



## Syllabus Course Program



# Fundamentals of Informatics

### Specialty

133 – Industrial machinery engineering

### Educational program

Industrial machinery engineering

### Level of education

Bachelor's level

### Semester

1

### Institute

Educational-scientific Institute of Mechanical Engineering and Transport

### Department

Hydraulic Machines (150)

### Course type

Obligatory (professional)

### Language of instruction

English, Ukrainian

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## Lecturers and course developers



### Kseniia Riezva

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Candidate of Technical Sciences, Associate Professor of the Department of Hydraulic Machines of NTU "KhPI"

Work experience is 10 years.

Author and co-author of more than 60 scientific and educational works.

Courses: "Technical equipment and technology of well repair", "Introduction to the specialty. Introductory practice", "Hydrogasdynamics", "Hydraulics", "Basics of scientific research", "Fountain and gas safety in the oil and gas industry", "Machines and equipment for wells drilling, equipment for oil and gas production".



### Yevhenii Krupa

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Candidate of Technical Sciences, Associate Professor of the Department of Hydraulic Machines named after G.F. Proscura of NTU "KhPI"

The author of more than 50 scientific and educational works (articles, manuals, monographs, patents on a useful model). Courses: "Fundamentals of bladed hydraulic machines theory", "Hydraulic turbines and reversible hydraulic machines", "Fundamentals of CAD for bladed hydraulic machines", "Design of bladed hydraulic machines"

## General information

### Summary

The course develops knowledge and skills in working with modern computer hardware and software, which will allow students to solve complex tasks and practical problems in industrial mechanical engineering.

### Course objectives and goals

Formation of practical skills for solving mechanical engineering tasks using computer technology, having the ability to use office and application software packages.

### Format of classes

Lectures, laboratory works, consultations, individual calculation tasks. Final control in the form of an exam.

### Competencies

GC-1 ability to think abstractly

GC-10 Skills in the use of information and communication technologies.

SC-1 Ability to apply typical analytical methods and computer software tools for solving engineering problems of industrial mechanical engineering, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate computer software for solving engineering problems of industrial mechanical engineering.

### Learning outcomes

LA-1 Knowledge and understanding of the basics of technological, fundamental and engineering sciences, which are the basis of industrial mechanical engineering in the relevant field.

LA-5 Analyze engineering objects, processes and methods.

LA-14 Develop machine parts and assemblies using automated design systems.

### Student workload

The total volume of the course is 90 hours (3 ECTS credits): lectures - 16 hours, laboratory works - 16 hours, self-study - 58 hours.

### Course prerequisites

To successfully complete the course, it is necessary to have knowledge and practical skills in the following subjects: Higher Mathematics, Physics

### Features of the course, teaching and learning methods, and technologies

In the lectures, various methods of oral presentation of information are used: maintaining attention for a long time, activating the listeners' thinking; techniques that ensure logical memorization: persuasion, argumentation, evidence, classification, systematization, generalization, etc.

The method of discussion of educational material and discussion is used in lectures. The discussion makes it possible to significantly deepen and systematize knowledge and understanding of a particular problem, to check the basis of the conclusions reached by students during the study of a specific topic. The discussion method develops students' ability to defend their views and beliefs. The discussion helps to identify, logically and critically consider different points of view, scientific concepts and approaches to the issues under consideration. The organization and support of the discussion is achieved by using the following methods: asking questions (main, additional, leading, etc.), discussing the answers and opinions of students, correcting the answers and formulating conclusions.

Visual and practical teaching methods. Among the visual methods of learning, illustration and demonstration are used. Illustration - showing students posters, maps, graphs, sketches on the board. During distance education, lecture material is presented in the form of presentations with pictures and videos.

The material is available on the Microsoft 365 resource and on the Moodle platform.

# Program of the course

## Topics of the lectures

### Topic 1. Introduction to Python.

Origins of Python. Download and install Python.

### Topic 2. Data types and conditional operator.

Data types. Operators "if", "elif", "else".

### Topic 3. "For" and "while" loops.

The syntax of writing "for" loop. The syntax of writing "while" loop. "Break" and "continue" operators.

### Topic 4. Functions.

Elementary mathematical functions. How to import functions. Creating function. Why it is important.

Functions with and without parameters, with local and global variables. Result operator "return "

### Topic 5. Lists.

How to create a list? Functions and methods of lists. Two-dimensional lists.

### Topic 6. Set and dictionaries.

Set structure. How to create a dictionary and why it is necessary.

### Topic 7. Graphics.

Graph creation. The main elements of the graph. Several graphs on one field. Presentation of graphs on different fields. Diagrams creation.

### Topic 8. Microsoft Office software package.

Main features of Visio. Creating and editing documents using the Word editor.

## Topics of the workshops

There are no practical classes.

## Topics of the laboratory classes

1. Conditional operator "if"
2. "For" and "while" loop
3. Functions
4. Lists
5. Set
6. Dictionaries
7. Graphs
8. Diagrams creation
9. Solving tasks in Visio

## Self-study

The course involves the completion of an individual calculation task on several topics from lectures.

## Course materials and recommended reading

1. <https://www.online-python.com/>
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://flaviocopes.com/books-dist/python-handbook.pdf
3. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://cfm.ehu.es/ricardo/docs/python/Learning\_Python.pdf
4. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://static.realpython.com/python-basics-sample-chapters.pdf
5. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.tutorialspoint.com/microsoft\_visio/microsoft\_visio\_tutorial.pdf
6. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ptgmedia.pearsoncmg.com/images/9780735697805/samplepages/9780735697805.pdf
7. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.sgul.ac.uk/about/our-professional-services/information-services/library/documents/training-manuals/Word-Fundamentals-Manual.pdf

## Assessment and grading

### Criteria for assessment of student performance, and the final score structure

Description of the final score structure:  
Exam (online test + problem solving) - 40 points  
Laboratory works - 40 points  
Calculation task - 20 points

### Grading scale

Total points	National	ECTS
90-100	Excellent	A
82-89	Good	B
75-81	Good	C
64-74	Satisfactory	D
60-63	Satisfactory	E
35-59	Unsatisfactory (requires additional learning)	FX
1-34	Unsatisfactory (requires repetition of the course)	F

## Norms of academic integrity and course policy

The student must adhere to the Code of Ethics of Academic Relations and Integrity of NTU "KhPI": to demonstrate discipline, good manners, kindness, honesty, and responsibility. Conflict situations should be openly discussed in academic groups with a lecturer, and if it is impossible to resolve the conflict, they should be brought to the attention of the Institute's management.

Regulatory and legal documents related to the implementation of the principles of academic integrity at NTU "KhPI" are available on the website: <http://blogs.kpi.kharkov.ua/v2/nv/akademichna-dobrochesnist/>

## Approval

Approved by

Date, signature

**Head of the department**  
Andrii ROGOVYI

Date, signature

**Guarantor of the educational program**  
Iryna Tynianova