

SYLLABUS OF THE ACADEMIC DISCIPLINE «ENGINEERING AND COMPUTER GRAPHICS»



Academic degree	Bachelor
Specialty	141 Electrical energetics, electrical engineering and electromechanics
Academic program	Electrical energetics, electrical engineering and electromechanics
Period of study	1, 2 semesters (2-4 terms)
Total workload	4 credits ECTS (120 hours)
Classroom workload:	
lectures:	2 hours (2 term), 1 hour (3, 4 terms)
laboratory works:	1 hour (3, 4 terms)
Language of study	English

Course page in E-learning platform of DniproTech:

<https://do.nmu.org.ua/course/view.php?id=974>

Teaching Department Engineering, Technical Aesthetics and Design (ETAD)

Information about instructor:



Fedoriachenko Serhii Oleksandrovykh,

Associate Professor, Candidate of Technical Sciences,
Head of the Department of Engineering, Technical Aesthetics
and Design

Personal web-page

<https://okmm.nmu.org.ua/ua/Fedoriachenko.php>

E-mail:

Fedoriachenko.s.o@nmu.one

1. About this course

Engineering and computer graphics is aimed at studying and mastering methods of depicting spatial bodies on a plane and making drawings in accordance with the state standard with the use of modern computer technology.

2. Aim and objectives

The aim of the course is to form competencies in the means of depicting spatial forms on a plane with the use of computer technology, which is the foundation on which the basic rules of technical drawing are based.

Course objectives:

- providing students with basic information on the rules of drawing in accordance with the System of Design Documentation (SDD) and the standards of ESDD (Unified system of design documentation);
- to acquaint students with the methods of projection drawing;
- to acquaint students with ways to perform graphic images;
- to acquaint students with ways to construct complex lines of mutual intersection of surfaces;

- provide students with information about the construction and reading of drawings (views, sections, sections);
- to acquaint students with the rules of drawing sizes, images of threads and fasteners;
- to acquaint students with the rules of execution of drawings of detachable and non-detachable connections;
- provide information to students on the rules of assembly drawings and technical documentation;
- provide students with information on reading and detailing assembly drawings.
- to get acquainted with the rules of implementation and output of graphic information in automated image creation (in Autodesk AutoCAD);
- to get acquainted with the main commands of the Autodesk AutoCAD graphics system for creating drawings;
- provide information on the basic concepts, rules and commands of spatial modeling in Autodesk AutoCAD;
- to get acquainted with the complexes of operations of graphic systems that allow you to create and modify three-dimensional models of parts and their drawings;
- to get acquainted with the methods of developing complete sets of design documentation in the Autodesk AutoCAD package.

3. Learning outcomes

- use the concepts and laws of descriptive geometry to formulate and solve scientific and scientific-technical problems with the reflection of geometric objects on the plane. To acquire knowledge of the development of design documentation based on the ability to make sketches and drawings of parts, read and detail assembly drawings, mark materials and develop drawings of electrical circuits using computer-aided design tools.

4. Course structure

Lectures
Preface. The method of projections. Types of projections. Projections of a point. The method of G. Monge.
The straight line. Position of the line relative to the projection planes. Natural size and angles of inclination to the projection planes of the line of general position. Relative position of a point and a line, two lines.
The plane. Ways to set the plane on a complex drawing. Classification of planes. A line and a point in a plane.
Curved lines and surfaces. Classification. Formation of shapes.
Fundamentals of drawing. Basic rules of drawing.
Fundamentals of computer-aided design: an overview of the main CAD systems for developing design documentation and 3D modeling of technical objects. Basic functionality of 2D and 3D modeling of computer-aided design systems (for example, AutoCAD, Inventor).
Projection of geometric bodies. Projections of a point and a straight line belonging to the surface of an object. Building a third projection from two given ones.
Images: views, sections, cross-sections.
Working mechanical engineering drawings. Text inscriptions on the drawings. Designation of materials on detail drawings.
Threads. Conventional image and designation of threads. Elements of threads. Standard threaded fasteners and their designations. Threaded connections.
Basic rules for making sketches and working drawings.
Reading and detailing assembly drawings. Features of assembly drawing design. Specifications.
Drawings of electrical circuits. Reading. Rules of formatting. Graphic designations of elements.

Laboratory classes
USDD standards. Elements of the drawing. Formats, scales, lines, drawing fonts, graphic designations of materials. Application of dimensions. Geometric constructions of slope and conicity. Work on task 1 - "Building images and drawing sizes of simple parts"
Fundamentals of computer-aided design. Basic functionality of 2D and 3D modeling of computer-aided design systems (for example, AutoCAD, Inventor). Developing skills in creating 2D and 3D images of simple shapes. Creating associative images.
Work on task 2 - "Construction of the line of intersection of surfaces of rotation by means of 2D and 3D modeling of computer-aided design systems"
Work on task 3 - "Building a drawing and the necessary sections of the model according to its visual representation"
Work on task 4 - "Construction of the drawing and the necessary sections of the model by its views"
Work on task 5 - "Performing sketches and working drawings of parts based on the assembly drawing of the unit"
Work on the task - 6 " Performing a drawing of the electrical circuit of the device"

5. Technical equipment and/or software

Technical training tools.

Activated university mail account (student.i.p. @ Nmu.one) at Office365.

Electronic library of the department for educational and methodological support of the discipline.

Software: Windows, MS Office, Autodesk AutoCAD. MOODLE remote platform.

6. Evaluation system and requirements

6.1. The academic achievements of higher education applicants based on the results of the completion of the course will be evaluated on the scale below:

Rating	Institutional
90 – 100	Excellent
74 – 89	Good
60 – 73	Satisfactory
0 – 59	Fail

The general criteria for achieving the learning outcomes correspond to the descriptions of the 6th qualification level of the NQF.

6.2. Applicants for higher education can receive a **final grade** in the discipline on the basis of formative assessment of knowledge, provided that the number of points scored in formative testing, and laboratory works will be at least 60 points.

Laboratory works are accepted according to the control questions for each of the works.

The theoretical part is assessed by the results of a survey of students according to the plan of the theoretical course and independent work.

6.3. Criteria for evaluating the final work

If the higher education applicant has scored less than 60 points and / or seeks to improve the grade, a summative assessment is carried out in a form of a complex control work, which contains tasks that cover key learning outcomes. Work content is as follows: 30 test tasks with four answer options, 1 correct answer is evaluated in 1 point; (a total of 30 points), 6 test tasks with four answer options, 1 correct answer is evaluated in 2 points (a total of 12 points); 2 problems with four answer options, 1 correct answer is evaluated in 4 points; 3 problems with four answer options, 1 correct

answer is evaluated in 5 points (a total of 15 points); 7 theoretical questions with a detailed answer, the correct answer is estimated at 5 points (a total of 35 points).

The test is conducted using Google Forms technology, MS Office 365.

A late response is considered not to have been submitted.

7. Course policy

7.1. Policy on academic integrity. The academic integrity of higher education applicants is an important condition for mastering the learning outcomes of the course and obtaining satisfactory grades in formative and summative assessments. Academic integrity is based on the condemnation of the practices of cheating (writing with the involvement of external sources of information other than those authorized for use), plagiarism (reproduction of published texts of other authors without proper attribution), fabrication (inventing data or facts used in the educational process). The policy on academic integrity is regulated by the Regulation on system of prevention and detection of plagiarism at the Dnipro University of Technology (https://www.nmu.org.ua/ua/content/activity/us_documents.pdf)

If a higher education applicant violates academic integrity (cheating, plagiarism, fabrication), the assignment is graded unsatisfactory and must be repeated. In this case, the instructor reserves the right to change the topic of the assignment.

7.2. Communication policy. Applicants for higher education must have an activated corporate university email.

All written questions to the instructors regarding the course should be sent to the university email.

7.3. Policy on retakes. Assignments that are submitted late without valid reasons will be evaluated at a lower grade. Retakes of the summative assessment are allowed with the permission of the dean's office if there are valid reasons (e.g., sick leave).

7.4. Class attendance. Attendance at classes is mandatory for full-time applicants for higher education. Valid reasons for absence from classes are illness, participation in university events, and academic mobility, which must be confirmed by documents. A higher education applicant must notify the instructor either personally or through the leader of the academic group about the absence from class and the reasons for the absence.

For objective reasons (e.g. international mobility), studies may take place online with the consent of the course instructor.

7.5 Evaluation appeal policy. If a higher education applicant does not agree with the evaluation of his/her knowledge, he/she may appeal the grade assigned by the instructor in a prescribed manner.

8. Recommended readings

1. Методичні рекомендації з геометричного та проєкційного креслення з дисципліни «Інженерна та комп'ютерна графіка» /О.С. Жовтяк, Т.С. Савельєва, Д. С. Пустовой, – Дніпро: ДВНЗ «НГУ», 2017. – 64 с.

2. Ванжа Г.К. Геометричне креслення [Текст]: навчально-наочний посібник / Г.К. Ванжа, О.С. Жовтяк, О.О. Якушева, А.С. Тен – Д.: Національний гірничий університет, 2013. – 242 с.

3. Ванжа Г.К. Проєкційне креслення [Текст]: навчально-наочний посібник / Г.К. Ванжа, С.В. Балашов, Т.А. Кузнецова, О.В. Федоскіна – Д.: Національний гірничий університет, 2013. – 242 с.

4. Ванжа Г.К. Складальне креслення [Текст]: навчально-наочний посібник / Г.К. Ванжа, О.С. Жовтяк, О.О. Якушева, І.В. Вернер – Д.: Національний гірничий університет, 2013. – 242 с.

5. Ванжа Г.К. Машинобудівне креслення [Текст]: навч. посібник / Г.К. Ванжа, О.О. Якушева, Г.С. Тен, І.В. Вернер. – Д.: Національний гірничий університет, 2011. – 168 с.

Supplementary:

1. Бліюк А.В., Ванін В.В., Гнітецька Г.О. Оформлення конструкторської документації: Навч. посібник. 4-те вид., випр. і доп. -К.: Каравела, 2012.-200 с.
2. Ванін В.В., Перевертун В.В., Надкернична Т.М., Власюк Г.Г. Інженерна графіка. - К.: Видавнича група ВНУ, 2009.- 400 с.: іл