



**Kazakh national research technical university named after K. I. Satpayev
Institute of Architecture, construction and energy named after T. K. Basenov
Department of Construction and building materials**

EDUCATIONAL PROGRAM

"CONSTRUCTION AND PRODUCTION OF BUILDING MATERIALS AND CONSTRUCTIONS"

(scientific and pedagogical direction (2 years))

**Master of Technical Science in the educational program "7M07302 - Construction and
production of building materials and structures"**




1-st edition
in accordance with the state higher education standard 2018

Almaty 2020

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Approved at the meeting of the Educational and methodological council of the Kazakh national research technical university named after K. I. Satpayev. Protocol №4 from 14.01.2020.

Qualification:

Qualifications and positions are determined in accordance with the «Qualification directory of positions of managers, specialists and other employees», approved by the order of the Minister of labor and social protection of the population of the Republic of Kazakhstan dated May 21, 2012 №. 201-p-m (as amended on 17. 04.2013). Graduates of the specialty 7M07302 «Construction and production of building materials and structures» can work in the following positions:

- master of technical sciences: organizations of higher and secondary professional education; research and design institutions; bureaus; companies, firms and organizations (enterprises) of construction, transport and communication, road construction, mining, oil and gas and military complexes; companies, firms and organizations (enterprises) of other economic infrastructures;

Professional competence: - the ability to apply knowledge, skills and personal qualities for successful activities in solving engineering problems in the construction industry.

Short description of the program:

The objects of professional activity of organizations of higher and secondary vocational education; research and design institutions; bureaus; companies, firms and organizations (enterprises) of construction; firms, organizations (enterprises) of other economic infrastructures, research institutes.

Masters of the specialty 7M07302 «Construction and production of building materials and structures» can perform the **following types of professional activities:**

- calculation and design and technical and economic;
- organizational and managerial support;
- production, technological and operational;
- legal, expert and advisory services
- scientific research;
- educational (pedagogical).

Settlement and design and technical and economic activities:

- production of appropriate calculations of structural elements of buildings and structures of transport and communication and oil and gas complexes;
- preparation of projects and feasibility studies for the construction of new, repairs, current maintenance and reconstruction of existing objects of transport and communication and oil and gas complexes.

Organizational and managerial activities:

- organization of the work of the labor collective of performers with the creation of the necessary conditions, equipping (providing) production with labor and material resources, making optimal management decisions in various production conditions;
- finding optimal solutions in the event of labor disputes on staffing, wages, cost and quality of various types of work, ensuring the safety of life, labor protection and compliance with environmental safety in production areas;
- assessment of production and non-production costs to ensure the quality of products of construction and repair production;

Production, technological and operational activities:

- planning and solving technological problems encountered in the production process;
- efficient use of materials and raw materials, equipment, machinery, modern computer programs for calculating and designing parameters of technological processes;
- organization and effective implementation of input quality control of raw materials, production control of semi-finished products and parameters of technological processes, quality of finished products;
- engineering and technical operation of buildings and structures.

Legal, expert and consulting activities:

- possession of basic knowledge in the field of civil, financial, commercial and other branches of law;
- ability to navigate the current legislation and the ability to apply certain legal norms in practice;
- conducting expertise and providing consulting assistance in various production situations.

PASSPORT OF THE EDUCATIONAL PROGRAM

1. Scope and content of the program

The duration of the master's degree is determined by the amount of academic credits mastered. When the set amount of academic credits is mastered and the expected learning outcomes for obtaining a master's degree are achieved, the Master's degree program is considered fully mastered. The scientific master's degree program has 120 academic credits with a study period of 2.0 years.

Planning of the content of education, the way of organizing and conducting the educational process is carried out by the university and the scientific organization independently on the basis of credit technology of training.

The Master's program implements educational programs of postgraduate education for the training of managerial personnel with in-depth professional training.

The content of the Master's degree program consists of:

- 1) theoretical training, including the study of cycles of basic and core disciplines;
- 2) practical training of undergraduates: various types of practices, scientific or professional internships;
- 3) experimental research work, including the implementation of the master's project;
- 4) final certification.

Objectives of the educational program:

The main objectives of the master's degree programs in the specialty 7M07302 «Construction and production of building materials and structures» are the training of highly qualified competent specialists in the field of construction, calculation and design, reconstruction of buildings and structures, as well as the production of building materials, products and structures capable of making the right decisions in the process of work.

2 Requirements for applicants

The previous level of education of applicants is higher professional education (bachelor's degree). The applicant must have a diploma of the established sample and confirm the level of knowledge of the English language with a certificate or diplomas of the established sample.

The procedure for admission of citizens to the master's program is established in accordance with the «standard rules for admission to training in educational organizations that implement educational programs of postgraduate education».

The formation of a contingent of undergraduates is carried out by placing a state educational order for the training of scientific and pedagogical personnel, as well as paying for training at the expense of citizens ' own funds and other sources. The state provides citizens of the Republic of Kazakhstan with the right to receive free postgraduate education on a competitive basis in accordance with the state educational order, if they receive this level of education for the first time.

Scientific, experimental and research activities:

- implementation of fundamental and applied scientific research in the study of objects of civil and industrial complexes;
- creation of new production technologies;
- implementation of development projects;
- production of analysis of the state and dynamics of objects of activity using modern methods and methods;
- production of scientifically based experimental studies on the objects of civil complexes;
- conducting standard and certification tests of materials and products;
- implementation of metrological verification of basic measuring instruments, reagents, hydrocarbon raw materials and final products.

Educational (pedagogical) activities:

- knowledge of the functions of teaching courses in basic disciplines, technology, organization, planning and management of construction production, performing educational work as a teacher (teacher) in institutions of secondary and vocational education (educational institutions).

At the «entrance», the master's student must have all the prerequisites necessary for the development of the corresponding educational program of the master's degree. The list of necessary prerequisites is determined by the higher education institution independently.

in the absence of the necessary prerequisites, the master student is allowed to master them on a paid basis.

3 Requirements for completing studies and obtaining a diploma

Degree/ qualifications awarded: The graduate of this educational program is awarded the academic degree of Master of Technical Sciences.

A graduate who has completed Master's degree programs must have the following general professional competencies::

- the ability to independently acquire, comprehend, structure and use new knowledge and skills in professional activities, develop their innovative abilities;
- the ability to independently formulate research goals, establish the sequence of solving professional tasks;
- the ability to apply in practice the knowledge of fundamental and applied sections of disciplines that determine the orientation (profile) of the master's program;
- the ability to professionally choose and creatively use modern scientific and technical equipment to solve scientific and practical problems;
- the ability to critically analyze, present, defend, discuss and disseminate the results of their professional activities;
- proficiency in the preparation and execution of scientific and technical documentation, scientific reports, reviews, reports and articles;
- willingness to lead the team in the field of their professional activities, tolerantly perceiving social, ethnic, religious and cultural differences;
- readiness for communication in oral and written forms in a foreign language to solve problems of professional activity.

A graduate who has mastered the master's program must have professional competencies that correspond to the types of professional activities that the master's program is focused on:

- *production activity:*

- ability to independently carry out production, field and laboratory and interpretation work in solving practical problems;

- the ability to professionally operate modern field and laboratory equipment and devices in the field of the master's degree program;

- the ability to use modern methods of processing and interpreting complex information to solve production problems;

- *project activity:*

- ability to independently draw up and present projects of research and production works;

- readiness to design complex research and production works in solving professional problems;

- *organizational and management activities:*

- readiness to use practical skills of organization and management of research and production works in solving professional problems;

- readiness for the practical use of regulatory documents in the planning and organization of scientific and production works;

When developing a master's program, all general cultural and general professional competencies, as well as professional competencies related to the types of professional activities that the master's program is focused on, are included in the set of required results of mastering the master's program.

4 Working curriculum of the educational program

4.1. Study duration 2,0 years

year of study	Code	Name of course	Component	Academic credits	lecture/ laboratory/ practice/MSIW	Prerequisites	Code	Name of course	Component	Academic credits	lecture/ laboratory/ practice/IWS	Prerequisites
1	1 semester						2 semester					
	LNG2 02	Foreign language (professional)	BD IC	6	0/0/ 3/3		HUM 201	History and philosophy of science	BD IC	4	1/0/ 1/2	
	HUM 204	Management psychology	BD IC	4	1/0/ 1/2		HUM 207	Higher school pedagogy	BD IC	4	1/0/ 1/2	
	CIV22 3	Fundamentals of scientific research	BD OC	6			CIV24 9	Professional computer programs	PS OC	6	1/0/ 2/3	
	1101	Elective	BD OC	6			2202	Elective	PS OC	6		
	1102	Elective	PS OC	6								
	1201	Elective	BD OC	6			AAP2 44	Pedagogical practice	BD IC	4	0/0/ 2/2	
	AAP2 42	Master's student scientific research, including an internship and a master's thesis.	MS SR	6			AAP2 42	Master's student scientific research, including an internship and a master's thesis.	MSS R	6		
	In total		40				In total		30			
2	3 semester						4 semester					
	3203	Elective	PS OC	6			AAP2 42	Master's student scientific research, including an internship and a master's thesis.	MSS R	6		
	3204	Elective	PS OC	6			AAP2 36	Research scientific training	PS	7		
	3205	Elective	PS OC	6			ECA2 05	Registration and defense of the master's thesis (RaDMT)	FA	12		
	3206	Elective	PS OC	6								
	AAP2 42	Master's student scientific research, including an internship and a master's thesis.	MS SR	6								
	In total		30				In total		25			
							In all		125			

Number of credits for the whole period of study	
Cycles of disciplines	Credits
The cycle of general education	0
A cycle of basic disciplines (BD IC, BD OC)	34
A cycle of principal subjects (PS IC, PS OC)	55
All on the theoretical classes:	89
MSSR	24
Registration and defense of the master's thesis (RaDMT)	12
In total	125

THE CURRICULUM FOR MODULAR EDUCATIONAL SYSTEM

Form of study: *full*

Duration of training: 2 years

Academic degree: Master of Technical Science

The cycle	code	Name of disciplines	Semester	Academ. credit	lec.	lab.	prac.	MSIW	Control type	Department
Profile training module										
Basic disciplines (BD) (34 credits)										
Institute component (IC)										
BD 1.1.1	LNG202	Foreign language (professional)	1	6	0	0	3	3	Exam	FL
BD 1.2.1	HUM201	History and philosophy of science	2	4	1	0	1	2	Exam	SS
BD 1.3.1	HUM207	Higher school pedagogy	2	4	1	0	1	2	Exam	SS
BD 1.4.1	HUM204	Management psychology	1	4	1	0	1	2	Exam	RECUP
BD 1.5.1	CIV223	Fundamentals of scientific research	1	6	2	0	1	3	Exam	CEaBM
Optional component (OC)										
BD 1.6.1	CIV244	Theory of elasticity and plasticity	1	6	2	0	1	3	Exam	CEaBM
BD 1.6.1.1	CIV220	Mathematical modeling in the technology of construction materials								
BD 1.7.1	CIV243	Spatial coverage	1	6	2	0	1	3	Exam	CEaBM
BD 1.7.1.1	CIV240	Modern standards for design calculation and design								
Practice-oriented module										
BD	AAP244	Pedagogical practice	2	4					Report	
Profiling subjects (PS) (55 credits)										
Institute component (IC)										
		Computer simulation module								
PS 2.1.1	CIV249	Professional computer programs	2	6	1	0	2	3	Exam	CEaBM
Optional component (OC)										
		Mathematical modeling module								
PS 2.2.1	CIV246	Seismic resistance of buildings and structures	1	6	2	0	1	3	Exam	CEaBM
PS 2.2.1.1	CIV247	Modern concrete								
PS 2.3.1	CIV207	Geotechnical engineering state and perspectives of development	2	6	2	0	1	3	Exam	CEaBM
PS 2.3.1.1	CIV228	Theoretical Foundations for the Production of Glass Crystal Materials								
PS 2.4.1	CIV211	Finite element method in construction problems	3	6	2	0	1	3	Exam	CEaBM
PS 2.4.1.1	CIV218	Colloidal cement systems								
PS	CIV245	Features in the construction of	3	6	2	0	1	3	Exam	CEaBM
Разработано:			Рассмотрено: заседание УС Института			Утверждено: УМС КазННТУ			Страница 8 из 36	

2.5.1		monolithic buildings								
PS 2.5.1.1	CIV219	Composite binders								
PS 2.6.1	CIV212	Modern design of construction projects	3	6	2	0	1	3	Exam	CEaBM
PS 2.6.1.1	CIV226	Silicate-sodium composite binders and concretes on their basis								
PS 2.7.1	CIV470	Project management	3	6	2	0	1	3	Exam	CEaBM
PS 2.7.1.1	CIV201	Intellectual property protection								
Practice-oriented module										
PS	AAP236	Research scientific training	4	7					Report	
Research module (24 credits)										
MSSR	AAP242	Master's student scientific research, including an internship and a master's thesis.	1,2, 3,4	24					Report	
Final certification module (12 credits)										
FA	ECA205	Registration and defense of the master's thesis (RaDMT)	4	12					Defense of dissertations	
Total credits				125						

5 Descriptors of the level and scope of knowledge, skills, skills and competencies

Requirements for the level of training of a master's student are determined on the basis of the Dublin descriptors of the second level of higher education (master's degree) and reflect the acquired competencies expressed in the achieved learning outcomes.

The results of training are formulated both at the level of the entire educational program of the master's degree, and at the level of individual modules or academic discipline.

Descriptors reflect learning outcomes that characterize the learner's abilities:

1) demonstrate developing knowledge and understanding in the studied field of science and technology related to the design, construction, operation of buildings and structures, civil and industrial purposes, as well as the production of building materials, products and structures, based on advanced knowledge of the construction industry, in the development and (or) application of ideas in the context of research;

2) apply your knowledge, understanding and abilities at a professional level to solve problems in a new environment, in a broader interdisciplinary context;

3) collect and interpret information to form judgments based on social, ethical and scientific considerations;

4) clearly and unambiguously communicate information, ideas, conclusions, problems and solutions, both to specialists and non-specialists;

5) training skills necessary for independent continuation of further training in the studied field of design, construction, operation of buildings and structures, civil and industrial purposes, as well as with the production of building materials, products and structures.

6 Competencies at the end of training

6.1 Requirements for the key competencies of graduates of the profile master's degree, must:

1) *to have an idea:*

- on current trends in the development of scientific knowledge;
- on current methodological and philosophical problems of natural (social, humanitarian, economic) sciences;
- on the contradictions and socio-economic consequences of globalization processes;
- on the current state of the economic, political, legal, cultural and technological environment of the global business partnership;
- on the organization of strategic enterprise management, innovation management, leadership theories;
- about the main financial and economic problems of the functioning of enterprises.

2) *to know:*

- methodology of scientific knowledge;
- the main driving forces of changes in the structure of the economy;
- features and rules of investment cooperation;
- at least one foreign language at a professional level that allows you to conduct scientific research and practical activities.

3) *be able to:*

- apply scientific methods of knowledge in professional activities;
- critically analyze existing concepts, theories and approaches to the study of processes and phenomena;
- integrate the knowledge gained in different disciplines, use it to solve analytical and managerial tasks in new unfamiliar conditions;

- conduct a microeconomic analysis of the company's economic activity and use its results in the management of the company;
- apply new approaches to the organization of marketing and management in practice;
- make decisions in complex and non-standard situations in the field of organization and management of the economic activity of the enterprise (firm);
- apply in practice the norms of the legislation of the republic of kazakhstan in the field of regulation of economic relations;
- creative thinking and creative approach to solving new problems and situations;
- conduct information-analytical and information-bibliographic work with the involvement of modern information technologies;
- summarize the results of experimental research and analytical work in the form of a master's thesis, article, report, analytical note, etc.

4) *have the skills:*

- solutions of standard scientific and professional tasks;
- scientific analysis and solution of practical problems in the organization and management of economic activities of organizations and enterprises;
- research problems in the field of management and marketing and use the results to improve the methods of enterprise management;
- professional communication and intercultural communication;
- oratory, correct and logical design of their thoughts in oral and written form;
- expanding and deepening the knowledge necessary for daily professional activities and continuing education in the doctoral program;
- use of information and computer technologies in the field of professional activity.

5) *to be competent:*

- in the field of research methodology in the specialty;
- in the field of modern problems of the world economy and the participation of national economies in world economic processes;
- in the organization and management of the company's activities;
- in the implementation of industrial relations with various organizations, including public service bodies;
- in ways to ensure constant updating of knowledge, expansion of professional skills and abilities.

B-Basic knowledge, skills and abilities:

B1 Be able to integrate knowledge gained in different disciplines to solve research problems in new unfamiliar conditions.

B2 Have the skills to use the acquired knowledge for the original development and application of ideas in the context of scientific research.

B3 Be able to make judgments and decisions based on incomplete or limited information through the integration of knowledge, be able to think creatively and creatively approach new problems and situations

P-Professional competencies:

P1 the Ability to conduct surveys to assess the state of natural and natural-man-made objects, determine the initial data for the design and calculation justification and monitoring of objects, patent research, prepare design tasks.

P2 Ability to conduct surveys to assess the state of natural and natural-man-made objects, determine the initial data for the design and design justification and monitoring of objects, patent research, prepare design tasks.

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазНИТУ	Страница 11 из 36
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P3 ability to conduct the organization, improvement and development of new technological processes of the production process at the enterprise or site, control over compliance with technological discipline, maintenance of technological equipment and machines.

P4 know modern technologies in construction production, new methods and methods in the technology of construction processes of buildings and structures, as well as in the production of building materials, products and structures.

P5 ability to organize the commissioning, testing and commissioning of facilities, samples of new and upgraded products manufactured by the enterprise.

P6 Know the basic principles of construction design, advanced methods of calculation and design of parts and assemblies, the basics of achieving maximum production efficiency and high quality of the final product.

P7 Know and use the latest achievements in the field of construction, determine the prospects for their use, carry out modeling of systems in the technology and organization of construction production.

P8 Be able to make qualified independent decisions based on the knowledge gained for subsequent practical justifications aimed at improving the functioning of construction industries, to introduce progressive forms of production organization at their enterprises.

O-Universal, social and ethical competencies:

O1 Have an idea of the role of science and education in public life, about current trends in the development of scientific knowledge, about current methodological and philosophical problems of natural (social, humanitarian, economic) Sciences.

O2 Willingness to work in a team, social interaction on the basis of accepted moral and legal norms, respect for people, willingness to be responsible for maintaining trusting partnerships

O3 Has a culture of thinking, is able to analyze, summarize information, set goals and choose ways to achieve them, has a culture of oral and written speech

C-Special and managerial competencies:

C1 Be able to economically justify and solve issues related to the organization of the production process, determine the volume and quality indicators of construction enterprises, process and analyze the results of theoretical and experimental studies on the technical level and operational condition of construction structures.

C2 Be able to competently predict the work of construction using statistical and other data; technically and economically evaluate foreign and domestic projects, development programs, strategic plans and promptly draw conclusions and proposals for practical application; as well as methods of rational organization of production processes in the construction sector.

C3 be Able to make informed decisions on the choice of options for management structures for the effective operation of construction enterprises; to make the formation of management structures at all levels; to use modern technologies for strategic planning purposes.

6.2 Requirements for experimental research work of a master's student in a specialized master's program:

1) corresponds to the profile of the master's degree program, according to which the master's project is carried out and defended;

2) it is based on modern achievements of science, technology and production and contains specific practical recommendations, independent solutions to management tasks;

3) performed with the use of advanced information technologies;

4) contains experimental research (methodological, practical) sections on the main protected provisions.

6.3 requirements for the organization of practices:

The educational program of the profile master's degree includes industrial practice in the PD cycle.

Industrial practice in the PD cycle is carried out in order to consolidate the theoretical knowledge obtained in the course of training, acquire practical skills, competencies and experience of professional activity in the master's degree program being taught, as well as develop best practices.

7 Annex to the certificate according to the standard ECTS

The application is developed according to the standards of the European Commission, the Council of Europe and UNESCO/sepes. this document serves only for academic recognition and is not an official confirmation of the document of education. It is not valid without a higher education diploma. The purpose of filling out the European Application is to provide sufficient data on the holder of the diploma, the qualification obtained, the level of this qualification, the content of the training program, the results, the functional purpose of the qualification, as well as information about the national education system. The application model that will be used for the transfer of assessments uses the European credit transfer or transfer system (ECTS).

The European diploma Supplement provides an opportunity to continue education at foreign universities, as well as to confirm national higher education for foreign employers. When traveling abroad for professional recognition, additional legalization of the diploma of education will be required. The European diploma Supplement is completed in English upon individual request and is issued free of charge.

Foreign language (professional)

CODE – LNG202

CREDIT - 6

PURPOSE AND OBJECTIVES OF THE COURSE

Thanks to this course, you will master specific terminology, be able to read specialized literature, get the knowledge necessary for effective oral and written communication in a foreign language in your professional activity.

BRIEF DESCRIPTION OF THE COURSE

In the course of training, students gain knowledge of a foreign language, including proficiency in specialized vocabulary, necessary for effective oral and written communication in a foreign language in their professional activities. Practical tasks and methods for developing the required language skills in the learning process include: case studies and role-playing games, dialogues, discussions, presentations, listening tasks, working in pairs or in groups, performing various written tasks, grammar tasks and explanations.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

As a result of mastering the discipline, the student will expand the professional lexical vocabulary, possess the skills of effective communication in a professional environment, the ability to correctly Express thoughts in oral and written speech, understand specific terminology and read specialized literature.

History and philosophy of science

CODE– HUM201

CREDIT –4

The goals and OBJECTIVES of the COURSE are to reveal the connection between philosophy and science, to highlight the philosophical problems of science and scientific knowledge, the main stages of the history of science, the leading concepts of the philosophy of science, modern problems of the development of scientific and technical reality

BRIEF COURSE DESCRIPTION the subject of philosophy of science, science dynamics, the specifics of science, science and prадnya, the antiquity and the emergence of theoretical science, main stages of the historical development of science, characteristics of science, neklassicheskie and post-non-classical science, philosophy, mathematics, physics, engineering and technology, the specifics of engineering Sciences, ethics of science, social and moral responsibility of the scientist and engineer

KNOWLEDGE and SKILLS UPON completion of the COURSE - know and understand the philosophical questions of science, the main historical stages of development of science, leading to the concept of philosophy of science, to be able to critically evaluate and analyze scientific and philosophical problems, to understand the specifics of engineering science, possess the skills of analytical thinking and philosophical reflection, to be able to justify and defend its position, own techniques of discussion and dialogue, to master the skills of commutatively and creativity in their professional work

Psychology of management

CODE HUM204

CREDIT –4

PREREQUISITE

PURPOSE AND OBJECTIVES OF THE COURSE

The main goal of the course is to study the characteristics of the behavior of individuals and groups of people within organizations; determining psychological and social factors influencing the behavior of employees. Also, much attention will be paid to the issues of internal and external motivation of people

The main goal of the course is to apply this knowledge to improve the efficiency of the organization.

BRIEF DESCRIPTION OF THE COURSE

The course is designed to provide a balanced coverage of all the key elements that make up the discipline. It will briefly explore the origins and development of organizational behavior theory and practice, and then explore the main roles, skills, and functions of management with a focus on management effectiveness, illustrated by real-life examples and case studies.

KNOWLEDGE, SKILLS AND ABILITIES AT THE END OF THE COURSE

At the end of the course, students will know: the basics of individual and group behavior; basic theories of motivation; basic theories of leadership; concepts of communication, conflict management and stress in the organization.

they will be able to identify the various roles of managers in organizations; look at organizations from the point of view of managers; understand how effective management contributes to an effective organization.

Pedagogy of higher education

CODE – HUM205

CREDIT –4

Purpose and objectives of the course. The course aims to study the psychological and pedagogical essence of the educational process of higher school; the formation of ideas about the main trends of development of higher education at the present stage, the consideration of methodical bases of training process in high school, as well as the psychological mechanisms influencing the success of learning, interaction, management subjects of the educational process. Development of psychological and pedagogical thinking of undergraduates.

Brief description of the course. In the course of studying the course, undergraduates get acquainted with the didactics of higher education, forms and methods of organizing training in higher education, psychological factors of successful learning, features of psychological influence, mechanisms of educational influence, pedagogical technologies, characteristics of pedagogical communication, mechanisms of managing the learning process. They analyze organizational conflicts and ways to resolve them, psychological destructions and deformations of the teacher's personality.

Knowledge and skills upon completion of the course – upon completion of the course the student should know: features of a modern system of higher professional education, organization of educational research, characteristics of subjects of educational process, didactic principles of organization of the learning process in higher education, educational technology, patterns of pedagogical communication, especially educational influences on students and problems of pedagogical activity.

Разработано:	Рассмотрено: заседание УС Института	Утверждено: УМС КазННТУ	Страница 17 из 36
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Professional computer programs

CODE – CIV 249

CREDIT - 6

The purpose of the discipline formation of the technological basis of competences, theoretical knowledge, practical skills and abilities in the specialized information systems support, analysis and research subject areas of the construction industry to obtain an objective evaluation of design, project activities, forecasting and planning science - based management decisions.

Mastering the methodology and technological tools of professionally-oriented computer programs to facilitate, accelerate and improve the quality of computational and analytical processing, modeling and presentation of information in the process of solving construction problems.

As a result of mastering the discipline, students should:

know:

- professionally-oriented computer systems and technology of their application in the field of calculation and design of building structures of buildings and structures;

- key aspects of development of calculation complexes and technologies, opportunities their use in the construction industry;

be able to:

- perform calculations of building structures of buildings and structures;
- apply modern calculation systems and programs for solving engineering problems in the field of calculation and design of building structures;

- work in the environment of specialized computer programs;

to own:

- skills of working with modern calculation systems for the calculation of building structures of buildings and structures, including spatial structures.

Fundamentals of scientific research

CODE – CIV 223

CREDIT - 6

The purpose of discipline - training of specialists familiar with research activity, capable of independent creative thinking, conducting research, collecting and analysing data, writing scientific articles, sections of major scientific research, as well as develop knowledge and skills on proper management of the pedagogical process as the object of professional activity.

Objectives of the discipline-training in modern information technologies, organization and conduct of research activities in the chosen scientific specialty, teaching in universities, successful combination of research and management activities, the basics of fundamental scientific training.

As a result of studying the discipline, undergraduates should:

have an idea:

- about the main social changes taking place in society, the role of science in material production, Economics, politics, management and in the education system and other spheres of society, about new trends in construction, as well as have an idea of modern methods of solving research and professional problems;

- on the current state of the science of experimental research;

- about the latest devices and equipment for experimental research;

know:

- general theoretical foundations for the formation of scientific research and the formulation of scientific research in the field of construction in accordance with the needs of man and society, as well as legislative acts, ethical and legal norms and regulatory materials for the organization and conduct of scientific research;

- methods of conducting experimental studies of various types of structures;

be able to:

- freely navigate in the choice of experimental research methods;

- formulate and solve research problems;

- choose the necessary analytical methods for solving problems;

- process the results obtained and apply them in practice;

acquire practical skills:

- organizational and managerial, design and research activities, implementation of various creative tasks in the field of construction, as well as in the field of scientific research in professional activities.

Theory of elasticity and plasticity

CODE – CIV 224

CREDIT - 6

The purpose of the discipline "Theory of elasticity and plasticity" is the acquisition of knowledge, skills and abilities by undergraduates on the issues of ensuring the mechanical reliability of complex spatial structural elements in further practical work.

Tasks of studying the discipline. Acquisition of skills in calculating complex structural elements, spatial structures, structures, machine parts for strength, rigidity and stability.

The study of the discipline is aimed at the formation of the following competencies:

- the use of the basic laws of natural science disciplines in professional activities, the use of methods of mathematical analysis and modeling, theoretical and experimental research;
- the ability to identify the natural-scientific nature of problems arising in the course of professional activity, to attract the appropriate physical and mathematical apparatus for their solution;
- the ability to understand the essence and importance of information in the development of modern information society, to recognize the dangers and threats that arise in this process, to comply with the basic requirements of information security;
- knowledge of the main methods, methods and means of obtaining, storing, processing information, skills of working with a computer as a means of information management.

A master's student should know:

- the main provisions and calculation methods used in the discipline "resistance of materials", which is based on the study of special courses of all building structures, machinery and equipment.

Be able to:

- choose the right construction materials that provide the required indicators of reliability, safety, efficiency and efficiency of structures;
- analyze the environmental impact on the material and structures, set requirements for construction and structural materials and choose the best material based on its purpose and operating conditions;
- draw up a conclusion on the condition of building structures based on the results of the survey and process the results of static and dynamic tests of structures and building systems;
- develop design solutions for the simplest buildings and enclosing structures, conduct technical calculations according to modern standards.

To own:

- skills in calculating elements of building structures and structures for strength, rigidity, stability;
- the main modern methods of setting, research and solving problems of mechanics.

Seismic resistance of buildings and structures

CODE – CIV 246

CREDIT - 6

The purpose of mastering the discipline "earthquake Resistance of buildings and structures" is to acquire in-depth knowledge and skills necessary for a specialist in the design of buildings and structures in seismically active areas of the earth, to master the practice of calculating buildings and structures for dynamic loads, including seismic, including using software systems.

Know:

- types of dynamic loads, methods of their mathematical description;
- causes of earthquakes, seismically active areas of the earth, principles of seismic zoning and microseismic zoning, principles of classification of earthquakes by magnitude and magnitude;
- basic laws of dynamic equilibrium of systems, knows the rules for performing matrix transformations, basic methods for solving differential equations;
- regulatory framework for earthquake-resistant construction of civil and industrial buildings, structures, structures of increased responsibility, unique structures, including those working together with the ground and water environment.

Be able to:

- to present a design scheme for a building, structure, to present a method for calculating seismic loads, a method for determining the stress-strain state of the structure;
- use the apparatus of mathematical analysis in solving engineering problems.

Have the skills:

- determination of seismic forces by linear-spectral method (LSM), calculations of strength and stability of structures taking into account seismic forces;
- calculations of the strength and stability of buildings and structures for seismic loads determined by.

Modern concretes

CODE – CTV 247

CREDIT - 6

The objectives of the development of the discipline are: to deepen the professional training of masters in the field of modern concrete and its production technology, to identify their role in construction.

The objectives of the course are: to study the technical and economic data of modern concrete, production technologies; to expand, systematize, deepen and consolidate theoretical knowledge; to develop the ability to independently solve a number of engineering and organizational problems related to the choice of modern materials, technologies and structures.

Know:

- methods of organizing production from the main production lines of a wide range of products;
- methodology of technical and economic calculations in the selection of modern materials, technologies and structures;

Be able to:

выбрать choose the necessary materials for the production of modern concrete, determine their suitability, taking into account economic and environmental factors;

- to carry out the justification and selection of rational technological and technical solutions; □ to calculate technical and economic indicators in the design of construction industry enterprises;
- independently solve a number of engineering and organizational tasks related to the organization, planning and management of production processes of building materials, products and structures.

Possess:

- skills to adjust project and working technical documentation.

Mathematical modeling in the technology of construction materials

CODE – CIV 220

CREDIT - 6

The purpose of studying this discipline is to master the methods of mathematical modeling of production processes of building materials and products.

Tasks:

- getting ideas about the main methods of mathematical modeling of the production of building materials and products, building mathematical models of the main processes using a software package that implements finite element methods (FEM).

- mastering the principles of development and features of the user interface of the software package;

- acquisition of skills in solving problems of mathematical analysis, in relation to modeling the processes of production of building materials and products;

- formation of prerequisites for computer research of the tasks of those areas of research that correspond to the scientific topic of the master's student.

The master's student should know

- the main provisions of the theory of similarity and the principles of mathematical modeling;

- fundamentals of the culture of scientific research;

- scientific basis for the integrated use of raw materials, local raw materials and man-made waste for the production of materials for construction products and structures;

- influence of technological impact modes on the structure of building materials;

- methodology for optimizing the production technology of materials of a given structure and properties;

- scientific basis for the selection of a material with specified properties depending on the specific conditions of manufacture and operation of products and structures;

- theoretical and applied problems of standardization of new materials and technological processes of their production, processing and processing;

be able to:

- plan and perform an engineering experiment;

- use information and communication technologies for scientific research;

- to select raw materials and design the composition of new building materials that have unique functional, physical and mechanical properties, optimal cost and environmental cleanliness (pc-1);

- perform the development of physico-chemical and physico-mechanical processes for the formation of the structure of materials with a given set of properties;

- establish the regularity and criterion for assessing the destruction of building material from the action of mechanical loads and the external environment.

Geotechnics state and prospects of development

CODE – CIV 207

CREDIT - 6

PREREQUISITE – soil mechanics, geotechnical engineering

The purpose of studying the discipline:

An idea of promising methods for calculating the foundations of foundations, taking into account nonlinear and rheological properties. summary: the formation of soil mechanics and the role of domestic scientists. Theory Of the ultimate stress state of soils. rheological processes in soils and their significance. Questions of dynamics of dispersed soils and methods of strengthening of bases and foundations. Features of The production of works on the construction of foundations. Foundations in special construction conditions.

Expected results: Optimization of the foundation of the annexed territories from the standpoint of foundation construction. automation of calculation of bases and foundations.

Intellectual property protection

CODE – CIV 201

CREDIT - 6

The purpose of studying the discipline is the formation of basic knowledge in the field of intellectual property among undergraduates, preparation for solving professional problems related to the registration of intellectual property rights and their protection, obtaining theoretical knowledge in the field of patenting and acquiring practical skills in the application of patent law as one of the components of intellectual property law in Kazakhstan, forming a modern scientific outlook among undergraduates, familiarization with the methodology of scientific research.

The main objectives of the discipline are:

- study of intellectual property objects and federal laws in the field of intellectual property protection;
- mastering the methods of protection of intellectual property rights, as well as the use of knowledge in the field of intellectual property in organizational, managerial and design activities;
- formation of ideas about the system of legislation in the field of intellectual property;
- skills in calculating the price of a license to use an industrial property object;
- skills of conducting patent research in the design of measuring instruments;
- abilities in the development of creative initiative, innovation and inventive activity in the process of carrying out design work;
- motivation for self-improvement of professional skills in the field of intellectual property management.

Composite binders

CODE – CTV 219

CREDIT - 6

The purpose of studying the discipline «Composite binders»:

- expand the theoretical knowledge of the sections of this discipline;
- to study the basic building properties of composite mineral binders;
- learn how to manage their basic properties;
- gain skills in performing experimental work, learn the basic test methods of composite binders in accordance with the requirements of GOST;
- learn to analyze the results of research, compare and draw correct conclusions from the results of research.

Colloidal cement systems

CODE – CIV 218

CREDIT - 6

The purpose of teaching the discipline is to form a General understanding of the principles and methods of testing of building materials, to study the influence of the internal structure of the material on its construction and technical properties and rational use in construction, depending on the functional properties, as well as to train specialists who can use their knowledge and skills in professional activities.

Finite element method in construction problems

CODE - CIV211

CREDIT – 6

Goals and objectives of the discipline

Study and practical development of the theory of numerical methods for calculating building structures, which are the basis of modern computing systems and applied programs used to develop optimal solutions for design problems.

Discipline summary

Numerical methods of linear algebra, numerical methods for solving differential equations with initial and boundary conditions, the use of numerical methods in solving specific technical problems on a computer.

As a result of studying the discipline, undergraduates must:

Know:

- basic mathematical relationships, basic provisions of mathematical analysis and modeling of building structures by means of a computer of higher mathematics.

Be able to:

- to calculate the elements of building structures using the principles and methods of structural mechanics.

Own:

- methods of algorithmicization of technical problems, the basic foundations of programming languages on a computer and methods of automated calculations of building structures based on applied software packages, skills in applying methods of computational mathematics to solve construction problems on a computer.

Spatial coverage

CODE - CIV243

CREDIT - 4

Course outline: this discipline reflects the achievements of theory and practice in the field of spatial structures, as well as the results of new scientific research in accordance with the volume of the course program. In-depth training of building structures that have the prospect for further widespread distribution in the Republic of Kazakhstan.

Knowledge gained during the course:

- types of spatial structures, methods of forming double-sided curved surfaces;
- a state of full torque and without a torque moment;
- equilibrium equations, geometric, physical theory of shells;
- limiting conditions;
- theory of flat shells;
- calculation and design of permutation, rotation, suspension systems, Gaussian curves of positive and negative shells.

Skills and abilities obtained in the course of passing the discipline (professional, managerial, communication):

- to determine the forces in the shells under various limiting conditions;
- to determine the strength in deformable and non-deformable contoured shells according to the theory without a moment;
- calculation of momentterdi;
- to correctly design various spatial structures;
- uses reference and informative literature.

Features in the construction of monolithic buildings

CODE - CIV245

CREDIT – 6

The aim of the course is to study the theoretical foundations and rules for the practical implementation of the complex implementation of construction and installation work in the construction of buildings and structures.

To achieve this goal in the course of teaching the course, the following tasks are solved:

- analysis of technologies for the construction of underground structures in urban conditions;
- analysis of production experience in the construction of buildings from stone materials;
- analysis of production experience in the installation of precast concrete and metal structures;
- analysis of advanced technologies for monolithic housing construction;
- possession of effective rules, methods and means of collecting, exchanging, storing and

processing information, skills in working with a computer as a means of information management (OPK-4);

- knowledge of the regulatory framework in the field of engineering surveys, principles of design of buildings, structures of engineering systems, planning and development of populated areas (PC-1).

As a result of studying the discipline, the student must:

Know:

- modern technologies for the construction of buildings and structures;
- the main methods of performing certain types and complexes of construction and installation

works;

- basic methods of technological coordination of construction and installation works;
- methodology for designing the main parameters of the technological process at various stages of building construction;

- content and structure of projects for the production of construction of buildings and structures;

Be able to:

- to design general and specialized technological processes;
- to develop schedules for the implementation of construction and installation works;
- to develop a construction master plan at different stages of the construction of buildings and

structures;

- to form the structure of construction works; carry out a variant design of technology for the construction of buildings and structures;

- to develop projects for the production of construction and installation works;

Own:

- the ability to develop operational plans for the work of primary production units, to analyze the costs and results of the activities of production units, to draw up technical documentation, as well as established reporting on approved forms (PC-8).

Modern design of construction projects

CODE - CIV212

CREDIT – 6

The purpose of studying the discipline:

Give the basic requirements: economics, ecology, planning, urban planning, architectural expressiveness and strength of the entire building.

Summary:

Problems of project classification, modern concept of object design. Application of the automated design system: AUTOCAD, LIRA, computer design. Fundamentals of project management. Energy-saving design methods. Network methods of object design. Optimization of network models in terms of time and resources. Analysis of costs and benefits. Layout of apartments based on graph theory. Methodological issues of assessing the strength and reliability of structures and structures.

Expected results:

Use modern methods of designing facilities, taking into account energy conservation, saving material resources and reliability of facilities. To widely use software: AUTOCAD, LIRA, and economic calculations.

Silicate-sodium composite binders and concretes on their basis

CODE - CIV226

CREDIT – 6

Technology and properties, as well as the purpose and application of sodium silicate composite binders and concretes based on them, representing their role and significance in modern construction and increasing the efficiency of capital investments.

The purpose of the discipline is to train specialists:

- deeply knowledgeable mineral, polymer and organic binders used in construction;
- representing their role and place in the production of concrete reinforced concrete products, heat-insulating and waterproofing, finishing and other materials;
- capable of developing and mastering new technologies and advanced materials and products based on binders.

Tasks:

- study of the technology of obtaining binders and the physical and chemical foundations of the processes of their hydration and hardening;
- management of the processes of hydration and hardening of binders;
- studying the properties of binders, taking into account the various areas of their application in construction;
- obtaining building materials based on binders with the required properties.

The main attention in the study of the discipline is paid to binders of inorganic origin, the study of their properties, production characteristics and areas of application.

Theoretical Foundations for the Production of Glass Crystal Materials

CODE - CIV228

CREDIT – 6

Objectives of mastering the discipline

Formation of the ability to obtain new information necessary to solve production and technological problems in the creation of refractory non-metallic and silicate materials, to integrate knowledge in relation to their field of activity, to be aware of responsibility for making their professional decisions.

Theoretical preconditions and basic principles for obtaining high quality concrete. The mechanism of physicochemical processes of the formation of the properties of high-strength concretes modified with plasticizers; highly and ultrafine mineral additives. Study of theoretical foundations and experience in obtaining composites with specified properties of dispersed reinforcement. Study of the theoretical foundations and practice of using high-quality multicomponent concrete with special properties.

As a result of mastering the disciplines, the undergraduate must:

Know:

- regularities of the course of chemical processes, typical processes of chemical technology, appropriate devices and methods for their calculation;
- basic principles of organization of chemical production, methods for assessing production efficiency;
- types of resources in the chemical industry; principles of energy saving and rational use of raw materials in chemical technology;
- basic principles of organization of chemical production, its structure, methods for assessing production efficiency; general laws of chemical processes.

Be able to:

- Choose equipment for a specific chemical-technological process, calculate the main characteristics of a chemical process, choose a rational scheme for the production of a product, evaluate the technological efficiency of production;
- apply methods for assessing the resource efficiency of chemical technological processes and chemical industries;
- calculate the main characteristics of the chemical process, choose a rational scheme for the production of a given product, evaluate the efficiency of production;

Own:

- experimental methods for determining the physicochemical properties of inorganic compounds
 - skills of designing the simplest devices of the chemical industry; methods for determining the optimal technological modes of equipment operation
- methods of analyzing the efficiency of chemical production, determining the technological indicators of the process

Project management

CODE - CIV470

CREDIT – 6

The purpose and objectives of the discipline

The purpose of mastering the discipline "Project Management" is to develop students' comprehensive theoretical and applied knowledge on project management and create a methodological basis for the formation of professional competencies in the field of project management; mastering the knowledge of organizing the work of the project team for the implementation of specific projects; study of the types of efficiency of investment projects, methods of analysis and assessment of their commercial efficiency and study of the features of assessing the effectiveness of projects, taking into account risk factors and uncertainty.

The objectives of studying the discipline "Project Management" are:

- disclosure of the essence and characteristics of projects; substantiation of the possibilities and limitations of project management;
- research of the content of the category "project" as a socio-economic system;
- acquaintance with the concept of the project life cycle and the possibilities of using project management functions at various stages of their development and implementation;
- disclosure of methods and tools for structuring projects;
- consideration of methods and conditions for effective management of the project team, taking into account the factors of group dynamics;
- consideration of the basic principles, types and methods of assessing the effectiveness of projects;
- consider the role of risk in project management, approaches and methods of analysis, assessment and risk management;
- disclosure of the essence and capabilities of modern information technologies for project management.

The student must:

Know:

- essence and characteristics of projects;
- the content of the category "project" as a socio-economic system;
- project life cycle and the possibility of using project management functions at various stages of their development and implementation; basic principles of project management;
- project management processes, inputs and outputs of each process;
- the main problems hindering successful project management and ways to resolve them;
- foundations of public-private partnership.

Be able to:

- evaluate the effectiveness of the project, taking into account risk factors and uncertainties;
- evaluate the investment qualities of individual financial instruments and select the most effective of them;
- develop a project estimate and budget that meets the specified constraints;
- organize the implementation of the project;
- organize effective completion of the project.

Own:

- methods and tools for effective management of the project team;
- the basic principles, types and methods of assessing the effectiveness of projects.

Registration and defense of the master's thesis (RaDMT)

CODE – ECA205

CREDIT –12

The purpose of the master's thesis is to demonstrate the level of scientific/research qualification of the master's student, the ability to independently conduct scientific research, test the ability to solve specific scientific and practical problems, knowledge of the most General methods and techniques for solving them.

SHORT DESCRIPTION

Master thesis – graduation qualification scientific work, which is a generalization of the results of independent studies undergraduates one of the pressing problems of a particular specialty relevant branch of science that has internal unity and reflects the progress and results of the development of the chosen topic.

Master's thesis – the result of research /experimental research work of a master's student, conducted during the entire period of study of a master's student.

The defense of the master's thesis is the final stage of the master's training. The master's thesis must meet the following requirements –

- the work must conduct research or solve current problems in the field of calculation and design of building structures, reconstruction of buildings and structures, technology of construction production, as well as the production of building materials, products and structures;
- the work should be based on identifying important scientific problems and solving them;
- decisions must be scientifically sound and reliable, have internal unity;
- the dissertation work must be written alone.

Content

- 1 Scope and content of the program
- 2 Requirements for applicants
- 3 Requirements for completing studies and obtaining a diploma
- 5 Working curriculum of the educational program
- 5 Descriptors of the level and scope of knowledge, skills, and competencies
- 6 Competencies at the end of training
- 7 Appendix to the diploma according to the standard ECTS