The list of academic disciplines of the university component

8D05 - Natural Sciences, Mathematics and Statistics
(Code and classification of the field of education)

8D053 - Physical and chemical sciences
(Code and classification of the direction of training)

0530
(Code in the International Standard Classification of Education)

D089 - Chemistry
(Code and classification of the educational program group)

8D05301 - Chemistry
(Code and name of the educational program)

Doctor of philosophy (PhD)
(Level of preparation)

set of 2023

Semey 2023

Developed
By the Academic Committee of the EP
The head of the AC Nurymkhan G. N.
EP Manager Orazzhanova L.K.

Reviewed
at the meeting of the Quality Assurance Commission of the Faculty of Engineering and Technology
Recommended for approval by the Academic Council of the University
Protocol № 4.6 "10" April 2023
Chairman of the Commission on Quality Assurance Abdilova G.

Approved at the meeting of the Academic Council of the University Protocol No. 8 "25" April 2023.

Approved
at the meeting of the Academic Council of the University
Protocol № 1 "01" of September 2023
Chairman of the Academic Council of the University Orynbekov D.R.

Academic writing

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

Short description of discipline
The discipline examines the basics of oral and written scientific communication in professional activity. The principles of constructing a scientific text in accordance with the topic of the dissertation and the direction of research, the rules of analytical review, general requirements for scientific work are studied. Outlines the basics of the formation of oral speech, scientific abstracting and presentation of research results; introduces scientific databases, domestic and foreign standards

Purpose of studying of the discipline
expansion of the communicative competence connected with analytical text activity; formation of linguistic and pragmatic thinking skills in students

Learning Outcomes
ON1 To demonstrate in-depth knowledge and skills in priority areas of chemistry for solving research and applied problems.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.

Learning outcomes by discipline
1) Summarize the results of the research in a scientific form
2) Use the basics of written and oral scientific communication to present research results
3) Plan scientific work using scientific databases

Prerequisites
Masters degree course

Postrequisites
Final examination Doctoral student research work, including internship and doctoral dissertation II Doctoral student research work, including internship and doctoral dissertation III Doctoral student research work, including internship and doctoral dissertation IV Doctoral student research work, including internship and doctoral dissertation V Doctoral student research work, including internship and doctoral dissertation VI

Actual theoretical and applied aspects of chemistry

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

Short description of discipline
The course introduces problematic issues, tasks, achievements and development trends of modern fundamental chemistry. The principles of "green chemistry", directions of organic synthesis technology, nanotechnology, fluid technologies in the chemistry of natural compounds are considered. Methods for modeling molecules and chemical reactions are discussed. Scientific, applied and technical aspects of organic, analytical and macromolecular chemistry are studied.

Purpose of studying of the discipline
deepening the knowledge of doctoral students about current issues, achievements and directions of fundamental chemistry

Learning Outcomes
ON2 Analyze the latest achievements of modern chemical science, non-standard approaches, apply them to solve professional problems.
ON10 Own methodology, basic methods and techniques of scientific analysis in the field of chemistry for solving research and applied problems in the chemical industry
ON11 Definition of new branches of research, new problems in the field of chemical science
ON12 Apply innovative ideas and technologies in the professional field

Learning outcomes by discipline
1) demonstrate knowledge in the field of achievements, tasks and directions of fundamental chemistry
2) simulate chemical synthesis processes
3) introduce modern achievements of chemistry into the chemical industry

Prerequisites
Masters degree course

Postrequisites
Final examination Research practice Doctoral student research work, including internship and doctoral dissertation II Doctoral student research work, including internship and doctoral dissertation III Doctoral student research work, including internship and doctoral dissertation IV Doctoral student research work, including internship and doctoral dissertation V Doctoral student research work, including internship and doctoral dissertation VI

Research methods

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

Short description of discipline
This course introduces the methods and direction of scientific research in the field of chemical science. The discipline considers tasks, methods, types, stages of theoretical and experimental research, studies structural components and forms of scientific activity. Mathematical, analytical means of cognition, metrological support are highlighted. The planning of the experiment, the stages of its organization, graphical processing, analysis and interpretation of the data obtained are studied.

Purpose of studying of the discipline
mastering knowledge about the laws, principles, concepts, terminology, content, and specific features of the organization and management of scientific research.
Learning Outcomes
ON3 Demonstrate the ability to solve scientific and educational problems in the field of chemistry, possess modern technologies of higher school education, communication technologies.
ON5 To possess the theory and skills of chemical scientific experiment, professional operation of modern equipment and devices.
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation
Learning outcomes by discipline
1) Apply the methods of scientific research in the performance of dissertation work
2) Plan the stages of theoretical and experimental research
3) Use scientific means of cognition in practical activities
Prerequisites
Masters degree course
Postrequisites
Final examination Research practice Doctoral student research work, including internship and doctoral dissertation II Doctoral student research work, including internship and doctoral dissertation III Doctoral student research work, including internship and doctoral dissertation IV Doctoral student research work, including internship and doctoral dissertation V Doctoral student research work, including internship and doctoral dissertation VI

Doctoral student research work, 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
The research work of a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation
Purpose of studying of the discipline
The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science
Learning Outcomes
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.
ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation
Learning outcomes by discipline
1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies
Prerequisites
Academic writing Research methods Actual theoretical and applied aspects of chemistry
Postrequisites
Final examination

Doctoral student research work, 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 research work of a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation
Purpose of studying of the discipline
The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science.
Learning Outcomes
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.

ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation

Learning outcomes by discipline

1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies

Prerequisites

Academic writing Research methods Actual theoretical and applied aspects of chemistry

Postrequisites

Final examination

Teaching practice

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

Short description of discipline

Teaching practice is essential and essential a component of the educational process of doctoral studies and is carried out in order to form professional pedagogical skills. Includes the study of the experience of pedagogical activity in the system of postgraduate education, the acquisition of practical teaching skills through the development of educational material, teaching disciplines in the chemical direction; participation in scientific activities, educational and methodological and educational work of the department.

Purpose of studying of the discipline

formation of professional and personal competencies necessary for the organization of the educational process in higher education.

Learning Outcomes

ON3 Demonstrate the ability to solve scientific and educational problems in the field of chemistry, possess modern technologies of higher school education, communication technologies.

Learning outcomes by discipline

1) Apply new techniques in pedagogical practice
2) Plan the educational process taking into account the best pedagogical experience
3) Suggest ways to solve pedagogical problems

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Doctoral student research work, 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

The research work of a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation

Purpose of studying of the discipline

The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science.

Learning Outcomes

ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.
ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation

Learning outcomes by discipline

1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies

Prerequisites

Basic and profile disciplines of the EP

Postrequisites

Final examination

Doctoral student research work, 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 a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation
Purpose of studying of the discipline
The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science
Learning Outcomes
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.
ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation
Learning outcomes by discipline
1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Final examination

Research practice

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

Short description of discipline
Research practice consists in studying advanced general scientific, methodological, scientific and technical achievements of chemical domestic and foreign science, improving experimental, research skills, conducting experiments in accordance with the topic of the dissertation, improving information processing skills and interpreting the data obtained. This type of activity contributes to the consolidation, deepening and systematization of knowledge gained in the study of fundamental chemical disciplines.
Purpose of studying of the discipline
familiarization with the latest theoretical, methodological and technological achievements of domestic and foreign science, modern methods of scientific research, processing and interpretation of experimental data
Learning Outcomes
ON5 To possess the theory and skills of chemical scientific experiment, professional operation of modern equipment and devices.
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
Learning outcomes by discipline
1) Apply the achievements of chemical science in professional activity
2) Interpret the obtained scientific results
3) To develop methods of solving a scientific problem when performing a dissertation
Prerequisites
Basic and profile disciplines of the EP
Postrequisites
Doctoral student research work, including internship and doctoral dissertation VI

Doctoral student research work, 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 a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation
Purpose of studying of the discipline
The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science.
Learning Outcomes
ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.

ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation

Learning outcomes by discipline

1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies

Prerequisites

Academic writing Research methods Actual theoretical and applied aspects of chemistry

Postrequisites

Final examination

Doctoral student research work, 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 research work of a doctoral student is carried out to prepare a doctoral student who knows the methodology of scientific knowledge of chemical processes and is able to apply scientific methods in the study of problems in the field of chemistry. In accordance with the topic of the dissertation, it includes the following stages: the study and selection of scientific resources, the design of bibliographic data, the choice of analysis methods, the implementation of experimental research, the passage of a foreign internship, the processing and publication of the results, the defense of the dissertation

Purpose of studying of the discipline

The goal is to prepare a doctoral student who knows the methodology of research knowledge of chemical processes and is able to apply scientific methods in the study of problems of modern chemical science.

Learning Outcomes

ON6 To show skills of self-preparation of the plan of scientific research, collection, processing and discussion of new scientific and applied results.
ON7 Have the ability to present the results obtained in research in the form of reports and scientific publications.
ON8 Demonstrate the ability to participate in public scientific discussions and speeches, including in English.
ON9 To analyze, systematize, summarize the results of scientific research and present the results in the form of a doctoral dissertation

Learning outcomes by discipline

1) Apply the methodology of scientific cognition when performing scientific work
2) Apply scientific methods to solve applied problems
3) Describe the results of experimental studies

Prerequisites

Academic writing Research methods Actual theoretical and applied aspects of chemistry

Postrequisites

Final examination