



## СИЛАБУС ДИСЦИПЛІНИ «Materials Science»

Ступінь вищої освіти - **Bachelor**  
 Спеціальність **133-«Sectoral mechanical engineering»**  
 Освітня програма - «**Bachelor**»  
 Рік навчання – **2**, semester – **3, 4**  
 Форма навчання - **daily learning**  
 Кількість кредитів ЄКТС - **5**  
 Мова викладання – **english**

**Лектор курсу**  
**Контактна інформація**  
**лектора (e-mail)**  
**Сторінка курсу в eLearn**

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### ОПИС ДИСЦИПЛІНИ

(до 1000 друкованих знаків)

Purpose is skills of Materials Science and laying the basis for the study subjects: "Machine parts", "Hoisting machinery", "Tractors and cars", "Agricultural and meliorative machines", "The safety and repair of machines."

Objectives:

- Study methods of obtaining metals and alloys;
- Study of the structure, properties and destination of metals and alloys;
- Studying the basic theory of heat treatment of carbon and alloy steels, their technology heat and chemical-heat treatment, as well as specific details and working of agricultural machines;
- The study of the structure, properties and appointment of non-metallic construction materials.

### THE STRUCTURE OF DISCIPLINE

Title of thematic modules and themes	Hours (Lectures / Laboratory lessons/ Independent study)	Training facts	Tasks	Estimation, units
<b>3 semester</b>				
<b>The thematic module 1. Metal science</b>				<b>25</b>
Theme 1. The theory of alloys	4/4/4	Student should be <i>know</i> : the main connections between the composition, structure and properties of steels and cast irons and changes in these properties under thermal, chemical or mechanical stress.  Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the steels and cast irons for their production.	Delivery of laboratory works. Execution of independent works.	<b>10</b>
Theme 2. Carbon steels and cast irons	6/6/6			<b>15</b>
<b>The thematic module 2. Bases of heat treatment of metals and alloys</b>				<b>25</b>

Theme 3. The theory of heat treatment	6/6/6	Student should be <i>know</i> : the main connections between the composition, structure and properties of steels and cast irons and changes in these properties under thermal, chemical or mechanical stress.		<b>12</b>
Theme 4. Technology of heat treatment	6/6/6	Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the steels and cast irons for their production.	Delivery of laboratory works. Execution of independent works.	<b>13</b>
<b>The thematic module 3. Alloyed steels and alloys</b>				<b>20</b>
Theme 5. The alloying theory	4/4/4	Student should be <i>know</i> : the main connections between the composition, structure and properties of alloy steels and changes in these properties under thermal, chemical or mechanical stress.		<b>10</b>
Theme 6. Classification of alloy steels, marking and their use in agriculture	4/4/4	Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the steels and cast irons for their production.	Delivery of laboratory works. Execution of independent works.	<b>10</b>
<b>Total for 3 semester</b>	<b>30/30/30</b>	-	-	<b>70</b>
<b>Test</b>				<b>30</b>
<b>Total for 3 semester</b>				<b>100</b>
<b>4 semester</b>				
<b>The thematic module 4. Steels and alloys with special properties</b>				<b>25</b>
Theme 1. Corrosion and heat resistant steels and magnetic alloys.	2/2/4	Student should be <i>know</i> : the main connections between the composition, structure and properties of corrosion and heat resistant steels and magnetic alloys and changes in these properties under thermal, chemical or mechanical stress.		<b>10</b>
Theme 2. Amorphous, bimetallic and composite materials and materials with shape memory	2/2/6	Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the corrosion and heat resistant steels and magnetic alloys for their production.	Delivery of laboratory works. Execution of independent works.	<b>15</b>
<b>The thematic module 5. Non-ferrous metals and alloys</b>				<b>25</b>

Theme 3. Copper, aluminum, titanium, magnesium and their alloys	4/4/6	Student should be <i>know</i> : the main connections between the composition, structure and properties of copper, aluminum, titanium, magnesium and their alloys and changes in these properties under thermal, chemical or mechanical stress.	Delivery of laboratory works. Execution of independent works.	<b>15</b>
Theme 4. Zinc, lead. Solders. Antifriction alloys	3/3/6	Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the copper, aluminum, titanium, magnesium and their alloys for their production.		<b>10</b>
<b>The thematic module 6. Nonmetallic construction materials</b>				<b>20</b>
Theme 5. Polymers and plastics. Rubber. Glue materials. Inorganic glass.	2/2/6	Student should be <i>know</i> : the main connections between the composition, structure and properties of polymers and plastics, rubber, glue materials, inorganic glass and changes in these properties under thermal, chemical or mechanical stress.	Delivery of laboratory works. Execution of independent works.	<b>10</b>
Theme 6. Paints and insulating materials. Wood.	2/2/2	Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the polymers and plastics, rubber, glue materials. inorganic glass for their production.		<b>10</b>
<b>Total for 4 semester</b>	<b>15/15/30</b>	-	-	<b>70</b>
<b>Exam</b>				<b>30</b>
<b>Total for course</b>				<b>100</b>

### EVALUATION POLICY

<b><i>Deadline and retake policy:</i></b>	The student must submit the work within the time specified by the teacher. Works that are submitted in violation of deadlines without good reason are evaluated at a lower grade. Rearrangement of modules takes place with the permission of the lecturer if there are good reasons (for example, hospital).
<b><i>Academic Integrity Policy:</i></b>	Write-offs during tests and exams are prohibited (including the use of mobile devices). Course papers, abstracts must have correct text references to the literature used
<b><i>Visiting policy:</i></b>	The student is obliged to attend classes of all kinds every day in accordance with the established schedule, not to be late, to have the appropriate appearance. For objective reasons (for example, illness, international internship) training can take place individually (in online form in consultation with the dean of the faculty)

### STUDENT EVALUATION SCALE

<b>Student rating, points</b>	<b>Evaluation results on national exam tests</b>	
	<b>Exams</b>	<b>Tests</b>
90-100	Excellent	Accepted
74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactorily	Not accepted