The list of academic disciplines of the university component

8D07 - Engineering, manufacturing and construction industries
(Code and classification of the field of education)

8D071 - Engineering and Engineering affairs
(Code and classification of the direction of training)

0710
(Code in the International Standard Classification of Education)

D100 - Automation and control
(Code and classification of the educational program group)

8D07102 - Automation and control
(Code and name of the educational program)

(Level of preparation)

set of 2024

Semey 2024

Developed

By the Academic Committee of the OP
The head of the AK Kozhakhmetova Dinara
EP Manager Zolotov A.D.

Reviewed

at the meeting of the Commission on Academic Quality of the Faculty of Engineering and Technology
Protocol No. 3 January 15, 2024
at the meeting of the Commission on Academic Quality of the Higher School of Artificial Intelligence and Construction
Recommended for approval by the Academic Council of the University
Protocol No. 1, "6" June 2024

Approved

at a meeting of the University Academic Council by protocol No. 6/1 of January 19, 2024.

at a meeting of the University Academic Council by protocol No. 11 of June 28, 2024.

Statistics and experimental design using R

Discipline cycle	Basic disciplines
Course	1
Credits count	3
Knowledge control form	Examination

Short description of discipline
The course provides an in-depth study of statistical methods and principles of experimental design using the R programming language. The course examines real-world research examples, starting with descriptive statistics and ending with complex experimental designs. The course will prepare students to independently perform data analysis, design experiments and interpret the results.

Purpose of studying of the discipline
Doctoral students tudents will master modern statistical methods of data analysis and the principles of experimental design using the R programming language, which will allow them to effectively apply this knowledge in scientific research.

Learning Outcomes
ON2 Interpret the results of scientific research and the limits of their application.

Learning outcomes by discipline
Knowledge of basic statistical concepts and methods. The ability to use R software for statistical data analysis. Skills of independent design of experiments and interpretation of their results. The ability to use the results obtained in real scientific and applied research. Негізгі статистикалық ұғымдар мен әдістерді білу.

Prerequisites
Masters degree course

Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation II

Research methods

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
Function of science. Scientific knowledge, its principles, laws of obtaining, levels of knowledge. The logic of scientific research. The hypothesis of the study. Systems approach in science and technology. Information approach in research. Modeling. Transformation of information in the research process. The problem of choice in scientific research. Planning and management of scientific research. Analysis and presentation of research results.

Purpose of studying of the discipline
The discipline gives an idea about the methods of scientific research as a special way of understanding reality and a means of forming technical knowledge. The course is aimed not only at the acquisition of theoretical knowledge, but also the ability to apply new research paradigms in practice, their introduction into the research process, the disclosure and study of historical facts, their adaptation to research work.

Learning Outcomes
ON2 Interpret the results of scientific research and the limits of their application.

Learning outcomes by discipline
Evaluates the status and level of research in its scientific field; establishes interdisciplinary interaction in modern science; adapts advances in science and technology to its own research At the completion of the development of the discipline student: - evaluates the status and level of research in its scientific field; - establishes interdisciplinary interaction in modern science; - adapts advances in science and technology to its own research.

Prerequisites
Masters degree course

Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation I

Servo systems

Discipline cycle	Basic disciplines
Course	1
Credits count	5
Knowledge control form	Examination

Short description of discipline
The course examines the purpose, composition, construction principles, control systems and operating modes of complete electric drives of direct and alternating currents, as well as their energy compatibility with the supply network and problems of energy conservation

Purpose of studying of the discipline
Mastering doctoral students principles of construction and methods of implementation of drive control systems, for specific technological mechanisms providing cartridges of operation of electric drives, acquisition of design skills, calculation and research of electrical drive systems of industrial machinery

Learning Outcomes
ON7 Choose systems of complete energy-saving electric drive and its correct operation.

Learning outcomes by discipline
Knowledge of the modern level of electromechanical equipment, mathematical apparatus of motion control systems;
technical characteristics of modern servo technology, control algorithms for tracking and positioning systems;
have the skills to use modeling tools for the analysis and synthesis of tracking and positioning systems.
Prerequisites
Masters degree course
Postrequisites
Embedded and distributed mechatronics systems

Research work of the doctoral student, including internship and doctoral dissertation I

Discipline cycle	Profiling discipline
Course	1
Credits count	15
Knowledge control form	Total mark on practice

Short description of discipline
Modern scientific achievements in automation and management. The role of the state of science and technology in Kazakhstan at the present stage. Methodology of scientific research. Scientific knowledge. Planning and organization of scientific research. Various systems for searching scientific information. Methods and tools of research. Presentation of the results of scientific work and communication of information.
Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the study of problems of modern science and education.
Learning Outcomes
ON3 To acquire knowledge in the field of management of complex processes and systems with the use of modern research methods on the basis of development of methods of management theory and decision-making.
Learning outcomes by discipline
Organizational structure of science stages of research, design;
Research, design and engineering works and specialized research using modern methods and tools of scientific and engineering work;
use information technologies;
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation II

Research work of the doctoral student, including internship and doctoral dissertation II

Discipline cycle	Profiling discipline
Course	1
Credits count	20
Knowledge control form	Total mark on practice

Short description of discipline
The scientific component of the educational program is formed from the doctoral research work, scientific publications and the writing of the doctoral thesis. The planning of the PhD program in the weeks is determined based on the doctoral student's standard working time during the week. The number of credits allocated for the implementation of INDH in a specific academic period is determined by the work plan of the vocational education program.
Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the study of problems of modern science and education.
Learning Outcomes
ON5 Analyze the organizational structure and develop proposals for its improvement, use methods to optimize the production process, organize programs to improve management systems.
ON6 Possess knowledge on the implementation and configuration of a control system based on a mathematical model of a mechatronic system.
Learning outcomes by discipline
-participation in the research work of the department;
- participation in scientific and scientific-methodological seminars held by the Academy, Department;
- to demonstrate a systematic understanding of the field of study, skill in terms of skills and research methods used in this field;
- to plan, develop, implement and adjust the complex process of scientific research;
- contribute original in-house research to the extension of scientific boundaries that may deserve national or international publication
Prerequisites
Research work of the doctoral student, including internship and doctoral dissertation I
Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation II

Pedagogical practice

Discipline cycle	Basic disciplines
Course	2
Credits count	10
Knowledge control form	Total mark on practice

Short description of discipline

Pedagogical practice is aimed at the formation of functional competencies, development of abilities to perform tasks in the professional and educational spheres. In the process of pedagogical practice, the professional and personal development of future teachers is intensified. During the practice, doctoral students draw up and implement a plan of educational activities with a group of students, develop and carry out a system of classes reflecting the completed part of the learning process on the basis of the content of major disciplines, demonstrate their mastery of modern technologies and teaching methods.

Purpose of studying of the discipline
Formation and development of the doctoral student's professional skills of the teacher of higher education; mastering the basics of pedagogical skill, skills and skills of independent conducting educational work.

Learning Outcomes
ON1 Use the possibilities of written communication in the academic and scientific-technical sphere when writing research papers and conducting classes.

Learning outcomes by discipline
Uses the opportunities of written communication in the academic and scientific-technical sphere when writing research papers and conducting classes

Prerequisites
Basic and profile disciplines of the EP

Postrequisites
Final examination

Research work of the doctoral student, including internship and doctoral dissertation III

Discipline cycle	Profiling discipline
Course	2
Credits count	20
Knowledge control form	Total mark on practice

Short description of discipline
Research practice of the doctoral student is conducted to study the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as to consolidate practical skills, application of modern methods of scientific research, processing and interpretation of experimental data in the thesis study.

Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the study of problems of modern science and education.

Learning Outcomes
ON5 Analyze the organizational structure and develop proposals for its improvement, use methods to optimize the production process, organize programs to improve management systems.
ON6 Possess knowledge on the implementation and configuration of a control system based on a mathematical model of a mechatronic system.

Learning outcomes by discipline
ability to analyze the natural scientific essence of problems arising in the course of professional activity;

- ability and willingness to apply modern research methods, carry out technical tests and (or) scientific experiments, evaluate the results of the work performed;

- ability to formulate, present and report the results of the work;

- willingness to use modern and advanced computer and information technologies;

- willingness to use modern achievements of science and advanced technology in research work;

Prerequisites
Research work of the doctoral student, including internship and doctoral dissertation II

Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation IV

Research work of the doctoral student, including internship and doctoral dissertation IV

Discipline cycle	Profiling discipline
Course	2
Credits count	30
Knowledge control form	Total mark on practice

Short description of discipline
The research work of the doctoral student is focused on professional practical training of the student. The researcher should be able to properly use information, logically build the text, apply terminology, present thoughts and draw conclusions.

Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the study of problems of modern science and education.

Learning Outcomes
ON7 Choose systems of complete energy-saving electric drive and its correct operation.
ON8 Knowledge of mechatronic systems and complexes, their capabilities, scope of their application; fundamentals of design and operation of mechatronic systems and complexes.

Learning outcomes by discipline
Collection of evidence for the thesis work, including development of data collection methodology, methods of processing the results, evaluation of their validity and sufficiency for the completion of the thesis

Research practice

Discipline cycle	Profiling discipline
Course	3
Credits count	10
Knowledge control form	Total mark on practice

Short description of discipline
Conducting experimental studies on the developed program, taking into account the requirements of the doctoral thesis. Development of skills of carrying out scientific and experimental works in accordance with the requirements of the level of training of doctor PhD.

Purpose of studying of the discipline
Research practice of the doctoral student is carried out with the aim of studying the latest theoretical, methodological and technological achievements of domestic and foreign science, as well as strengthening practical skills, application of modern methods of scientific research, processing and interpretation of experimental data in the thesis study

Learning Outcomes
ON3 To acquire knowledge in the field of management of complex processes and systems with the use of modern research methods on the basis of development of methods of management theory and decision-making.

Learning outcomes by discipline
- the ability to use in practice skills and abilities in the organization of research and production, in the management of the team, to influence the formation of the team's goals, to influence its social andpsychological climate in the direction necessary to achieve the goals, to assess the quality of the results of activities;
- the ability to acquire and use new knowledge and skills independently, including in new areas of knowledge not directly related to the field of activity, to expand and deepen their scientific outlook, including through information technology;

Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation V

Research work of the doctoral student, including internship and doctoral dissertation V

Discipline cycle	Profiling discipline
Course	3
Credits count	20
Knowledge control form	Total mark on practice

Short description of discipline
The research work of the doctoral student is focused on professional practical training of the student. The researcher should be able to properly use information, logically build the text, apply terminology, present thoughts and draw conclusions.

Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the study of problems of modern science and education

Learning Outcomes
ON4 Develop and improve existing structures, mechanisms and dynamic control systems model by solving research.
ON8 Knowledge of mechatronic systems and complexes, their capabilities, scope of their application; fundamentals of design and operation of mechatronic systems and complexes.

Learning outcomes by discipline
- ability and willingness to apply modern research methods, carry out technical tests and (or) scientific experiments, evaluate the results of the work performed;
- the ability to plan and set research tasks, to choose methods of experimental work, to interpret and present the results of scientific research, to give practical recommendations on their introduction into production;

- willingness to submit research results in the form of reports, abstracts, scientific publications and public discussions.

Prerequisites
Research practice
Postrequisites
Research work of the doctoral student, including internship and doctoral dissertation V

Research work of the doctoral student, including internship and doctoral dissertation VI

Discipline cycle	Profiling discipline
Course	3
Credits count	18
Knowledge control form	Total mark on practice

Short description of discipline
The role of the state of science and technology in the Republic of Kazakhstan at the present stage. Methodology of scientific research. Scientific knowledge. Planning and organization of scientific research. Various scientific information search systems. Methods and means of research. Registration of the results of scientific work and transfer of information.

Purpose of studying of the discipline
To prepare a doctoral student, who possesses the methodology of scientific knowledge and is able to apply scientific methods in the

study of problems of modern science and education

Learning Outcomes

ON4 Develop and improve existing structures, mechanisms and dynamic control systems model by solving research.

ON6 Possess knowledge on the implementation and configuration of a control system based on a mathematical model of a mechatronic system.

ON7 Choose systems of complete energy-saving electric drive and its correct operation.

ON8 Knowledge of mechatronic systems and complexes, their capabilities, scope of their application; fundamentals of design and operation of mechatronic systems and complexes.

Learning outcomes by discipline

mastering modern methods of working with literary sources using modern methods and technologies for collecting and using information from domestic and foreign databases

Prerequisites

Research work of the doctoral student, including internship and doctoral dissertation VI

Postrequisites

Final examination