WELDING AND HARDENING OF SPECIAL STEELS
COURSE SYLLABUS ABSTRACT

6-05-0714-03 "Engineering and technical design and production of materials and products from them"
(speciality code and name)

"Equipment and technology of welding production"
(concentration)

	STUDY MODE		
	full-time	part-time	part-time (shortened program)
Year	**4**	**4, 5**	**3, 4**
Semester	7, 8	8, 9	6, 7
Lectures, hours	58	14	14
Laboratory classes, hours	46	10	10
Exam, semester	7, 8	8, 9	6, 7
Contact hours	104	24	24
Guided independent study, hours, type/ semestr	104	184	184
Independent study, hours	208/6	208/6	208/6

1. Course outline: Classification and characteristics of special steels and alloys. High-chromium steels. Chromium-nickel steels. Martesitic-aging steels. Nickel-based alloys. High-chloride steels. The tendency of seams to form gas inclusions. Alloying of the seam metal. Gas-electric welding. Welding behavior of pearlite, martensitic, ferritic, and austenitic steels. Weldability of special steels and alloys. Absorption of hydrogen by the seam metal during submerged arc welding, manual arc welding with coated electrodes, and in protective gases. Characteristics of heat resistance. The effect of structure and chemical composition on heat resistance. A tendency to cold and hot cracks. The effect of the thermal welding cycle on weldability.

2. Course learning outcomes
Upon completion of the course, students will be expected to
know:
- metallurgical processes during welding and the causal relationships between the nature of the process and the quality of welded joints; technological features of welding special steels;

be able to:
- sensitivity of special steels and alloys to the thermal deformation cycle of welding; heat treatment of welded joints; resource-saving welding technologies. be able to: select basic and welding materials for the manufacture of welded structures;

to possess a skill:
- design technological processes for welding special steels and alloys. have the skill to evaluate the technological strength of welded joints; rational choice of welding materials and heat treatment modes depending on the operating conditions of welded structures.

3. Competencies: to be able to choose rational schemes and modes of welding, hardening and heat treatment of welded joints of special steels and alloys, to evaluate the physical, mechanical and operational properties of materials and products.

4. Requirements and forms of midcourse evaluation and summative assessment: control papers – written response to test assignments; laboratory work defense – oral; test - written response to test assignments; exam – oral response to a ticket.