

# TECHNOLOGY OF STRUCTURAL MATERIALS

## COURSE SYLLABUS ABSTRACT

1-36 01 01 "Technology of mechanical engineering"

	STUDY MODE
	full-time
Year	2
Semester	4
Lectures, hours	34
Laboratory classes, hours	34
Exam, semester	4
Contact hours	68
Independent study, hours	40
Total course duration in hours / credit units	108/3

### 1. Course outline

The discipline is aimed at studying the structure and properties of the main structural materials used in industry. It includes a wide range of issues related to structure formation in the process of various methods of influence on the material, including mechanical, chemical and thermal. It discusses methods for studying metals and alloys, the structure of metals, plastic deformation and mechanical properties. A detailed description of the influence of heating on the structure and properties of the deformed metal is given; theory and technology of thermal and chemical-thermal treatment of steel. The marking, properties and scope of most structural materials are considered. Structural steels for general purposes. Heat-resistant and corrosion-resistant materials. Heat resistant materials. Metal-ceramic alloys based on iron. Tool steels. precision alloys. Titanium and its alloys. Refractory metals and their alloys. Aluminum, magnesium and their alloys. Copper and its alloys. Zinc, lead, tin and their alloys. Non-metallic materials, composite materials. Economic efficiency of using various types of materials and ways to increase the durability of products.

### 2. Course learning outcomes

Upon completion of the course, students will be expected to

#### **know:**

- methods for studying the structure and properties of materials;
- fundamentals of the theory and practice of thermal, chemical-thermal, thermomechanical processing of metallic materials;
- practical ways of studying the structure, properties of materials and their heat treatment;
- modern materials and effective methods of their heat-strengthening treatment.

#### **be able to:**

- rational use of reference literature on the choice of materials, technologies for their processing, providing the necessary indicators of properties;
- correctly determine the scope of a particular material;
- assign methods and regimes of structure-changing processing that provide optimal properties of materials for the operation of specific parts under certain operating conditions.

#### **possess:**

- methods for studying the structure and properties of materials;
- methods for determining the structure and properties of materials;
- the practice of using different materials.

### 3. Competencies

CK-2.2 - Know the relationship of the structure and composition of metals with their mechanical properties, methods of heat treatment of metals and alloys, methods for their research, basic properties and applications.

### 4. Requirements and forms of midcourse evaluation and summative assessment

To assess the current performance, a written or oral form is used (defense of laboratory work), and for an intermediate one, an oral-written form (exam).