Ministry of Science and Higher Education of the Republic of Kazakhstan

D.Serikbayev EKTU

APPROVED:
Dean of SoDTaIS:
Khasenova Z.T.
_____2024 y.

METHODS OF SCIENTIFIC RESEARCH
Syllabus

Programme of Study: 8D06101 Information Systems (in Branches)
Course code: MNI7202
Number of credits: 5
Cycle: BD
Component: UC

Ust-Kamenogorsk, 2024

The syllabus was developed at «SoDTaIS» on the basis of the State General Educational Standard for Higher Education approved by the Minister for Education and Science of the Republic of Kazakhstan (Order No. 604 dated 10.31.2018), Rules for organizing educational process based on academic credit system approved by the Minister for Education and Science of the Republic of Kazakhstan (Order No. 563 dated 12.10.2018), Education Program, Work Curriculum, and the Catalog of Elective Courses.

Approved by the Quality Assurance Commission

Chairperson   ФИО
Date   29.08.2024 y.   minutes №1

Head of the educational program   Zhomartkyzy G.
                                            8D06101

Library employee   ФИО

Developed by   Smailova S.S.
                                            Professor
                                            Blinaeva E.V.
                                            Associate professor
                                            Zhomartkyzy G.
                                            Associate professor

1 COURSE DESCRIPTION. ITS PLACE IN THE ACADEMIC PROCESS

1.1 Course Overview

The discipline is aimed at developing fundamental knowledge about the methodology of scientific research and acquiring practical skills in conducting research in the field of ICT in compliance with the principles and criteria of scientific research. The discipline includes the practical aspects of forming a complete understanding of knowledge management information technologies and the implementation of Data Science methods.

1.2 Goals and Objectives of the Course

Goals of the course:
Acquisition and development of skills of organization and planning of scientific research

Objectives of the course:
- Provide an overview of the essence of a research paper
- To form basic skills necessary for independent research in information technologies.
- Familiarize yourself with the general flowchart of information technology research sequence
- Master the principles of organizing research work
- Study the methodology of scientific research
- master the technologies of preparation and design of scientific and analytical review, scientific report, theses of the report, scientific article and master's thesis

1.3 Цели устойчивого развития

Goal 4. Ensuring inclusive and equitable quality education and promoting lifelong learning opportunities for all

1.4 Learning Outcomes

Learning outcomes are determined based on Dublin Descriptors for the appropriate educational level and are expressed through competencies.

Core competencies to be formed	Learning outcomes (units of core competencies)	
	Programme of study	Course
KK1 - Ability to participate in professional discussions on solving scientific (scientific and technical) and scientific and educational problems, publish research results in international scientific journals, objectively evaluate the results of research and development in the field of ICT, including using international databases of	PO1 - Analyze the structure of scientific publications, prepare scientific articles, reports of scientific and technical analysis and examination of projects of research and scientific and technical activities in the field of ICT based on scientific research criteria and Data Science methods; the main objective of the project is to promote the development of a new system of education, science and innovation integration, as well as the development of a new system of education; maintain and develop the educational environment and organizational culture; work in a team with colleagues and university staff.	- Demonstrate knowledge and understanding of research organization and planning processes that are the basis for the development and application of research ideas - Ability to conduct scientific research on the topic of master's thesis; to use scientific methodology in information systems and technologies; to study the methodology of scientific research; to apply methods of solving scientific problems and modeling methods in information systems - Ability to integrate knowledge of scientific inquiry, to deal with complex

Core competencies to be formed	Learning outcomes (units of core competencies)	
	Programme of study	Course
publication activity performed by others by specialists.		issues, and to make scientific judgments based on incomplete or limited information, taking into account ethical and social responsibility for the application of those judgments and knowledge. - Can clearly and concisely communicate the conclusions of scientific research and its rationale to specialists and non-specialists alike - May continue to pursue various research areas on their own
KK2 - Ability to formulate research tasks in the academic or industrial industry and find ways to solve them based on models and methods of data mining, machine learning, big data processing and systems engineering.	PO2 - Apply the methodology of scientific creativity and knowledge management for theoretical and experimental research of information processes and resources in the field of ICT to solve real scientific and technological problems in the academic or industrial sector.	
KK3 - The ability to conduct independent research, obtain theoretical, methodological and practical results and the willingness to professionally compile and prepare application, reporting documentation for scientific grants for the implementation of integrated research, including interdisciplinary and in the field of ICT.	PO4 - Identify current scientific problems and methodologies for constructing concepts, strategies, functional models of activity and interaction in the field of ICT using systems engineering methods and Data Science.	
	PO5 - To develop substantiated applications or explanatory notes of research projects in the field of ICT for the commercialization of projects, leading to the acquisition of new knowledge and new solutions to real scientific and technological problems of academic or industrial sectors.	

1.5 Educational Technologies Used in the Course

1.5.1 Modern Educational Technologies

The following educational technologies are used during the training:
- Technology of research activity
- Technology of educational and research activities
- Communication technologies (discussions, press conference, brainstorming, academic debates, etc.).
- Information and communication (including distance) technologies

1.5.2 Adaptive Learning Technologies (Inclusive Education)

The following Learner-adaptive educational technologies can be used in education for persons with special needs:
- Provision of electronic teaching aids, links to Internet resources with materials
-

1.6 Prerequisites

- Organization and planning of research

1.7 Postrequisites

1.8 Course Workload

Types of classes	hours
Lectures	15
Practical classes	30
SAWTG (Student Autonomous Work under Teacher Guidance)	75
SAW (Student autonomous work)	30
Final assessment method	Exam

2 COURSE CONTENT

2.1 Course Topics

№	Topic, content	Workload (hours)	Достигаемые результаты CDIO	Метод обучения	Reading
	Lectures				
1	**Topic 1. The role of science in modern society.** Classification and sectoral structure of science. Scientific potential of the state and the efficiency of its use	1	-		1-5
2	**Topic 2. Basics of organization and stages of scientific research**	1	-		1-5
3	**Topic 3. Methodological foundations of scientific research**	1	-		1-5
4	**Topic 4. Application of scientific research to problem solving in information technology and systems**	1	-		1-5
5	**Topic 5. State and problems of Kazakhstani science**	1	-		1-5
6	**Topic 6. Research technology**	1	-		1-5
7	**Topic 7. Organization of a scientific team.** Features of scientific activity	1	-		1-5
8	**Topic 8. Ғылыми зерттеу бағытын таңдау**	1	-		1-5
9	**Topic 9. Search, accumulation and processing of scientific information**	1	-		1-5
10	**Topic 10. Information retrieval, design and presentation of research results**	1	-		1-5
11	**Topic 11. Theoretical and experimental studies**	1	-		1-5
12	**Topic 12. Fundamentals of inventive creativity**	1	-		1-5
13	**Topic 13. The concept and structure of a doctoral dissertation**	2	-		1-5
14	**Topic 14. Preparation of a scientific article**	1	-		1-5
TOTAL		**15**			

№	Topic, content	Workload (hours)	Достигаемые результаты CDIO	Метод обучения	Reading
	Practical classes				
1	**Topic 1. Determining the specifics of scientific research in the chosen specialty**	4	-	Report	1-5
2	**Topic 2. Stages of the doctoral student's research work**	6	-	Presentation	1-5
3	**Topic 3. Drawing up an individual doctoral student plan**	5	-	Presentation	1-5
4	**Topic 4. Research methods**	5	-	Presentation	1-5
5	**Topic 5. Working with scientific literature**	5	-	Report	1-5
6	**Topic 6. Preparation of a scientific article**	5	-	Report	1-5
TOTAL			**30**		

2.2 Tasks for Student Autonomous Work (SAW)

Topic	Content	Assessment method	Submission date, week	Workload (hours)	Результаты CDIO
Analysis of articles included in indexed scientific literature databases	Conducting a literature review on the topic of the dissertation	Report	3	5	-
Analysis of dissertation abstracts on the research topic	Conducting a review of scientific research on the topic of the dissertation	Report	6	10	-
Planning a scientific research on the topic of the dissertation	Research of the spectrum of theoretical and practical issues in the chosen field of science. Formulation of goals, setting of tasks and clarification of the methodological foundations of the dissertation research. Creating a plan for the structure of the dissertation.	Presentation	10	10	-
Preparation of a scientific article on the topic of dissertation research	Publication of the main results of the dissertation research. The structure of the scientific article: title, abstract, keywords, introduction, research	Report	14	5	-

	D. SERIKBAYEV EAST KAZAKHSTAN TECHNICAL UNIVERSITY	Page 7 of 9
Integrated management system	I EKTU 026-I-2023
Development and design of a curriculum (Syllabus) in the JSC «D. Serikbayev EKTU»	

Topic	Content	Assessment method	Submission date, week	Workload (hours)	Результаты CDIO
	methods, research results, conclusion, list of references				
TOTAL				**30**	

2.3 Schedule of Course Task Submission

Types of tasks	Academic period, week														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Knowledge															
Comprehension															
Application															
Analysis															

3 ASSESSMENT OF STUDENT KNOWLEDGE

Teacher oversees various tasks related to ongoing assessment and determines students' current performance twice during each academic period. Ratings 1 and 2 are formulated based on the outcomes of this ongoing assessment. The student's learning achievements are assessed using a 100-point scale, and the final grades P1 and P2 are calculated as the average of their ongoing performance evaluations. The teacher evaluates the student's work throughout the academic period in alignment with the assignment submission schedule for the discipline. The assessment system may incorporate a mix of written and oral, group and individual formats.

Period	Type of work	Final Assessment
First rating		0-100
Second rating		0-100
Final control	Exam	0-100

3.1 The evaluating policy of learning outcomes by work type

Type of work	90-100	70-89	50-69	0-49

	Excellent	**Good**	**Satisfactory**	**Unsatisfactory**

The student's final grade in the course is calculated on a 100 point grading scale, it includes:
- 60% of current academic performance results;
- 40% of the result obtained on the exam.

The final grade is calculated by the formula:

$$И = 0{,}6\frac{P_1+P_2}{2} + 0{,}4Э \qquad (1)$$

where P1, P2 are numerical values of Rating 1 and Rating 2 correspondingly;
Э is the numerical value of the examination grade.

:

Alphabetical grade	Numerical value	Points (%)	Traditional grade
A	4.0	95-100	Excellent
A-	3.67	90-94	
B+	3.33	85-89	Good
B	3.0	80-84	
B-	2.67	75-79	
C+	2.33	70-74	
C	2.0	65-69	Satisfactory
C-	1.67	60-64	
D+	1.33	55-59	
D	1.0	50-54	
FX	0.5	25-49	Unsatisfactory
F	0	0-24	

4 COURSE POLICY

Student is required to:
The discipline's policy is to implement the learning process in a consistent and purposeful manner. The requirements of teachers to students are based on the general principles of higher education.
Mandatory, regular attendance at practical training sessions
Mandatory regular attendance at lectures
Mandatory fulfillment of all topics of practical assignments
Active participation in the learning process
Development of a draft individual plan of a doctoral student
Passing the boundary control in the boundary week
Doctoral students should not be late for class
Respectful attitude towards faculty and students
Preparation of a scientific article for publication in scientific conference proceedings / scientometric scientific journals

5 RECOMMENDED READING

5.1 Key reading

1. Методы и средства научных исследований: учеб. пособие / Ю. Н. Колмогоров [и др.]. — Екатеринбург : Изд-во Урал.ун-та, 2017.— 152 с.

2. Методология научных исследований: учеб. пособие / А.Б. Пономарев, Э.А. Пикулева. – Пермь: Изд-во Перм. нац. исслед. политехн. ун-та, 2014. – 186 с.

3. Derntl, Michael. "Basics of research paper writing and publishing." International Journal of Technology Enhanced Learning 6.2 (2014): 105-123.

4. Walliman, Nicholas. Research methods: The basics. Routledge, 2017.Routledge, 2017

5. Patten, Mildred L., and Michelle Newhart. Understanding research methods: An overview of the essentials. Routledge, 2017

5.2 Further reading

1. Основы научных исследований (Общий курс): Учебное пособие/Космин В. В. - М.: ИЦ РИОР, НИЦ ИНФРА-М, 2015. - 214 с.: 60x90 1/16. - (Высшее образование: Магистратура) (Переплёт 7БЦ) ISBN 978-5-369-01464-6 - Режим доступа: http://znanium.com/catalog/product/487325

2. Основы научных исследований : учеб. пособие / Б.И. Герасимов, В.В. Дробышева, Н.В. Злобина [и др.]. — 2-е изд., доп. — Москва : ФОРУМ : ИНФРА-М, 2018. — 271 с. — (Высшее образование: Бакалавриат). - Текст : электронный. - URL: http://znanium.com/catalog/product/924694

3. IPR SMART http://www.iprbookshop.ru

4. ScienceDirect - http://www.sciencedirect.com.

5. EBSCO Discovery Service (EDS) - http://search.ebscohost.com

6. The Web of Knowledge: Web of Science (Clarivate) http://www.WebofKnowledge.com; http://www.isiwebofknowledge.com

7. Scopus - https://www.scopus.com/freelookup/form/author.uri.