

**MINISTRY OF AGRICULTURE OF THE REPUBLIC OF KAZAKHSTAN  
"NJSC "S. SEIFULLIN KAZAKH AGROTECHNICAL UNIVERSITY"**

Approve  
NJSC "Saken Seifullin Kazakh  
Deputy Chairman of the Management  
Board Academic Activity-Rector  
\_\_\_\_\_ A.M Abdyrov.  
« \_\_\_\_\_ » \_\_\_\_\_ 2021.

**CATALOG OF ELECTIVE COURSES**

For students in groups of educational programs

Heat and gas supply, ventilation and eco-engineering in agriculture, Heat and Power engineering

**Nur-Sultan, 2021**

**MINISTRY OF AGRICULTURE OF THE REPUBLIC OF KAZAKHSTAN  
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Brief description of elective disciplines of the educational program

Professional Kazakh (Russian) language

1	Name of course	Political Science and Sociology
2	Code of course	PS 1117
3	Cycle of course	Language
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	1
8	Prerequisites	"School course Man society law "
9	Postrequisites	Fundamentals of economics and law
10	Course summary	Socio-political aspects of studying the problems of society
11	Learning outcomes	Socio-political aspects of studying the problems of society

1	Name of course	Ecology and fundamentals of life safety
2	Code of course	EOBZh 2118
3	Cycle of course	General education
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	"School course Biology, Geography "
9	Postrequisites	Environmental technologies for fuel combustion
10	Course summary	Ecosystem and environmental factors
11	Learning outcomes	Ecosystem and environmental factors

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Brief description of elective disciplines of the educational program

Professionally-oriented Foreign Language

1	Name of course	Engineering and computer graphics
2	Code of course	IKG 1210
3	Cycle of course	General education
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	1
8	Prerequisites	Geometry, drawing, and computer science
9	Postrequisites	Inventive creativity in heat and power engineering
10	Course summary	Methods for solving metric and positional problems in space
11	Learning outcomes	Methods for solving metric and positional problems in space

1	Name of course	Automation of gas supply and ventilation systems
2	Code of course	ASGV 3227
3	Cycle of course	Computer technologies in heat and power calculations and engineering graphics
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Physics, Mathematics, Chemistry
9	Postrequisites	Electrical equipment of thermal power stations
10	Course summary	Design issues of automatic control systems for gas supply and ventilation systems
11	Learning outcomes	Design issues of automatic control systems for gas supply and ventilation systems

1	Name of course	Theoretical and applied mechanics
2	Code of course	TPM 2218
3	Cycle of course	Theoretical disciplines
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	School course in algebra and geometry
9	Postrequisites	Fluid and Gas Mechanics
10	Course summary	Axioms of Statics and dynamics
11	Learning outcomes	Basics of Statics and dynamics

1	Name of course	Technical thermodynamics and heat and mass transfer
2	Code of course	TTT 2217

3	Cycle of course	Theoretical disciplines
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, higher mathematics, engineering and computer graphics
9	Postrequisites	Basics of thermal power plants, steam and gas turbines, boiler plants and steam generators
10	Course summary	Ways to transfer and change energy
11	Learning outcomes	Ways to transfer and change energy

1	Name of course	Heat transfer in enclosing structures
2	Code of course	TOK 2226
3	Cycle of course	Theoretical disciplines
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, engineering and computer graphics

9	Postrequisites	Steam and gas turbines, boiler plants and steam generators
10	Course summary	Thermal engineering calculation of enclosing structures
11	Learning outcomes	Thermal engineering calculation of enclosing structures

1	Name of course	Operation and adjustment of heat and gas supply and ventilation systems
2	Code of course	ENSTV 4231
3	Cycle of course	Theoretical disciplines
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Heat transfer in enclosing structures
9	Postrequisites	Diploma design
10	Course summary	Operating modes and adjustment of heat and gas supply and ventilation systems
11	Learning outcomes	Operating modes and adjustment of heat and gas supply and ventilation systems



1	Name of course	Electric machines and electric drive
2	Code of course	EME 3312
3	Cycle of course	Theoretical disciplines
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Electrical and Electronics Engineering
9	Postrequisites	Methods of maximum energy saving
10	Course summary	Methods of maximum energy saving
11	Learning outcomes	Methods of maximum energy saving

1	Name of course	Energy efficiency of buildings
2	Code of course	EZ 4315
3	Cycle of course	Theoretical disciplines
4	Amount of credits	7
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	4
8	Prerequisites	Heat transfer in enclosing structures
9	Postrequisites	Operation and adjustment of heat and gas supply and ventilation systems
10	Course summary	Energy-efficient design of residential and public buildings
11	Learning outcomes	Energy-efficient design of residential and public buildings

1	Name of course	Materials science in heat engineering
2	Code of course	MT 2213
3	Cycle of course	Technical hydromechanics and methods of water treatment
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, higher mathematics, engineering and computer graphics
9	Postrequisites	Basics of thermal power plants, steam and gas turbines, boiler plants and steam generators
10	Course summary	Effective use of modern methods and means of measuring heat engineering quantities
11	Learning outcomes	Effective use of modern methods and means of measuring heat engineering quantities

1	Name of course	Thermal engineering measurements
2	Code of course	TI 2214
3	Cycle of course	Technical hydromechanics and methods of water treatment
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, engineering and computer graphics
9	Postrequisites	Design of thermal points
10	Course summary	Solving applied problems of heat and power engineering
11	Learning outcomes	Solving applied problems of heat and power engineering

1	Name of course	Fluid and Gas Mechanics
2	Code of course	MZhG 2211
3	Cycle of course	Technical hydromechanics and methods of water treatment
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, higher mathematics, engineering and computer graphics
9	Postrequisites	Design of gas supply networks
10	Course summary	Calculations in the theory of physical modeling
11	Learning outcomes	Calculations in the theory of physical modeling

1	Name of course	Physical and chemical methods of water treatment
2	Code of course	FHMPV 2216
3	Cycle of course	Technical hydromechanics and methods of water treatment
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Fluid and Gas Mechanics
9	Postrequisites	Special questions about fuel combustion
10	Course summary	Waste water treatment technologies, thermal water treatment
11	Learning outcomes	Waste water treatment technologies, thermal water treatment

1	Name of course	Electrical and Electronics Engineering
2	Code of course	EE 2212
3	Cycle of course	Technical hydromechanics and methods of water treatment
4	Amount of credits	4

5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, mathematics
9	Postrequisites	Electrical equipment of thermal power stations
10	Course summary	Synchronous and asynchronous machines
11	Learning outcomes	Knowing of synchronous and asynchronous machines

1	Name of course	Fundamentals of scientific research
2	Code of course	ONI 3222
3	Cycle of course	Fundamentals of scientific research and professional languages
4	Amount of credits	3
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Physics, higher mathematics, engineering and computer graphics
9	Postrequisites	Diploma design
10	Course summary	Types of presentation of research results
11	Learning outcomes	Types of presentation of research results

1	Name of course	Safety in power plants
2	Code of course	TBEU 3224
3	Cycle of course	Furnace processes and devices
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	The basis of economics and law
9	Postrequisites	Energy saving in heat and power engineering and heat technology
10	Course summary	System of safety standards in power plants
11	Learning outcomes	System of safety standards in power plants



1	Name of course	Special questions about fuel combustion
2	Code of course	SVST 3303
3	Cycle of course	Furnace processes and devices
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Fluid and Gas Mechanics
9	Postrequisites	Design of ventilation and air conditioning systems
10	Course summary	Selection and calculation of burner devices depending on the type of fuel and the nature of the fuel burned
11	Learning outcomes	Selection and calculation of burner devices depending on the type of fuel and the nature of the fuel burned

1	Name of course	Use of renewable energy sources
2	Code of course	IVIE 2228
3	Cycle of course	Sections of the diploma design
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, Mechanics of liquid and gas
9	Postrequisites	Diploma design
10	Course summary	Use of primary and secondary energy resources
11	Learning outcomes	Use of primary and secondary energy resources

1	Name of course	Design of gas supply networks
2	Code of course	PSG 2230
3	Cycle of course	Sections of the diploma design
4	Amount of credits	4
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	2
8	Prerequisites	Physics, Mechanics of liquid and gas
9	Postrequisites	Diploma design
10	Course summary	Gas equipment for heating boilers and industrial furnaces
11	Learning outcomes	All equipment for heating boilers and industrial furnaces

1	Name of course	Design of ventilation and air conditioning systems
2	Code of course	PSVKV 3229
3	Cycle of course	Sections of the diploma design
4	Amount of credits	6
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Heat generating plants
9	Postrequisites	Diploma design
10	Course summary	Design of ventilation systems
11	Learning outcomes	Design of ventilation systems

1	Name of course	Engineering systems of buildings and structures
2	Code of course	ISZS 3317
3	Cycle of course	Sections of the diploma design
4	Amount of credits	7
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Physics, Mechanics of liquid and gas
9	Postrequisites	Diploma design
10	Course summary	Urban gas distribution networks
11	Learning outcomes	Urban and country gas distribution networks

1	Name of course	High-temperature processes and installations
2	Code of course	VPU 3314
3	Cycle of course	Sections of the diploma design
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	3
8	Prerequisites	Technical thermodynamics and heat and mass transfer
9	Postrequisites	Design of thermal points
10	Course summary	Ramjet-vortex melting chamber, mixer-dispenser-fluidized bed reactor, phase inversion reactor-tube furnace
11	Learning outcomes	Ramjet-vortex melting chamber, mixer-dispenser-fluidized bed reactor, phase inversion reactor-tube furnace

1	Name of course	Heat and gas supply to rural localities
2	Code of course	TSNM 3316
3	Cycle of course	Sections of the diploma design
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering

7	Year	3
8	Prerequisites	Heat generating plants
9	Postrequisites	Diploma design
10	Course summary	Thermal engineering tests of boiler plants
11	Learning outcomes	Thermal engineering tests of boiler plants

1	Name of course	Theoretical foundations of thermal power plants
2	Code of course	TOTES 4304
3	Cycle of course	Sections of the diploma design
4	Amount of credits	7
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	4
8	Prerequisites	Heat generating plants
9	Postrequisites	Energy audit of heating networks and heating systems
10	Course summary	Layout of the main and auxiliary equipment of the TPP
11	Learning outcomes	Layout of the main and auxiliary equipment of the TPP

1	Name of course	Design of thermal points
2	Code of course	PTP 4313
3	Cycle of course	Sections of the diploma design
4	Amount of credits	8
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	4
8	Prerequisites	Heat generating plants
9	Postrequisites	Diploma design
10	Course summary	Thermal calculation of heat points
11	Learning outcomes	Thermal calculation of heat points



1	Name of course	Energy audit of heating networks and heating systems
2	Code of course	EATSSO 4318
3	Cycle of course	Sections of the diploma design
4	Amount of credits	5
5	Level of preparation	Undergraduate studies
6	Department	Heat and power Engineering
7	Year	4
8	Prerequisites	Heat generating plants
9	Postrequisites	Diploma design
10	Course summary	Methods for determining the indicators of heat networks and heating systems
11	Learning outcomes	Methods for determining the indicators of heat networks and heating systems