – chamfers, cuts	**Lab. 4.** **By oneself. 1.** Forming grooves	3+3+3+5
Topic 5. Standard parts	2/4	**Be able to** work with libraries of standard parts	**Lab. 5.** **By oneself. 1.** Parametric modeling of parts	3+3+3+10
Topic 6. Assembly products	2/4	**Be able to** create assembly units	**Lab. 6.** **By oneself. 1.** Create a pipe connection	3+3+3+5
Topic 7. Paperwork	2/4	**Be able to** perform the functions of constructing drawings	**Lab. 7.** **By oneself. 1.** Execute pipe connection drawings	3+3+3+10
Total per module	14/28			**100**
Meaningful module 2				
Topic 8. Detailing	2/4	**Be able to** read assembly drawings	**Lab. 8.** **By oneself. 2.** Rotation part model execution	3+3
Topic 9. 3D Simulation in SW	2/4	**Be able to** create models of simple parts	**Lab. 9.** **By oneself. 2.** Execution of the model of the body part	3+3+3
Topic 10. Kinematic connections	2/4	**Be able to** create models of complex parts	**Lab. 10.** **By oneself. 2.** Kinematic part model execution	3+3+3+10
Topic 11. Associative drawings	2/4	**Be able to** create product drawings	**Lab. 11.** **By oneself. 2.** Assembly of the product	3+3+3+5
Topic 12. Assembly drawings	2/4	**Be able to** create general type drawings, specification	**Lab. 12.** **By oneself. 2.** Formation of a general drawing	3+3+3+10
Topic 13.		**Be able to** form	**Lab. 13.**	3+3+3+5

Presentation of products	2/4	product presentation scenes	By oneself. 2. Shape a presentation scene	
Topic 14. Kinematic study	2/4	**Be able to** perform kinematics and deformation analysis	**Lab. 14. By oneself. 2.** Self protection	3+3+3+10
Total per module	14/28			**100**
In just a semester				70
Exam				30
Total per course				100

EVALUATION POLICY

Deadlines and Rebuild Policy:	Works that are submitted in violation of deadlines without good reason are evaluated for a lower rating. Retaking of modules takes place with the permission of the lecturer in the presence of valid reasons (for example, sick leave)
Academic Integrity Policy:	Cheating during tests and exams is prohibited (including using mobile devices)
Attendance Policy:	Attendance of classes is mandatory. For objective reasons, training can take place online in agreement with the Dean of the Faculty

STUDENT GRADING SCALE

Applicant rating, points	National score for the results passing exams, tests;	
	Examinations	**credits**
90-100	Perfectly	credited
74-89	Well	
60-73	Satisfactory	
0-59	Disappointing	not credited

Recommended Sources

Base

1. https://www.maplesoft.com
2. https://www.autodesk.com
3. https://www.solidworks.com
4. Інформатика: Комп'ютерна техніка. Комп'ютерні технології: Підручник для студентів вищих навчальних закладів/ За ред. О.З.Пушкаря.- К.: Видавничий центр "Академія", 2002. -704 с.
5. Чисельні методи: Навчальний посібник. / Волонтир Л.О, Зелінська О.В., Потапова Н.А., Чіков І.А. – Вінниця: ВНАУ, 2020 – 322 с.
6. Алгоритми та методи обчислень [Електронний ресурс]: навч. посіб. / М. А. Новотарський. -– Київ : КПІ ім. Ігоря Сікорського, 2019. – 407 с.
7. Числові методи: навч. посібник / О.І. Ярошенко, М.В. Григорків. – Чернівці : Чернівецький нац. ун-т, 2018. – 172 с.

Secondary

8. Нелюбов В. О., Куруца О. С. Основи інформатики. Microsoft Excel 2016: навчальний посібник. Ужгород: ДВНЗ «УжНУ». - 2018. - 58 с.

9. Ляшенко Б.М. , Кривонос О.М., Вакалюк Т.А. Методи обчислень: навчально-методичний посібник для студентів фізико-математичного факультету. – Житомир: Вид-во ЖДУ, 2014. – 228 с.

Normative documents

10. Стандарт вищої освіти за спеціальністю 122 «Комп'ютерні науки» для першого (бакалаврського) рівня вищої освіти. URL: https://mon.gov.ua/storage/app/media/vishcha-osvita/zatverdzeni%20standarty/2019/07/12/122-kompyut. nauk.bakalavr-1.pdf.
11. Нові інформаційні технології, Електронний посібник, Режим доступу http://www.eduforme.org/mod/page/view.php?id=13