



COURSE SYLLABUS

«Building material science and welding in construction»

Degree of higher education - Bachelor
Specialization 192-«Building and civil engineering»
Educational programme - «Bachelor»
Academic year – 1, 2. semester – 2, 3.
Form of study - full-time
Number of ECTS credits - 4
Language of instruction – English

Lecturer of the course
Contact information of the lecturer (e-mail)
Course page on eLearn

Aftandilants I.

aftvev@yahoo.com

Part 1. <http://elearn.nubip.edu.ua/course/view.php?id=1168>

Part 2. <http://elearn.nubip.edu.ua/course/view.php?id=2257>

COURSE DESCRIPTION

(up to 1000 printed characters)

The course " Building material science and welding in construction " is a complex discipline that contains basic information about the methods of obtaining construction materials and methods of their physical, chemical and mechanical processing in order to give them the appropriate properties and formation necessary in construction.

The purpose of the discipline is the general technological training of a specialist in the field of construction, as well as the acquisition of skills in construction material science and the establishment of a base for studying the disciplines: "Reinforced concrete and stone structures", "Reliability of construction equipment", "Technology of construction production", "Wood structures and plastics", "Inspection and testing of buildings and structures".

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.

Competencies of EP:

1) Integral competence (IC):

IC The ability to solve complex specialized construction and civil engineering tasks in the learning process, which involves the application of a complex of theories and methods for determining the strength, stability, deformability, modeling, strengthening of building structures; further safe operation, reconstruction, construction and installation of buildings and engineering structures; application of automated design systems in the field of construction.

2) **General competences (GC):**

GC2 – Knowledge and understanding of the subject area and professional activity.

GC6 – Ability to search, process and analyze information from various sources.

GC7 – Interpersonal skills.

3) **Professional (special) competences (PC):**

PC1 – Ability to use conceptual scientific and practical knowledge in mathematics, chemistry and physics to solve complex practical problems in the field of construction and civil engineering.

PC4 – Ability to choose and use appropriate equipment, materials, tools and methods for designing and implementing technological processes of construction production.

SC7 – Ability to take responsibility for making and making decisions in the field of architecture and construction in unpredictable work contexts.

PC10 – Ability to ensure the organization and technology of construction production of agro-industrial, industrial, transport and civil facilities using modern energy-efficient technologies and construction materials.

Program learning outcomes (PLO) of the educational programme:

PLO1 – Apply basic theories, methods and principles of mathematical, natural, social, humanitarian and economic sciences, modern models, methods and decision support software to solve complex construction and civil engineering problems.

PLO2 – Participate in research and development in the field of architecture and construction.

PLO4 – Design and implement technological processes of construction production, using appropriate equipment, materials, tools and methods.

PLO7 – Collect, interpret and apply data, including through the search, processing and analysis of information from various sources.

PLO8 – Rationally use modern building materials, products and structures based on knowledge of their technical characteristics and manufacturing technology.

COURSE STRUCTURE

Topic	Hours (lectures / laboratory, practical, seminar)	Learning outcomes	Tasks	Assessment
Semester 2				
Module 1. Metal science				25
Topic 1. Classification, structure and composition of building materials	4/10/2	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. Performing laboratory and independent work in "Elearn"	10
Topic 2. Carbon steels and cast irons	4/4/2			15
Module 2. Heat treatment of building materials				25
Topic 3. The theory of heat treatment	1/2/1	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	Delivery of laboratory works. Execution of independent works. Performing laboratory and independent	10
Topic 4. Technology of heat treatment	1/2/2			15

		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.	work in "Elearn"	
Module 3. Alloy and non-ferrous alloys, inorganic and organic binders, aggregates, concretes, ceramic and polymeric materials				20
Topic 5. The alloying theory	4/6/2	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. 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. Performing laboratory and independent work in "Elearn"	7
Topic 6. Non-ferrous metals and alloys	2/2/2			7
Topic 7. Inorganic and organic binders, aggregates, concretes, ceramic and polymeric materials	14/4/4			6
Total for 2 semester				70
Exam				30
Total for 2 semester				100
Semester 3				
Module 4. Welding technology in construction				35
Topic 8. Formation of welded joints and weldability of metal. Classification of welding methods in construction	2/2/1	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. Student should <i>be able to</i> based on knowledge of the working conditions to work of the machine parts to select of the	Delivery of laboratory works. Execution of independent works. Performing laboratory and independent work in "Elearn"	5
Topic 9. Arc welding: manual arc welding with a fusible electrode, automatic arc welding with a fusible electrode, arc welding in shielding gases, arc welding with a non-fusible electrode, special types of arc welding.	2/2/2			10
Topic 10. Plasma welding. Electroslag welding. Gas welding.	2/2/2			10
Topic 11. Hot welding	2/2/2			10

tools. Cold welding tools. Radiation welding. Inspection of welded joints		corrosion and heat resistant steels and magnetic alloys for their production.		
Module 5. Welding in construction				35
Topic 12. Classification of welded structures. Features of welding of different types of metals. Basic types of welded joints. Operation of welded joints under different load conditions.	2/2/2	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. 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.	Delivery of laboratory works. Execution of independent works. Performing laboratory and independent work in "Elearn"	5
Topic 13. Construction welded metal structures: frames of industrial buildings, welded beams, trusses and columns, sheet solid building structures	2/2/2			10
Topic 14. Machine-building welded structures and pipelines	2/2/2			10
Topic 15. New technologies in construction.	1/1/2			10
Total for 3 semester				70
Exam				30
Total for course				100

ASSESSMENT POLICY

<i>Policy regarding deadlines and results:</i>	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).
<i>Academic honesty policy:</i>	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
<i>Attendance policy:</i>	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)

SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

Student rating, points	National grade based on exam results	
	Exams	credits
90-100	Excellent	Accepted

74-89	Good	
60-73	Satisfactory	
0-59	Unsatisfactorily	Not accepted

RECOMMENDED SOURCES OF INFORMATION

The main ones:

The main ones:

1. Афтанділянц Є.Г., Зазимко О.В., Лопатько К.Г. Будівельне матеріалознавство та зварювання в будівництві. Навчальний посібник. К.: НУБіП України, 2018.- с. 523.
2. Новомлинець, О. О. Будівельне матеріалознавство : навч. посіб. для здобувачів вищої освіти спец. 192 – Будівництво та цивільна інженерія / О. О. Новомлинець, М. М. Корзаченко, А. І. Сергеев. – Чернігів : НУ «Чернігівська політехніка», 2021. – 420 с.
3. Будівельне матеріалознавство. Лабораторний практикум для студентів спеціальності «Будівництво та цивільна інженерія» / С.М. Скрєбнева, В.В. Грабовчак, А.І. Глушаниця/ – К.: НАУ, 2019. – 88 с.

Auxiliary:

1. Афтанділянц Є.Г., Зазимко О. В., Лопатько К.Г. Технологія конструкційних матеріалів і матеріалознавство. Навчальний посібникІ. Металознавство. Київ, НУБіП України. 2020- с.334.
2. Афтанділянц Є.Г., Зазимко О. В., Лопатько К.Г. Технологія конструкційних матеріалів і матеріалознавство. Курс лекцій. Частина II. Металознавство. Київ, НУБіП України. 2020- с.356.
3. Опальчук А.С., Афтанділянц Є.Г., Роговський Л.Л., Семеновський О.Є., Клендій М.Б., Біловод О.І., Дудніков І.А., Матеріалознавство і технологія конструкційних матеріалів: підручник для вищих навчальних закладів III-IV ступенів акредитації; за ред. А.С. Опальчука і О.Є. Семеновського. – Ніжин: Видавець ПП. Лисенко М.М., 2013. – 752 с.

Internet sources:

1. Спеціальні види бетонів: характеристика основних складів - <https://probud.in.ua/spetsialni-vidi-betoniv-harakteristika-osnovnih-skladiv.html>
2. Полимербетон — современный инновационный заменитель обычного бетона <http://stroyres.net/beton/polimerbeton/ponyatie-vidyi-proizvoditeli.html>
3. Армоцементные конструкции - https://ru.wikipedia.org/wiki/%D0%90%D1%80%D0%BC%D0%BE%D1%86%D0%B5%D0%BC%D0%B5%D0%BD%D1%82%D0%BD%D1%8B%D0%B5_%D0%BA%D0%BE%D0%BD%D1%81%D1%82%D1%80%D1%83%D0%BA%D1%86%D0%B8%D0%B8
4. Марки сталей і сплавів: властивості та характеристики <https://metinvestholding.com/ua/products/steel-grades>
5. Що таке чавун? Характеристики металу, особливості виробництва і застосування <https://metinvest-smc.com/ua/articles/chto-takoe-chugun-kharakteristiki-metalla-osobennosti-proizvodstva-i-primeneniya/>
6. Сплави кольорових металів https://uk.wikipedia.org/wiki/%D0%A1%D0%BF%D0%BB%D0%B0%D0%B2%D0%B8_%D0%BA%D0%BE%D0%BB%D1%8C%D0%BE%D1%80%D0%BE%D0%B2%D0%B8%D1%85_%D0%BC%D0%B5%D1%82%D0%B0%D0%BB%D1%96%D0%B2

7. Керамічні матеріали <https://www.pharmencyclopedia.com.ua/article/3477/keramichni-materiali>
8. Композиційні матеріали <https://mozok.click/1786-kompozicyn-materali.html>
9. Теплоізоляційні матеріали https://euroterm.com/brand-thermaflex/?gclid=EAIaIQobChMI15zGpYzl8QIVHQCIAx0gKg9iEAAYASAAEgJj1vD_BwE
10. Світлопрозорі конструкції. <https://stroyrec.com.ua/sv%D1%96tloprozor%D1%96-konstryc%D1%96%D1%97-ogliad-pol%D1%96mernih-sv%D1%96tloprozorih-mater%D1%96al%D1%96v/>