Syllabus
lighting component SC

Object-oriented programming

Subjects:	**Object-oriented programming**
Level of higher education:	**first (undergraduate)**
Course page in Moodle:	*https://dl2022.khadi.kharkov.ua/course/view.php?id=2985*
Semester:	**4 credits (120 hours)**
Final control form	**Test**
Consultations:	**on schedule**
Name of the department:	**Department of Computer Technologies and Mechatronics**
Teaching language:	**English**
Course leader:	**Serhii Viktorovych Pronin, Ph.D., associate professor**
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Brief content of the educational component:

The **goal** is to teach students the basics of object-oriented design and programming in modern software development environments.

Subject: theoretical and methodological foundations of the object-oriented approach in creating software.

The main **tasks** of studying an academic discipline are:

- studying the methodology and principles of building object-oriented programs;
- studying the basics of object-oriented programming;
- studying the basic principles of designing object-oriented programs.

Prerequisites for studying the educational component:
Fundamentals of programming; Informatics; Higher mathematics

Competencies acquired by the acquirer:
General competences:

The ability to think abstractly.

Ability to gather and interpret information and express judgments about relevant social, scientific or ethical problems.

Special (professional) competences:

Ability to apply typical analytical methods and computer software for solving engineering tasks in the field of lifting and transport, construction, road and reclamation engineering.

The ability to evaluate and ensure the quality of the work performed.

Ability to use computerized design systems and specialized application software to solve engineering tasks in the field of mechanical engineering.

The ability to find and use interdisciplinary and interdisciplinary connections in scientific activity.

Learning outcomes:

Search for the necessary scientific and technical information in available sources, in particular, in a foreign language, analyze and evaluate it.

Analyze engineering objects, processes and methods.

Thematic plan

№ of topic	Name of topics (LK, LR, PR, SZ, SR)	Number of hours	
		intramural	extramural
1	LK Fundamentals of Python programming	2	2
	PR Creation of a program in the Python language	4	4
	CP Algorithm of the program in the Python language	9	9
2	LC Principles of object-oriented programming	2	2
	PR Creating a simple class PR Construction of classes	4	4
	SR Attributes and class methods	9	9
3	LC Inheritance	2	2
	PR Interrelationships between classes during imitation PR Multiple inheritance	4	4
	SR The MRO mechanism in Python	9	9
4	LC Overloading of operators	2	2
	PR Overloading operators	4	4
	SR Decorators	9	9
5	LC Exceptions	2	2
	PR Handling of exceptional situations	4	4
	SR Using an exception when creating an application	9	9
6	LC Managed attributes	2	2
	PR Descriptors PR Methods __getattr__, __getattribute__ and __setattr__	4	4
	SR Use of managed attributes in classes	9	9
7	LK Metaclasses and decorators	2	2
	PR Decorators and metaclasses	4	4
	SR Metaprogramming	9	9
8	LC Principles of S.O.L.I.D	2	2
	PR Principles of S.O.L.I.D	4	4
	SR Design Patterns	9	9
Together	LK	16	16
	PR	32	32
	SR	72	72

Individual educational and research task (if available):

Teaching methods:
MH1–verbal method (lecture, explanation, story);
MH2 – practical method (practical classes);
MH3 – visual method (illustration method, demonstration method);
MH4 – work with educational and methodical literature;
MH6 – independent work.

Assessment forms and methods
FMO2 - final control (credit)
FMO3 - oral control (conversation)
FMO7 – practical examination (protection of practical works)Individual educational and research task (if available):

Teaching methods:
1) verbal: 1.1 traditional: lectures, explanations, stories, etc.;
1.2 interactive (non-traditional): problem lectures, discussions, etc.;
2) visual: method of illustrations, method of demonstrations
3) practical: 3.1 traditional: practical classes, seminars;
3.2 interactive (non-traditional): business and role-playing games, trainings, seminars-discussions, "round table", brainstorming method.

Evaluation system and requirements:

Current performance
1 The current success of applicants for the performance of educational types of work in training sessions and for the performance of independent work tasks is evaluated using a four-point rating scale with subsequent transfer to a 100-point scale. During the evaluation of the current academic performance, all types of work provided by the educational program are taken into account.
1.1 Lecture classes are evaluated by determining the quality of performance of specified tasks.
1.2 Practical classes are evaluated by the quality of performance of a control or individual task, performance and design of practical work.
1.3 Laboratory classes are evaluated by the quality of reports on the performance of laboratory work.
1.4 Seminar classes are evaluated by the quality of individual assignment/abstract.

Final assessment
1 A student of higher education receives a credit in the last lesson in the discipline based on the results of the current assessment. The average score for the current activity is converted into points on a 100-point scale, according to the conversion table (table 1).
Applicants for higher education who have a current grade point average in the discipline lower than "3" (60 points) can increase their current grade by taking tests in the discipline in the last session.
Assessment of the knowledge of applicants through testing is carried out according to the following scale:
– "Excellent": at least 90% of correct answers;
– "Very good": from 82% to 89% of correct answers;
– "Good": from 74% to 81% of correct answers;
– "Satisfactory": from 67% to 73% of correct answers;
– "Satisfactory enough": from 60% to 66% of correct answers;
– "Unsatisfactory": less than 60% of correct answers.
2 The condition for obtaining credit is:
- making up for all missed classes;
– the average current grade in the discipline is not lower than "3" (60 points).
3 For performing individual independent work and participation in scientific events, additional points are awarded to the winners.
3.1 Additional points are added to the sum of points scored by the student of higher education for the current educational activity (for disciplines for which the final form of control is a credit), or to the final grade in the discipline for which the final form of control is an exam.
3.2 The number of additional points awarded for different types of individual tasks depends on their volume and importance:
- prizes in the discipline at the international / all-Ukrainian competition of scientific student works - 20 points;

- prize places in the discipline at the All-Ukrainian Olympiads - 20 points;
- participation in the international / all-Ukrainian competition of scientific student works - 15 points
- participation in international / all-Ukrainian scientific conferences of students and young scientists - 12 points;
- participation in all-Ukrainian Olympiads in the discipline - 10 points
- participation in Olympiads and scientific conferences of the Khnadu in the discipline - 5 points;
- performance of individual scientific and research (educational and research) tasks of increased complexity - 5 points.

3.3 The number of additional points cannot exceed 20 points.

4 The learning result is evaluated (select is required):

– on a two-point scale (passed/failed) according to table 2;

– on a 100-point scale (for differentiated assessment) according to table 3.

The final grade together with additional points cannot exceed 100 points.

Table 1 – Scale for transferring points to the national evaluation system

On a 100-point scale	**On a national scale**
from 60 points to 100 points	**are counted**
less than 60 points	**are not counted**

Table 2 – The scale for evaluating the knowledge of students based on the results of the final control of the academic discipline

Evaluation in points	**Evaluation according to the national scale**		**Evaluation according to the ECTS scale**	
	examination	**test**	**Rating**	**Criteria**
90-100	**Perfectly**	**Enrolled**	**A**	**The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have been formed, all educational tasks provided for in the training program have been completed, the quality of their performance has been assessed with a number of points close to the maximum**
80–89	**Okay**	**Enrolled**	**B**	**The theoretical content of the course has been mastered in its entirety, without gaps, the necessary practical skills for working with the mastered material have mainly been formed, all educational tasks provided for by the training program have been completed, the quality of most of them has been assessed with a number of points close to the maximum**

Evaluation in points	Evaluation according to the national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
75-79			C	The theoretical content of the course has been mastered in its entirety, without gaps, some practical skills of working with the mastered material have not been formed enough, all educational tasks provided for by the training program have been completed, the quality of none of them has been assessed with a minimum number of points, some types of tasks have been completed with errors
67-74	Satisfactorily		D	The theoretical content of the course is partially mastered, but the gaps are not of a significant nature, the necessary practical skills for working with the mastered material are basically formed, most of the educational tasks provided by the training program have been completed, some of the completed tasks may contain errors
60–66			E	The theoretical content of the course has been partially mastered, some practical work skills have not been formed, many educational tasks provided by the training program have not been completed, or the quality of some of them has been assessed with a number of points close to the minimum.
35–59	Unsatisfactorily	Not counted	FX	The theoretical content of the course has been partially mastered, the necessary practical work skills have not been formed, most of the prescribed training programs of educational tasks have not been completed, or the quality of their implementation has been assessed with a number of points close to the minimum; with additional independent work on the course material, it is possible to improve the quality of the performance of educational tasks (with the possibility of retaking)

Evaluation in points	Evaluation according to the national scale		Evaluation according to the ECTS scale	
	examination	test	Rating	Criteria
0–34	**Unacceptable**		**F**	**The theoretical content of the course has not been mastered, the necessary practical work skills have not been formed, all completed educational tasks contain gross errors, additional independent work on the course material will not lead to any significant improvement in the quality of the performance of educational tasks (with a mandatory repeat course).**

Course policy:

– the course involves working in a team, the environment in the classroom is friendly, creative, open to constructive criticism;

- mastering the discipline involves mandatory attendance of lectures and practical classes, as well as independent work;

- independent work involves the study of individual topics of the academic discipline, which are presented in accordance with the program for independent study, or were considered briefly;

– all tasks provided by the program must be completed within the set time;

- if the student of higher education is absent from classes for a good reason, he presents the completed tasks during independent preparation and consultation of the teacher;

- while studying the course, students of higher education must adhere to the rules of academic integrity set forth in the following documents: "Rules of academic integrity of participants in the educational process of the Khnadu" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_dobroch_1.pdf), "Academic integrity. Checking the text of academic, scientific and qualification papers for plagiarism" (https://www.khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_85_1_01.pdf), "Moral and ethical code of participants in the educational process of the Khnadu (https://www .khadi.kharkov.ua/fileadmin/P_Standart/pologeniya/stvnz_67_01_MEK_1.pdf).

- in case of detection of plagiarism, the applicant receives 0 points for the task and must repeat the tasks provided for in the syllabus;

- writing off during tests and exams is prohibited (including using mobile devices). Mobile devices are allowed to be used only during online testing.

Recommended literature: (literature no later than 10 years old, except for 1 fundamental classical textbook or monograph)

1. Basic literature

1. Learning Python, 5th Edition Fifth Edition – O'Reilly Media; Fifth edition (July 30, 2013). – 1643 pages.

2. Python Object-Oriented Programming: Build robust and maintainable object-oriented Python applications and libraries, 4th Edition 4th ed. Edition / Steven F. Lott (Author), Dusty Phillips (Author). – Packt Publishing; 4th ed. edition (July 2, 2021). – 714 pages.

3. Object-oriented analysis and design with examples of applications, 3 3rd Edition / by Grady Booch (Author), Robert A. Maksimchuk (Author), Michael W. Engle (Author), Bobbi J. Young (Author), & 2 more – Addison-Wesley Professional; 3rd edition (April 30, 2007). – 720 pages.

2. Supporting literature:

4. Python documentation URL: https://docs.python.org/3.7/library/functions.html (Дата звернення: 16.12.2020г.).

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