

# MATERIALS SCIENCE AND TECHNOLOGY OF STRUCTURAL MATERIALS

(course title)

## **COURSE SYLLABUS ABSTRACT**

Specialty: 1 – 36 11 01 Innovative equipment for the construction complex

(speciality code and name)

|   | STUDY MODE |
|---|------------|
|   | full-time  |
| Year  | 2          |
| Semester                                      | 3,4        |
| Lectures, hours                               | 68         |
| Laboratory classes, hours                     | 68         |
| Pass/fail, semester                           | 3          |
| Exam, semester                                | 4          |
| Contact hours                                 | 136        |
| Independent study, hours                      | 104        |
| Total course duration in hours / credit units | 240/6      |

### 1. Course outline

The structure of metals. Plastic deformation and mechanical properties. Iron and its alloys. General purpose structural steels. 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. Materials technology: modern methods of obtaining structural materials, technological methods of improving the quality of metallurgical production; physical bases of forming of workpieces and machine parts by methods of plastic deformation, casting and welding.

### 2. Course learning outcomes

Upon completion of the course, students will be expected to

know:

- fundamentals of theory and practice of thermal, chemical-thermal, thermomechanical processing of metal materials;
- practical skills in studying the structure, properties of materials and their heat treatment;
- modern materials and effective methods of their heat-hardening treatment.

be able to:

- rationally use reference literature on the choice of materials, technologies of their processing, providing the necessary indicators of properties;
- correctly determine the application areas of a particular material;
- assign methods and modes of structuring processing.

possess:

- properties of materials;
- modern basic technological methods of forming blanks of parts;
- methods of determining the use of a particular material.

### 3. Competencies

BOD 4. Choose and apply materials depending on the specific working conditions of machine parts and equipment based on basic theoretical knowledge and practical skills.

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

The defense of laboratory work is carried out orally.

The test and the exam are conducted in writing in the form of answers to test questions.