Національний технічний університет України
«КИЇВСЬКИЙ ПОЛІТЕХНІЧНИЙ ІНСТИТУТ
імені ІГОРЯ СІКОРСЬКОГО»

Department of Machines and Apparatus of Chemical and Oil Refining Production

# "Computer systems of two-dimensional design"

## The silhouette of the discipline

| Details of the discipline | |
|---|---|
| **Level of higher education** | **First (bachelor's) degree** |
| **Field of expertise** | 13 - Mechanical engineering |
| **Specialty.** | 133 - Industrial engineering |
| **Educational program** | "Computer-integrated technologies for designing chemical engineering equipment" |
| **Status of the educational component** | Selective |
| **Scope of the discipline** | 120 hours/ 4 ECTS credits |
| **Year of study, semester** | 3 (2 for the accelerated form) years of study, spring semester |
| **Form of study** | Full-time (daytime) |
| **Class schedule** | 1 lecture and 2 computer workshops every two weeks |
| **Semester control / control measures** | Credit / GR |
| **Language of instruction** | Ukrainian |
| **Information about the course leader / teachers** | D., Associate Professor, Seminsky Oleksandr Olehovych, forstd@ukr.net , @mahnv_kpi;<br>Volodymyr Kosenko, v.v.kosenko@kpi.ua |
| **Placement of the course** | http://ci.kpi.ua |

## Program of the discipline

### 1. Description of the discipline, its purpose, subject matter and learning outcomes

The discipline "Computer Systems of Two-Dimensional Design" is designed to expand the basic competencies in the field of computer-aided design, which provides a complement to the basic component of professional training of students in the program "Computer-Integrated Technologies for Designing Chemical Engineering Equipment" in accordance with the requirements of stakeholders.

***The aim of the discipline*** is to improve computer-aided design skills with an emphasis on the development of technical documentation.

The discipline forms the following ***competencies***:

- Ability to think abstractly.
- Ability to apply knowledge in practical situations.
- Ability to plan and manage time.
- Ability to generate new ideas (creativity).
- Skills in the use of information and communication technologies.
- Ability to learn and master modern knowledge.

- Ability to apply typical analytical methods and computer software tools for solving chemical engineering problems, effective quantitative methods of mathematics, physics, engineering sciences, as well as appropriate software for solving chemical engineering problems.
- Ability to implement engineering developments in industrial engineering, taking into account technical, organizational, legal, economic and environmental aspects throughout the entire life cycle of machines and devices: from design, construction, operation, maintenance, diagnostics and disposal.
- Ability to use computer-aided design systems and specialized application software to solve problems in chemical engineering.
- Ability to realize creative and innovative potential in project developments in the field of processes and equipment of chemical and related technologies.

The ***program learning outcomes*** after studying the discipline include:
- Analyze engineering objects, processes, and methods.
- Understand the methods and have the skills to design standard equipment, its components and elements in accordance with the task.
- Develop machine parts and assemblies using computer-aided design systems.

## 2. Prerequisites and post-requisites of the discipline (place in the structural and logical scheme of study in the relevant educational program)

The discipline is based on the educational components "Engineering and Computer Graphics" and "Fundamentals of Computer Engineering". It provides, first of all, the discipline "Processes and Equipment of Chemical Technology", as well as the educational components "Undergraduate Practice" and "Graduate Design".

## 3. Content of the discipline

**Topic 1:** Principles and examples of two-dimensional design in engineering practice.

**Topic 2.** Preparation and design of flow charts.

**Topic 3**. Preparation and design of automation schemes.

**Topic 4.** Technique of two-dimensional drawing.

## 4. Training materials and resources


1. Yanushevska, OI (2022). *Fundamentals of waste processing technology*. Igor Sikorsky Kyiv Polytechnic Institute.
2. Voloshin, M.D. (2016). *Technology of inorganic substances. Parts 1-3: Study guide*. Dneprodzerzhinsk: DSTU.
3. Suberlyak, O.V., Skorokhoda, V.Y., & Semenyuk, N.B. (2015). *Theoretical foundations of polymer chemistry and technology: a textbook*. Lviv: Lviv Polytechnic Publishing House.
4. Ratushniak, G.S. (2002). *Theoretical foundations of gas emissions treatment technology: Study guide for students of specialty "Heat and gas supply and ventilation"*. Vinnytsia: VDTU.
5. Technology and equipment for the production of drinking and industrial water: Physicochemical bases and algorithms for calculating water treatment processes [Electronic resource] : a textbook for students majoring in 161 "Chemical Technology and Engineering", specialization "Chemical Technology of Inorganic Substances and Water Treatment" / N.M. Tolstopalova, A. L. Kontsevoy, I. V. Kosogina, S. A. Kontsevoy ; Igor Sikorsky Kyiv Polytechnic Institute [Electronic text data (1 file: 2.52 MB)] - Kyiv : Igor Sikorsky Kyiv Polytechnic Institute, 2018. 130 p. - Title from the screen.
6. Kontsevoy, A. L. Technology of bound nitrogen and chemical fertilizers: technology and algorithms for calculating the production of nitrogen fertilizers [Electronic resource] : a textbook for students majoring in 161 "Chemical Technology and Engineering", specialization "Chemical Technology of Inorganic Substances and Water Treatment" / A.L. Kontsevoy ; Igor Sikorsky Kyiv Polytechnic Institute [Electronic text data (1 file: 4.57 MB)] - Kyiv : Igor Sikorsky Kyiv Polytechnic Institute, 2019. 227 p. - Title from the screen.

7. Pandey, J., Shoukry, Ya. (2022). *Practical Autodesk AutoCAD 2023 and AutoCAD LT 2023: A beginner's guide to 2D drafting and 3D modeling with Autodesk AutoCAD*. Packt Publishing.

## Educational content

### 5. Methods of mastering the discipline

**Calendar and thematic plan**

| *Week* | *The content of the training work* | *SRS (66 hours according to the curriculum)* |
|---|---|---|
| 1, And a week | **Lecture 1:** Principles and examples of two-dimensional design in engineering practice. | Study the topic of the class. Work with the recommended literature. |
| 2, And a week | **Computer workshop 1.** Technological lines for the production of chemicals. | Practical training on the topic of the class. |
| 3, Week 2 | **Computer workshop 2.** Technological lines for the production of plastics. | Practical training on the topic of the class. |
| 4, And a week | **Lecture 2.** Drawing up and designing flow charts. Theory. | Study the topic of the class. Work with the recommended literature. |
| 5, And a week | **Computer workshop 3.** Technological lines for the production of chemical fertilizers. | Practical training on the topic of the class. |
| 6, Week 2 | **Computer workshop 4.** Technological lines for the production of pharmaceutical substances. | Practical training on the topic of the class. |
| 7, And a week | **Lecture 3** Drawing up and designing flow charts. Examples. | Study the topic of the class. Work with the recommended literature. |
| 8, And a week | **Computer workshop 5.** Technological lines for the production of pesticides and insecticides. | Practical training on the topic of the class. |
| 9, Week 2 | **Computer workshop 6.** Technological lines for the production of dyes and pigments. | Practical training on the topic of the class. |
| 10, And a week | **Lecture 4.** Drawing up and designing automation schemes. Theory. | Working out the topic of the lesson.<br>Work with the recommended literature. |
| 11, And a week | **Computer workshop 7.** Technological lines for the production of household chemical products. | Practical training on the topic of the class. |
| 12, Week 2 | **Computer workshop 8.** Technological lines for the production of cosmetics. | Practical training on the topic of the class. |
| 13, And a week | **Lecture 5.** Drawing up and designing automation schemes. Examples. | Working out the topic of the lesson.<br>Work with the recommended literature. |
| 14, And a week | **Computer workshop 9.** Technological lines for the production of food additives and flavors. | Practical training on the topic of the class. |
| 15, Week 2 | **Computer workshop 10.** Technological lines for the production of adhesives and sealants. | Practical training on the topic of the class. |

| *Week* | *The content of the training work* | *SRS (66 hours according to the curriculum)* |
|---|---|---|
| 16, And a week | **Lecture 6:** Technique of two-dimensional drawing. Examples. | Working out the topic of the lesson. Work with the recommended literature. |
| 17, And a week | **Computer workshop 11.** Technological lines for the production of polymeric materials. | Practical training on the topic of the class. |
| 18, Week 2 | **Computer workshop 12.** Technological lines for the production of biofuels and bioethanol. | Practical training on the topic of the class. |
| 19, And a week | **Lecture 7.** Development of sketches and diagrams of equipment. | Study the topic of the class. Work with the recommended literature. |
| 20, And a week | **Computer workshop 13.** Technological lines for the production of detergents and soap. | Practical training on the topic of the class. |
| 21, Week 2 | **Computer workshop 14.** Technological lines for the production of synthetic rubber and rubber. | Practical training on the topic of the class. |
| 22, And a week | **Lecture 8.** Drawings of general types of equipment. | Study the topic of the class. Work with the recommended literature. |
| 23, And a week | **Computer workshop 15.** Technological lines for the production of building materials. | Practical training on the topic of the class. |
| 24, Week 2 | **Computer workshop 16.** Technological lines for wastewater treatment. | Practical training on the topic of the class. |
| 25, And a week | **Lecture 9.** Master class on design. | Study the topic of the class. Work with the recommended literature. |
| 26, And a week | **Computer workshop 17.** Presentations of graphic works. | Preparation of graphic work. |
| 27, Week 2 | **Computer workshop 18.** Final lesson. | Preparing for the final lesson. |

## 6. Independent work of the student

The types of independent work are listed in the table in paragraph 5, according to the academic weeks and scheduled classes.

## Policy and control

## 7. Policy of the academic discipline (educational component)

A system of requirements for students:

- **rules for attending classes** - attendance at all types of classes (lectures, computer workshops) is mandatory both in classrooms and in distance learning. In the latter case, classes are held in Zoom conferences and students attend them by connecting to the links provided by teachers;
- **rules of behavior in the classroom** - not to interfere with other students' listening to lectures or working in practical classes by unnecessary activities or conversations (including by phone). In the classroom and during distance learning at home, follow safety rules;

- **rules for crediting practical classes and awarding points for their completion** - the teacher evaluates the student's work during the class, the quality and timeliness of the presentation of the results of the assignment;
- **rules for awarding reward and penalty points** - no reward and penalty points are provided;
- **policy of deadlines and retakes**:

1) all assignments are submitted and evaluated exclusively during classroom sessions;

2) passing/retaking of the test is carried out according to the schedule established at the university level within the timeframe determined by the teacher and communicated to students when the rating scores are announced;

- **Policy on Academic Integrity** - students are required to comply with the provisions of the Honor Code and the requirements of academic integrity during the educational process.

## 8. Types of control and rating system for assessing learning outcomes (RSO)

**Current control**. Students receive points:

1. For completing computer workshops - up to 5 points for each workshop (maximum 80 points for all workshops):

5 points are awarded for excellent performance of the task;

4 points are awarded for good performance of the task;

3 points are awarded for satisfactory completion of the task;

1-2 points are awarded for a sufficient level of performance of the assignment, taking into account the completeness of the work and timely submission.

2. Up to 20 points for graphic work. Points are awarded based on the completeness and correctness of the work.

**Calendar control**: is carried out twice a semester on weeks 7-8 and 14-15 as a monitoring of the current state of fulfillment of SilaBus requirements - a student receives "satisfactory" during the first and second calendar control if his/her current rating is at least 0.5 of the maximum number of points possible at the time of control.

**Semester control** is carried out in the form of a test, which is given at the last practical lesson based on the results of work in the semester in accordance with the student's rating in the discipline.

**Conditions of admission to semester control**:

- admission to the test is possible only in case of successful completion of all computer workshops and submission of graphic work;
- students who received a total rating score of < 25 during the semester are not allowed to take the test.

**Table of correspondence between rating points and grades on the university scale**:

| *Number of points* | *Assessment.* |
|---|---|
| 100-95 | Excellent |
| 94-85 | Very good |
| 84-75 | Okay. |
| 74-65 | Satisfactory |
| 64-60 | Enough |
| Less than 60 | Unsatisfactory |
| The conditions for admission are not met | Not allowed |

## 9. Additional information on the discipline (educational component)

Lectures are held in the form of master classes supplemented by explanations of theoretical material.

Retakes are conducted according to a "soft" scheme (with the points gained during the semester). In this case, 10 penalty points are removed for each retake.

**The silhouette of the discipline:**

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Approved at the meeting of the Department of Machines and Apparatus of Chemical and Oil Refining Production (Minutes No. 19 of May 17, 2023).

**Approved by the** Methodological Commission of the Faculty of Engineering and Chemistry (Minutes No. 10 of May 26, 2023).