

**Module Reference Book**  
**Information Systems (Ma)**

## Table of Contents

Module 1:Basics of Scientific and Research World View.....	16
Module 2:Psychological and Pedagogical Education .....	18
Module 3:Research Work1 .....	20
Module 4:Analysis, Simulation and Design of Information Systems .....	21
Module 5:Research Work 3 .....	23
Module 6: Teaching Practice .....	24
Module 7:Research Work 4 .....	26
Module 8: Research Practice.....	27
Module 9: Final Academic Assessment.....	28
Module 10: Methodology of Scientific Research .....	30
Module 11: Mathematical Simulation in Information Systems.....	32
Module 12: Project and Information Management.....	37

Module Name:	<b>Module 1:Basics of Scientific and Research World View</b>
Code	M1IS(Ma)
Module Elements	<b>Compulsory</b> Foreign Language (Professional) History and Philosophy of Science
Semester Number:	1
Person responsible for the module:	A.V. Nikiforov
Lecturer:	Foreign Language – T.K. Sagitdinova History and Philosophy of Science – A.V. Nikiforov
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours perweek and per semester :	Full-time: 1 semester: hours per week – 12(lectures -1; workshops -3; independent work of students -8); hours per semester – 180
Workload:	Full-time education: Teaching Load: 60 hours Extracurricular Classes: 120 hours Total: 180 hours
Credit Points:	6 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained by students in previous undergraduate subjects: Foreign Language, Professionally-Oriented Foreign Language, Philosophy
Expected Learning Outcomes:	<b>Knowledge:</b> foreign language at the professional level allowing to conduct research and practical activities; functional and stylistic characteristics of the scientific presentation of the material in foreign languages; general scientific terminology and terminological sublanguage relevant to the specialty; lexical vocabulary; business vocabulary. philosophy and methodology of science, main directions, problems, theories and methods of philosophy, the content of modern philosophical discussions on the philosophy of science and methodology of scientific knowledge; actual, methodological and philosophical problems of natural sciences; the role of science and education in public life; modern trends in the development of scientific knowledge. <b>Skills:</b> reading, translation of original literature, followed by analysis, interpretation and evaluation of the extracted information; explicating scientific information in writing; registration and management of business papers; perception, analysis and processing of information obtained from the media and other sources; conducting business meetings, forming and defending own position on various issues; evaluating and analyzing of various social and scientific trends, facts and phenomena.apply scientific methods of knowledge in professional activities; think creatively to solve new problems and situations;conduct independent research and experiments; willingness to use knowledge on modern information systems and technologies;competently present the results of research and project activities. <b>Abilities:</b> willingness to use in practice the skills in the organization of research and design work; annotate referencing literature; preparation of the report; preparation of abstracts (articles); conducting business correspondence in a foreign language.conduct research activities, solving scientific problems; formulate and solve problems arising in the course of research activity;draw up the results of research in various forms of scientific products;conduct scientific discussion using the evidence base obtained as a

	result of theoretical and experimental research.
Intendend use/applicability	Modules: Analysis, Simulation and Design of Information Systems
Content:	<p><b>1. Foreign Language (Professional).</b> Improving the skills of undergraduates in English: improving the level of skills of speaking, writing, perception of oral and written speech; study of the rules of construction of scientific and professional speech, features of the language of reports and presentations; study of basic terms from the field of scientific interests, consolidation of all major grammatical structures and phenomena.</p> <p><b>2. History and Philosophy of Science</b> Philosophy and methodology of science, main directions, problems, theories and methods of philosophy, content of modern philosophical discussions on the philosophy of science and methodology of scientific knowledge.</p>
Examination Form, module mark:	<p><b>Comprehensive examination of the module including:</b>  <i>Foreign Language (Professional) - written control examination.</i>  <i>History and Philosophy of Science - written control examination.</i>  Module mark: the result of the exam <i>History and Philosophy of Science</i></p>
Technical/Multimedia Facilities:	Multimedia language laboratory, interactive whiteboard, multimedia system.
Study Materials:	<ol style="list-style-type: none"> <li>1. D. E. Zemach, L.A. Rumisek. Academic Writing. MacMillan Press, 2006.</li> <li>2. Key Concepts in Information and Communication Technology (Palgrave) by Roger I. Cartwright.</li> <li>3. Holi Roddick. Business Writing Makeovers, AST, Astrel, 2004.</li> <li>4. A. M. Aldanova, D. K. Akanova. Social and Business Kazakh Language. Almaty, 2002</li> <li>5. T.A. Akhmetova. Business Kazakh Language. Petropavlovsk, NKSU.2005.</li> <li>6. N. K. Mukhamadiyeva. Professional Kazakh Language. I Textbook. Almaty,2006</li> <li>1. A. A. Ivin. Modern Philosophy of Science. M., 2005.</li> <li>2. V.P. Kokhanovskiy, Y. V. Zolotukhina, T. G. Leshkevich, T. B. Fatkhi. Philosophy for Graduate Students: Textbook. Rostov-on-Don, 2003.</li> <li>3. Philosophy of Science/Ed.S. A. Lebedyev . M., 2006.</li> <li>4. M. M. Makhanov, S. M. Kalanova. Basics of Research in Universities, Methods of Writing Scientific and Methodical Works, Rules of Registration: Textbook-Taraz: TarSU,1999.-170 p.</li> <li>5. I. N. Kuznetsov. Scientific Research. Methods of Carrying out and Registration - M.: Dashkov i K – 2008, - 460 p.</li> <li>6. A. Zakharova, T. Zakharova. How to Write and Defend a Thesis. SPb.:Piter, 2007. -160 p.</li> </ol>
Date of last amendment	20.01.2020

Module Name:	<b>Module 2: Psychological and Pedagogical Education</b>
Code	M2IS(Ma)
Module Elements	<i>Compulsory</i> Psychology Pedagogics <b>Methods of teaching technical disciplines in higher education</b>
Semester Number:	1
Person responsible for the module:	A.K. Imanov
Lecturer:	Psychology – L.A. Bogunov Pedagogics– A.K. Imanov <b>Methods of teaching technical disciplines in higher education- E.V.Kuharenko</b>
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	1 semester: hours per week – 12 (lectures -2; workshops -2; independent work -8); hours per semester – 180. 2semester: hours per week – 6 (lectures -1; workshops -1; independent work -4); hours per semester – 90.
Workload:	Teaching Load: 90 hours Extracurricular Classes: 180 hours Total: 270 hours
Credit Points:	9 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Sociology, Philosophy.
Expected Learning Outcomes:	<b>Know:</b> social and psychological nature of pedagogical activity; properties of mental and cognitive processes included in cognitive activity; content and specifics of psychological and pedagogical influence; psychology of cognitive activity of students in the learning process; <b>main directions and trends of higher education development; general problems of higher school pedagogy, methodological and theoretical bases of higher school pedagogy;</b> <b>Be able to:</b> apply psychological methods and means to improve the effectiveness and quality of training; <b>Possess the skills:</b> professional communication and intercultural communication; <b>Demonstrate the ability to:</b> apply psychological methods and means to improve the effectiveness and quality of training; a holistic view of the factors and laws of the pedagogical process of higher education. <b>build and implement promising lines of intellectual, cultural, moral, physical and professional self-development and self-improvement; follow ethical and legal standards; social adaptation.</b>
Intendend use/applicability	Modules: Teaching Practice
Content:	<b>1. Psychology.</b> Basics of psychology of higher education; psychological and pedagogical essence of the educational process in higher education; a holistic view of the most important theoretical concepts, empirical research and basic applications of general, social, developmental and pedagogical psychology in relation to the course of Psychology; main trends in the development of higher education at the present stage; development of professional psychological and pedagogical thinking.

	<p><b>2. Pedagogics.</b>Main directions and trends of development of higher education; principles and features of organizing of the pedagogical process in higher schools; basics of didactics and pedagogical process in higher school, structure of the pedagogical process, principles of learning, the content of higher education; general problems of pedagogy of higher school, methodological and theoretical basics of pedagogics in higher school;</p> <p><b>Methods of teaching technical disciplines in higher education.</b> Distance learning technologies. Environments for creating educational materials. Platforms and support tools. Internet multimedia facilities. multimedia projects.</p>
Examination Form, module mark:	<p><b>Comprehensive examination of the module including:</b>  <i>Psychology – written control examination;</i>  <i>Pedagogics– computer-based testing.</i>  <b>Methods of teaching technical disciplines in higher education-</b> written control examination;</p> <p>Module mark: the result of the exam <i>Pedagogics, Methods of teaching technical disciplines in higher education-</i></p>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia complex.
Study Materials:	<ol style="list-style-type: none"> <li>1. A. M. Bandurka, S. P. Bocharova, Y. V. Zemlyanskaya, Psychology of Management. SPb., 2013.</li> <li>2. Ki Lefrancois. Applied Pedagogical Psychology. SPb., 2003.</li> <li>3. S. M. Dzhakupov. Psychological Structure of the Teaching Process. Almaty: Kazak university, 2004. – 311 p.</li> <li>4. M. I. Dyachenko, L. A Kandybovich. Psychology of Higher School. – Minsk, 2006.</li> <li>5. S.I. Arkhangelskiy. Educational Process in Higher School, its Natural Basics and Methods - M., 2004-102p.</li> <li>6. V. I. Zagvyazinskiy. Didactics of Higher School. Lectures. – Chelyabinsk, 2003. – 304 p.</li> <li>7. Organization of independent work of students in the conditions of development of distance learning technology / DV Lepashev. - Omsk: NOU VPO OmGA, 2014. - 112 p.</li> <li>8. Kleynosova, N.P. Distance learning in the Moodle environment / N.P. Kleynosova, E.A. Kadyrova, I.A. Telkov, O.M. Baskakova, R.V. Khrunichev -, 2011. - 28 p.</li> </ol>
Date of last amendment	20.01.2020

Module Name:	<b>Module 3:Research Work1</b>
Code	M3IS(Ma)
Module Elements	<b>Compulsory</b> Research Work1
Semester Number:	1
Person responsible for the module:	Y.V. Kukhareno
Lecturer:	V.P. Kulikov, V.P. Kulikova, Y.V. Kukhareno
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours perweek and per semester :	Full-time: 1 semester: hours per week – 12 (independent work of students -12); hours per semester – 210.
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 210 hours Total: 210 hours
Credit Points:	Final Academic Assessment: 7 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Organizing of Research and Innovation Activities, Theoretical Basics of Information Processes.
Expected Learning Outcomes:	<b>Knowledge:</b> modern methods, tools and technologies of research and project activities; technology of educational process design at the level of higher education. <b>Skills:</b> integrate the knowledge gained in the course of different subjects, use them to solve analytical and management problems in new unfamiliar conditions; expand and deepen the knowledge necessary for daily professional activities. <b>Abilities:</b> update knowledge, expand professional skills; carry out research projects in the professional field.
Intendend use/applicability	Modules: Analysis, Simulation and Design of Information Systems
Content:	Formulation and solution of problems arising in the course of research; justification and selection of the required research methods, modification of existing and development of new ones based on the objectives of a particular study; basics of the original development and application of ideas in the context of scientific research.
Examination Form, module mark:	<i>Research Work1 - Scientific Research Report Defense</i> Module mark: the result of the exam <i>Research Work1</i>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	1. M. M. Makhanov, S. M. Kalanova.Basics of Research in Universities, Methods of Writing Scientific and Methodical Works, Rules of Registration: Textbook-Taraz: TarSU,1999.-170 p. 2. S.I. Arkhangelskiy. Educational Process in Higher School, its Natural Basics and Methods - M., 2004-102p. 3. I. N. Kuznetsov. Scientific Research. Methods of Carrying out and Registration - M.: Dashkov i K – 2008, - 460 p.
Date of last amendment	20.01.2020

Module Name:	<b>Module 4:Analysis, Simulation and Design of Information Systems</b>
Code	M4IS(Ma)
Module Elements	Compulsory Analysis, Simulation and Design of Information Systems Research Work 2
Semester Number:	2
Person responsible for the module:	V.P. Kulikov
Lecturer:	Analysis, Simulation and Design of Information Systems - V.P. Kulikov Research Work - V.P. Kulikov
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours perweek and per semester :	Full-time: 2 semester: hours per week – 10 (lectures -1; works – 1; labs-2; independent work of students -6) ; Research Work 180 hours per semester – 330.
Workload:	Full-time education: Teaching Load: 60 hours Extracurricular Classes: 90 hours Research Work 180 hours Total: 330hours
Credit Points:	11ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	The module is based on the knowledge gained in the course of previous undergraduate subjects.
Expected Learning Outcomes:	<b>Knowledge:</b> methods of collection, presentation and analysis of data; principles of design and implementation of information models, systems and processes; principles and design features of various information systems; methods of building structures of information systems and basic algorithms of their functioning; tools for the development of modern information systems. <b>Skills:</b> to use knowledge and understanding for the design and implementation of information models, systems and processes, to operate automated management systems; to develop an information system that meets the technical task, conduct theoretical and experimental research, including the search and study of the required scientific and technical information, analysis and interpretation of the data in the use of information processing systems and management; integrate knowledge gained in different courses to solve research problems in new unfamiliar conditions. <b>Abilities:</b> to use system analysis in the formulation of information system design tasks, to determine the conceptual model of information systems, to describe and design information systems, to develop means of implementation of information technologies (methodical, information, mathematical, algorithmic, technical and software), to carry out simulation of processes and systems.
Intendend use/applicability	Modules: Research Work 3, Project and Information Management
Content:	Setting problems of design of information systems applications and methods of their solution; basic technologies of design of information systems applications; the content of work at the stage of research and substantiation of information systems applications; prospects for the development of technologies of design of information systems



	<p>applications; issues of quality assurance of IT projects; issues of design of information systems applications, selection of structure and set of software components that implement the requirements for the information system; the study of modern information systems of various types; methods of scientific research on the theory of design and technology of development of information systems.</p> <p>Research work. Integration of knowledge obtained in different disciplines to solve research problems in new unfamiliar conditions.</p>
Examination Form, module mark:	<p>Examination of the module including:  <i>Analysis, Simulation and Design of Information Systems –written control examination</i>  <i>Researchwork 2 -Scientific Research Report Defense</i>  Module mark: the result of the exam  <i>Researchwork 2</i></p>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia complex, computer class.
Study Materials:	<ol style="list-style-type: none"> <li>1. T. V. Gvozdeva. Design of Information Systems: Textbook / T. V. Gvozdeva, B. A. Ballod. – Rostov-on-Don: Phoenix, 2009. -508 p.</li> <li>2. V. I. Grekul, G. N. Denischenko, N. L. Korovkina. Design of information systems. Course of lectures. Textbook. Internet University of Information Technologies. M., 2008. -299 p.</li> <li>3. G. Butch, I. Jacobson, J. Rumbaugh. UML: User Manual / Translated from English. - M: DMK, 2010.</li> <li>4. A.M. Korikov. Theory of Systems and System Analysis: textbook/ A. M. Korikov, S. N. Pavlov. -2nd ed, updated and revised. – Tomsk: Publishing House of TUSUR, 2008. – 264 p.</li> <li>5. Theory of Information Processes and Systems: textbook for students of higher institutions/ under the editorship of B. Y. Sovetov – Moscow: Akademiya Publishing Center, 2010. – 432 p.</li> </ol>
Date of last amendment	20.01.2020

Module Name:	<b>Module 5:Research Work 3</b>
Code	M5IS(Ma)
Module Elements	<b>Compulsory</b> Research Work 3
Semester Number:	3
Person responsible for the module:	Y.V. Kukharenko
Lecturer:	V.P. Kulikov, V.P. Kulikova, Y.V. Kukharenko
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	Full-time: 3 semester: hours per week – 18(independent work of students -18); hours per semester –270.
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 270 hours Total: 270 hours
Credit Points:	Final Academic Assessment: 9 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Organizing of Research and Innovation Activities, Theoretical Basics of Information Processes, Modern Trends in Artificial Intelligence Systems.
Expected Learning Outcomes:	<b>Knowledge:</b> modern methods, tools and technologies of research and project activities; technology of educational process design at the level of higher education. <b>Skills:</b> integrate the knowledge gained in different disciplines, use them to solve analytical and management problems in new unfamiliar conditions; expand and deepen the knowledge necessary for daily professional activities. <b>Abilities:</b> update knowledge, expand professional skills and abilities; implement research projects in the professional field; research activities and solving scientific problems.
Intendend use/applicability	Modules: Research Work 4, Research Practice
Content:	Critical analysis of the problem, the proposed ways of solving the problem, confirmation of the study results with an indication of their practical application and prospects.
Examination Form, module mark:	<i>Research Work 3 - Scientific Research Report Defense</i> Module mark: the result of the exam <i>Research Work 3</i>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	1. M. M. Makhanov, S. M. Kalanova.Basics of Research in Universities, Methods of Writing Scientific and Methodical Works, Rules of Registration: Textbook-Taraz: TarSU,1999.-170 p. 2. S.I. Arkhangelskiy. Educational Process in Higher School, its Natural Basics and Methods - M., 2004-102p. 3. I. N. Kuznetsov. Scientific Research. Methods of Carrying out and Registration - M.: Dashkov i K – 2008, - 460 p.
Date of last amendment	20.01.2020

Module Name:	<b>Module 6: Teaching Practice</b>
Code	M6IS(Ma)
Module Elements	<b>Compulsory</b> Teaching Practice
Semester Number:	3
Person responsible for the module:	Y.V. Kukharenko
Lecturer:	V.P. Kulikova, Y.V. Kukharenko, N.S. Kolyeva
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	Full-time: 3 semester: hours per week – 6 (independent work of students -6); hours per semester – 90.
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 90 hours Total: 90 hours
Credit Points:	Final Academic Assessment: 3ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Педагогика, Psychology, History and Philosophy of Science, Organizing of Research and Innovation Activities, Theoretical Basics of Information Processes, Modern Trends in Artificial Intelligence Systems.
Expected Learning Outcomes:	<b>Knowledge:</b> basic concepts and system methodologies, international professional standards in the field of education, management and information technology; new approaches to the organization of the pedagogical process, research activities, as well as the use of knowledge gained in the course of different subjects to solve pedagogical, analytical and managerial problems in new unfamiliar conditions. <b>Skills:</b> expansion and deepening of knowledge required for daily professional activities; conducting independent scientific work, research and experimentation; integrate knowledge gained in the course of different subjects, use them to solve pedagogical and managerial problems in new unfamiliar conditions. <b>Abilities:</b> in the field of development of projects of the educational process, their implementation and analysis - the formation of the technological culture of the future teacher; update knowledge, expand professional skills; competently present the results of research and professional activities, within the application of modern trends and information technologies in the field of management and economics.
Intendend use/applicability	Modules: Research Practice
Content:	Basic concepts and system methodologies, international professional standards in the field of education, management and information technology; main documents that determine the work of the institution, educational standard of the new generation, curricula, educational and methodical complexes of disciplines; systems of planning and accounting of educational work; new approaches to the organization of

	the pedagogical process. Critical analysis of the problem, the proposed ways to solve the problem, confirmation of the results of the study indicating their practical application and prospects.
Examination Form, module mark:	<i>Teaching Practice - Training report defense</i> Module mark: the result of the exam <i>Teaching Practice</i>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	<ol style="list-style-type: none"> <li>1. New Pedagogical and Information Technologies in the Education System: Textbook /under the editorship of Y. S. Polat, M.: Akademiya. - 2001. – 272 p. – ISBN 5-7695-0811-6.</li> <li>2. T.D. Martsinkovskaya. Psychology and Pedagogy: Textbook. – M.: Prospect, 2010. – 464 p.</li> <li>3. T. S. Panina. Modern Methods of Enhanced Learning: Textbook. – 3<sup>rd</sup> ed. – M: Akademiya, 2008. – 176 p.</li> <li>4. A. P. Panfilova. Innovative Pedagogical Technologies: Active Learning: Textbook for universities. – M: Akademiya, 2009. – 192 p.</li> <li>5. Pedagogical Technologies of Enhanced Learning in Higher School: Textbook / L. G. Smyshlyaeva, L. A. Sivitskaya. – 2<sup>nd</sup>ed. – Tomsk: TPU Publishing House, 2009. 190 p.</li> <li>6. I. P.Podlasiy. Pedagogy: Textbook for universities. – M: Vyssheye Obrazovaniye, 2009. – 540 p.</li> <li>7. Pedagogy: ScientificJournal / Russian Academy of Education.</li> </ol>
Date of last amendment	20.01.2020

Module Name:	<b>Module 7:Research Work 4</b>
Code	M7IS(Ma)
Module Elements	<b>Compulsory</b> Research Work
Semester Number:	4
Person responsible for the module:	Y.V. Kukhareno
Lecturer:	V.P. Kulikov, V.P. Kulikova, Y.V. Kukhareno
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours perweek and per semester :	Full-time: 4 semester: hours per week – 14 (independent work of students - 14); hours per semester – 210.
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 210 hours Total: 210 hours
Credit Points:	Final Academic Assessment: 7 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Organizing of Research and Innovation Activities, Theoretical Basics of Information Processes, Modern Trends in Artificial Intelligence Systems.
Expected Learning Outcomes:	<b>Knowledge:</b> methods and techniques of self-education and research activities; modern methods, tools and technologies of research and project activities; technology design of the educational process at the level of higher education. <b>Skills:</b> integrate the knowledge gained in the course of different subjects, use them to solve analytical and management problems in new unfamiliar conditions; expand and deepen the knowledge necessary for daily professional activities. <b>Abilities:</b> willingness to use in practice the skills and abilities in the organization of research and project work.
Intendend use/applicability	Modules: Final Academic Assessment
Content:	Application of methodological and methodical knowledge in scientific research, pedagogical and educational work; critical analysis of the problem, the proposed methods of solving the problem, confirmation of the study results with an indication of their practical application and prospects.
Examination Form, module mark:	<i>Research Work - Scientific Research Report Defense</i> Module mark: the result of the exam <i>Research Work</i>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	1. M. M. Makhanov, S. M. Kalanova. Basics of Research in Universities, Methods of Writing Scientific and Methodical Works, Rules of Registration: Textbook-Taraz: TarSU, 1999.-170 p. 2. S.I. Arkhangelskiy. Educational Process in Higher School, its Natural Basics and Methods - M., 2004-102p. 3. I. N. Kuznetsov. Scientific Research. Methods of Carrying out and Registration - M.: Dashkov i K – 2008, - 460 p.
Date of last amendment	20.01.2020

Module Name:	<b>Module 8: Research Practice</b>
Code	M8IS(Ma)
Module Elements	<b>Compulsory</b> Research Practice 2
Semester Number:	4
Person responsible for the module:	Y.V. Kukhareno
Lecturer:	V.P. Kulikov, V.P. Kulikova, Y.V. Kukhareno
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	Full-time: 4 semester: hours per week –18 (independent work of students -18); hours per semester – 270 .
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 270 hours Total: 270 hours
Credit Points:	Final Academic Assessment: 9 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Organizing of Research and Innovation Activities, Theoretical Basics of Information Processes, Modern Trends in Artificial Intelligence Systems.
Expected Learning Outcomes:	<b>Knowledge:</b> modern methods of scientific research with the obligatory experimental part, processing and interpretation of experimental data with the use of new information technologies. <b>Skills:</b> to integrate the knowledge gained in the course of different subjects, to use them to solve educational, analytical and managerial problems in professional activities; to expand and deepen the knowledge necessary for daily professional activities. <b>Abilities:</b> update knowledge, expand professional skills; carry out research projects in the professional field.
Intendend use/applicability	Modules: Final Academic Assessment
Content:	Application of modern methods of research; processing and interpretation of experimental data with the use of new information technologies; approbation of the results of scientific research carried out within the framework of the master's thesis.
Examination Form, module mark:	<i>Research Practice 2 - Scientific Research Report Defense</i> Module mark: the result of the exam <i>Research Practice 2</i>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	1. V. Borovikov. Statistica (Art of Data Analysis on a Computer) PITER, 2003. – 688 p. 2. V. A. Filippov. Data Mining: Methods and Tools M.: URSS, 2008. 52 p. 3. Y. I. Tyurin, A. A. Makarov. Statistical Analysis of Data on a Computer (under the editorship of V. E. Figurnov), M., INFRA, 1998. – 528 p. 4. I. I. Yeliseyeva, M. M. Yuzbashev. General Theory of Statistics. M.: Finance and statistics, 2007. – 656 p. 5. L. M. Kharchenko, V. G. Dolzhenkova, V. G. Ioninet al. Statistics: Textbook. M.: INFRA-M, 2006. – 384 p.
Date of last amendment	20.01.2020

Module Name:	<b>Module 9: Final Academic Assessment</b>
Code	M9IS(Ma)
Module Elements	<b>Compulsory</b> Comprehensive examination Master's thesis defense
Semester Number:	4
Person responsible for the module:	Y.V. Kukharenko
Lecturer:	V.P. Kulikov, V.P. Kulikova, Y.V. Kukharenko N.S. Kolyeva
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	Full-time: 4 semester: hours per week – 28 (independent work of students - 28); hours per semester – 420.
Workload:	Full-time education: Teaching Load: 0 hours Extracurricular Classes: 420 hours Total: 420 hours
Credit Points:	Final Academic Assessment: 14 ECTS
Conditions for Examinations:	Completion of the degree program and writing a master's thesis
Recommended Conditions:	The module is based on the knowledge gained in the course of all modules of the master's degree program.
Expected Learning Outcomes:	<b>Knowledge:</b> modern methods, tools and technologies of research and project activities; technology of design of the educational process at the level of higher education. <b>Skills:</b> integrate the knowledge gained in the course of different subjects, use them to solve analytical and management problems in new unfamiliar conditions; summarize the results of analytical work in the form of a master's thesis, article, report, analytical note, etc. <b>Abilities:</b> update knowledge, expand professional skills; carry out research projects in the professional field.
Intendend use/applicability	
Content:	Critical analysis of the problem, the proposed methods of solving the problem, confirmation of the study results with an indication of their practical application and prospects.
Examination Form, module mark:	Master's thesis defense, state examination in the specialty
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room
Study Materials:	<ol style="list-style-type: none"> <li>1. B. Y. Sovetov, S. A. Yakovlev. Simulation of Systems. 3<sup>rd</sup> ed. Updated and revised. – M.: Vysshaya shkola, 2001. – 343 p.</li> <li>2. Basics of Simulation. Laboratory Practical Course / Comp. V. V. Dronov; NovGUnamed after Yaroslav-The-Wise– Velikiy Novgorod, 2006.</li> <li>3. Computer simulation. Laboratory Practical Course / Comp. V. V. Dronov; NovGUnamed after Yaroslav-The-Wise– Velikiy Novgorod</li> <li>4. Design of Economic Information Systems //under the editorship of G. N. Smirnova. – Finance and statistics, 2001-440 p.</li> <li>5. A. M. Vendrov, Software Design of Economic Information Systems, Finance and statistics, 2000</li> <li>6. Design of Information Systems, M: KompyuterPress, No. 9, 2001</li> <li>7. L. Kozlenko. Design of Information Systems.</li> <li>8. Clegg, Dai and Richard Barker Case Method Fast-track: A RAD Approach Adison-Wesley, 1994.</li> </ol>

	<p>9. S. V. Maklakov. Creation of Information Systems with AllFusionModellingSuite M.: Dialog-MIFI, 2003</p> <p>10. Project Management: Standards, Methods, Experiences / A. S. Tovb, G. L. Sipes. M.: ZAO Olimp-Business, 2003. — 239 p.</p> <p>11. Project Management: English-Russian Definition Dictionary. – reference book.</p> <p>12. V. D. Shapiro, N. G. Olderogge, , A. A. Yurkevich; Under the editorship of V. D. Shapiro. M.: Vysshaya shkola, 2000. — 379 p.</p> <p>13. Project Management: Textbook / A. A. Shefov. Vladimir, 2000.</p>
Date of last amendment	20.01.2020



Module Name:	<b>Module 10: Methodology of Scientific Research</b>
Code	M10IS(Ma)
Module Elements	<i>Elective Subjects</i> <b>Research Management</b> <b>Commercialization of Scientific Projects</b> Methodology of Scientific Research Methodology of Work with Scientific Texts (in Kazakh)
Semester Number:	1
Person responsible for the module:	M.V. Pogrebetskaya
Lecturer:	Research Management - Y.V. Kukharenko Commercialization of Scientific Projects - V.P. Kulikova, Methodology of Scientific Research – M.V. Pogrebetskaya Methodology of Work with Scientific Texts (in Kazakh) -T.A. Akhmetova
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	1 semester: hours per week – 16 (lectures -3; workshops -3; independent work -10); hours per semester – 240.
Workload:	Teaching Load: 90 hours Extracurricular Classes: 150 hours Total: 240 hours
Credit Points:	8 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	Module: Methodology of Scientific Research
Expected Learning Outcomes:	<b>Know:</b> modern methodology, methods of scientific research; types of research projects and the basic principles of their management; methods of setting goals and objectives of scientific project research; the legislative framework for the management of science and its organizational structure; methods of obtaining, processing and storage of scientific information; ways of commercialization of objects of intellectual property; possible ways of further development of radioelectronic and telecommunication equipment. <b>Be able to:</b> perform the functions of a manager in the management of a scientific project; solve scientific and technical problems of introduction of communication systems, radio broadcasting, radio systems, television technologies, antenna-feeder, radio transmitting and radio receiving devices; systematize domestic and foreign experience in the field of research; apply scientific methods of knowledge in professional activity; creative thinking and creative approach to solving new problems and situations; competently present the results of research and project activities. <b>Possess the skills:</b> research, preparation of reports and publications on research topics, development of individual research issues; solving problems related to the management of scientific research; application of new technologies of communication networks; search and analysis of modern scientific and technical information. <b>Demonstrate the ability:</b> to scientific activity and to further independent management of scientific research; formulate and solve problems arising in the course of research activities; draw up the results of research work in various forms of scientific products; conduct a scientific discussion using the evidence base.

Intendend use/applicability	Modules: Scientific Research 2, Scientific Research 3, Scientific Research 4, Research Scientific Training
Content:	<p><i>Research Management</i> Basic concepts related to research in general, main goals and approaches of scientific research. In addition, the following functions of research management are considered: planning, organization, motivation and control, as well as the legislative framework of science management.</p> <p><i>Commercialization of Scientific Projects</i> Basic concepts related to research in general, main goals and approaches of scientific research. In addition, the following functions of research management are considered: planning, organization, motivation and control, as well as the legislative framework of science management.</p> <p><i>Methods of Organization of Scientific Research</i> Main stages and deadlines of research. Structural elements of the thesis (theme, relevance, problem, contradiction, object, subject, purpose, tasks, hypothesis). Structural elements of the thesis (methods, scientific novelty, theoretical and practical significance). Methodology and methods of scientific research. Experiment as a research method. Statistical research methods (basics). Statistical research methods (research data analysis). Work with scientific literature. Language and style of scientific speech. Publication of research results. The logic of science. Organization of defense of master's thesis. Modern development of science in Kazakhstan.</p> <p><i>Methods of Organization of Work with Scientific Texts (in Kazakh)</i> This discipline is aimed at the formation of skills of writing scientific texts (annotation, reference paper, abstract, report, essay, comment, etc.) and skills of working with scientific literature in the Kazakh language.</p>
Examination Form, module mark:	<p><i>Research Management</i> - computer-based testing  <i>Commercialization of Scientific Projects</i> - written examination  <i>Modern Methods of Measurement in Radio Engineering and Telecommunication Networks</i> - computer-based testing  <i>Methods of Organization of Work with Scientific Texts (in Kazakh)</i> - written examination</p>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system.
Study Materials:	<ol style="list-style-type: none"> <li>1. A. M. Novikov. Methodology of Scientific Research: Textbook. -M: LIBROKOM, 2010. 280 p.</li> <li>2. A.V. Pavlov. Logic and Methodology of Science. Modern Humanitarian Knowledge and its Prospects. - M.:Flinta: Nauka, 2010.- 344 p.</li> <li>3. Law of the Republic of Kazakhstan on Copyright and Related Rights.</li> <li>4. Law of the Republic of Kazakhstan on Innovations.</li> <li>5. Patent Law of the Republic of Kazakhstan.</li> <li>6. Law of the Republic of Kazakhstan on Science".</li> <li>7. A. Zakharova, T. Zakharova. How to Write and Defend a Thesis. SPb.: Piter, 2007. -160 p.</li> <li>8. M. F. Shklyar. Basics of Scientific Research: Textbook .-M: Dashkov i K, 2008.-244 p.</li> <li>9. A. N. Dzhurinskiy. Development of Education in the Modern World: Textbook.-2<sup>nd</sup> ed. - M:VLADOS, 2003.-240 p.</li> <li>10. A. F. Anufriyev, Scientific Study. Course papers, Theses and Dissertations. - 3<sup>rd</sup> ed.- M. : Os-89, 2007. - 112 p.</li> </ol>
Date of last amendment	20.01.2023

Module Name:	<b>Module 11: Mathematical Simulation in Information Systems</b>
Code	M12IS(Ma)
Module Elements	<i>Elective</i> Mathematical Simulation in Information Systems Simulation of Information Processes and Systems Information Systems Infrastructure Information Systems Administration Theory of Discrete Control Systems Calculus of variations and optimization methods Information Protection Methods Information Security Neurocomputing Systems Applied Fuzzy Systems
Semester Number:	2
Person responsible for the module:	N.V. Astapenko
Lecturer:	Mathematical Simulation in Information Systems– V.P. Kulikova, Simulation of Information Processes and Systems – Y.V. Kukhareno Information Systems Infrastructure – N.V. Astapenko Information Systems Administration– V.P. Kulikov Theory of Discrete Control Systems– V.P. Kulikova, Calculus of variations and optimization methods– V.P. Kulikova, Information Protection Methods– N.V. Astapenko Information Security– Y.V. Kukhareno Neurocomputing Systems– V.P. Kulikov Applied Fuzzy Systems– V.P. Kulikova
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	Full-time: 3 semester: hours per week – 38 (lectures -6; workshops -6; independent work of students -26); hours per semester –570.
Workload:	Full-time education: Teaching Load: 190 hours Extracurricular Classes: 380hours Total: 570hours
Credit Points:	19 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Information Protection, Fuzzy Logics and Neural Networks
Expected Learning Outcomes:	<b>Knowledge:</b> theories, methods and technologies of simulation in the study and design of information systems; simulation technologies using mathematical apparatus; basic methods of systems simulation, modern technology and their software for solving simulation problems, methods of analysis and evaluation of the effectiveness of the development, implementation and functioning of information systems; modern information systems, models, methods and technologies of design, as well as business administration; system concepts for understanding and determining the problems, basic principles of complex information systems that are compatible with the most modern technologies, and possess personal experience of adequate handling of such systems; general methodology for the development of object-oriented programs using modern algorithmic languages and programming systems. <b>Mathematical apparatus Z -</b>

	<p>transformations; methods of structural and parametric synthesis of digital controllers.</p> <p><b>Knowledge:</b> means of protection, standards of evaluation of security level and major software vulnerabilities, basic concepts of information security and information protection; sources, risks, forms of attacks on information; security policy and standards; methods of software reliability; legal and organizational support of software development and application, basics of the theory of fuzzy sets and practical results of the use of fuzzy technologies for processing semi-structured information to determine effective solutions; terminology related to neural networks; architecture of neural networks.</p> <p><b>Skills:</b> to analyze the initial problem, to assess the need to solve the problem by simulation, to bring the original model to a form convenient for simulation, to develop programs for solving specific problems of simulation, to apply known methods for the identification of mathematical models; implementation of information models, systems and processes; to apply IT and mathematical models used in the analysis of systems of different nature in planning and forecasting of human economic activity in fields of professional activity; to implement information models, systems and processes, to use modern methods, styles and tools in the development of software products in various fields of professional activity; to use modern languages and technologies of program development; features of their application in the education system; recurrence relations from transfer functions in order to implement digital controllers on a computer for industrial control objects.</p> <p><b>Skills:</b> to implement measures to fight network security violations using a variety of software, install, test, try and use hardware and software protection; to implement measures to fight network security violations using a variety of software protection; install and configure software to protect against malicious software, to apply the obtained theoretical knowledge to solving practical problems of neural network simulation in economic applications; to apply the obtained theoretical knowledge to solving practical problems of neural network simulation in financial applications; to use the basic principles of solving problems of economic analysis, classification, forecasting and management using neural networks.</p> <p><b>Abilities:</b> to select methods, tools and instruments for simulation; to construct models and obtain new knowledge based on the analysis, be competent in matters of design, deployment and business administration of information systems; be competent to solve problems of information processing with the use of modern programming languages. methods of discrete-analog obtaining of recurrence relations from transfer functions; methods for synthesizing digital controllers; methods for modeling digital control systems on a computer, analyzing the quality and stability of the system.</p> <p><b>Abilities:</b> security administration, identifying and eliminating software vulnerabilities, analysis of information security; administration of security software; skills to identify and resolve software vulnerabilities.</p> <p>to professional operation of modern equipment and devices, knowledge of optimization methods and the ability to apply them in solving problems of professional activity, apply the basic principles of solving problems of economic analysis, classification, forecasting and management using neural networks, willingness to use knowledge and understanding for the design and implementation of information models, systems and processes.</p>
Intendend use/applicability	Modules: Project and Information Management
Content:	<b>1. Mathematical Simulation in Information Systems.</b> Classification of types of simulation. System approach in simulation. Technology of development and research of the model. The problem of conditionality of the model and numerical stability of the simulation algorithm. Conceptual models of

	<p>systems, application of graph theory in conceptual simulation. Simulation in the research and design of systems.</p> <p><b>2. Simulation of Information Processes and Systems.</b> Basic methods of systems simulation, modern technical means and their software for solving simulation problems. Study of general principles and methods of simulation discrete-continuous processes, in particular, information processes occurring in computer systems and data networks; studying the theory of queuing systems, the principles of the system approach in the development of simulation models, the structure and methods of writing simulation programs in universal programming languages, methods and algorithms for simulation of random events with different distribution laws.</p> <p><b>Theory of Discrete Control Systems/</b>  Digital laws of control. Quantization of continuous signals. Study of an open linear system. Recovery of continuous signals. Sequence analysis. Linear discrete systems. Designing a regulator for a linear system. Stability. Single-loop discrete system. Stabilizability. Discretization of continuous processes. Transfer functions of digital systems. Sustainability of digital systems. Quality indicators. Re-equipment of continuous regulators. Synthesis of the controller according to the reference model. Synthesis using bilinear transformation.</p> <p><b>Calculus of variations and optimization methods</b></p> <p><b>3. Information Systems Administration.</b> Study of methods and models of information system management, functions, procedures and services of various hardware and software platforms of administration; capabilities of platforms, tools and systems of administration; methods of administration and control; objects and methods of administration of information systems; service administration and configuration management of information systems; hardware and software platform administration.</p> <p><b>4. Information Systems Infrastructure.</b>  The concept of modern enterprise infrastructure. Basic principles of design and construction of information system infrastructure, a set of technologies for the construction of enterprise management IT-infrastructure.</p> <p><b>8. Information Protection Methods</b>  Information market: features of formation and development. Formation of the information industry. Information as commodity. Features of pricing for information products. Main methods of determining the cost of information security. Determination of the amount of reasonable costs to ensure the security of information. Economic evaluation of intellectual property. Models of information security systems. General model of information security process. Generalized system model of information security. Generalized methods of information protection.</p> <p><b>9. Information Security</b> International standards of information exchange. The concept of threat. Types of possible violations of the information system. Protection. Purpose and tasks in the field of information security at the state level. Provisions of the theory of information security of information systems.</p> <p><b>10. Neurocomputing Systems.</b> Basics of building neurocomputers. A detailed review and description of the most important methods of teaching neural networks of different structures, as well as the problems solved by these networks. Consideration of the issues of neural networks implementation. Overview of fuzzy systems.</p> <p><b>11. Applied Fuzzy Systems.</b> Study of the theoretical basics of the theory of fuzzy sets and practical results of the use of fuzzy technologies for the processing of semi-structured information in professional activities. Overview of neurocomputer systems.</p>
Examination Form, module	<b>Examination of the module including:</b>

mark:	<p><i>Mathematical Simulation in Information Systems</i>  <i>Simulation of Information Processes and Systems</i>– written control examination. - written control examination  <i>Information Systems Administration</i>- written control examination  <i>Information Systems Infrastructure</i>– written control examination  <i>Theory of Discrete Control Systems</i>- written control examination  <i>Calculus of variations and optimization methods</i>– written control examination- written control examination  <i>Information Protection Methods</i>- written control examination  <i>Information Security</i> - written control examination  <i>Neurocomputing Systems</i>- written control examination  <i>Applied Fuzzy Systems</i> - written control examination</p>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room.
Study Materials:	<ol style="list-style-type: none"> <li>1. V. N. Ashikhmin, M. B. Gitman et al. Introduction to Mathematical Simulation. -M., Logos, 2008.</li> <li>2. G. G. Arunants. Simulation of Economic Processes: Practical course – Kaliningrad, 2009.</li> <li>3. S. I. Shelobayev. Mathematical Methods and Models (Economics, Finance, Business) ° M., 2007.</li> <li>4. , A.V. Kaplan et al. Solution of Economic Problems on the Computer - M., 2007.</li> <li>5. S. A. Orlov. Software Development Technology - St. Petersburg.: Piter, 2002.</li> <li>6. V. N. Petrov. Information Technologies - St. Petersburg.: Piter, 2006.</li> <li>7. A. M. Vendrov. Practical Course on Design of Software for Economic Information Systems - M.: Finances and statistics, 2006.</li> <li>8. Polyakov K.Yu. Fundamentals of digital systems theory management, - St. Petersburg: SPbGMTU Publishing House, 2012</li> <li>9. Polyakov K.Yu. Research of continuous and digital control systems in the Scilab environment, - St. Petersburg: SPbGMTU Publishing House, 2020</li> <li>10. Polyakov K.Yu. Fundamentals of the theory of automatic control, - St. Petersburg: SPbGMTU Publishing House, 2016</li> <li>11. V. F. Shangin Protection of Computer Information. Effective Methods and Means. – M: DMK Press, 2012.</li> <li>12. A.V. Vasilkov, I. A. Vasilkov. Security and Access Control in Information Systems.- M: FORUM, 2012</li> <li>13. Ensuring Information Security. Edited by A. P. Kurilo. M. Alpin, 2011</li> <li>14. B. Schneier. Secrets and Lies. Data Security in the Digital World. Publishing House: Piter, 2003 ISBN: 5-318-00193-9, 0-471-25311-1</li> <li>15. Practical Cryptography.Niels Ferguson, Bruce Schneier,Publishing House: Williams, 2005, ISBN: 5-8459-0733-0, 0-4712-2357-3</li> <li>16. Basics of Information Security. Textbook for high schools / by Y. B. Belov, V. P. Los, R. V. Mescheryakov, A. A. Shelupanov. – M: Goryachaya liniya – Telekom, 2006. – 544 p.: with pictures.</li> <li>17. Gulnara Yakhyaeva. Fuzzy Sets and Neural Networks. Internet University of Information Technologies, 2011</li> <li>18. Alexander Galushkin. Neural Networks. Basics of the Theory. Goryachaya liniya - Telekom ISBN 978-5-9912-0082-0; 2012</li> <li>19. Ryszard Tadeusiewicz, Barbara Borovik, Tomas Gonzak, Bartos Lepper. Elementary Introduction to Neural Networks with Examples of Programs(translated by Igor Rudinskiy). Goryachaya liniya - Telekom ISBN 978-5-9912-0163-6; 2011</li> <li>20. Toby Segaran. Programming Collective Intelligence. (translated by</li> </ol>

	A. Slinkin). Simvol-Plus ISBN 978-5-93286-119-6, 5-93286-119-3, 0-596-52932-5; 2008
Date of last amendment	20.01.2023

Module Name:	<b>Module 12: Project and Information Management</b>
Code	M14IS(Ma)
Module Elements	<p><b>Elective</b></p> <p>Design of Information Systems  IT Projects Quality Management  <b>Optimal control theory</b>  Modern Trends in Artificial Intelligence Systems  Global computer networks  Data and Knowledge Management in Information Systems  Computer Network Security  Information Systems in Management  Corporate Information Systems  <b>Analysis and modeling of complex systems</b>  Modern Information and Communication Technologies in the Education System  Information Control Systems in Education/</p>
Semester Number:	3
Person responsible for the module:	V.P. Kulikov
Lecturer:	<p>IT Projects Quality Management – V.P. Kulikova  Design of Information Systems– N.V. Astapenko  Modern Trends in Artificial Intelligence Systems – V.P. Kulikov  Global computer networks – V.P. Kulikov  Data and Knowledge Management in Information Systems– N.V. Astapenko  Computer Network Security – V.P. Kulikov  <b>Optimal control theory-</b> V.P. Kulikov  Information Systems in Management – V.P. Kulikova  Corporate Information Systems – N.V. Astapenko  <b>Analysis and modeling of complex systems– V.P. Kulikova</b>  Modern Information and Communication Technologies in the Education System – V.P. Kulikov  Information Control Systems in Education – N.V. Astapenko</p>
Language:	Russian
Curriculum relation:	Information Systems (Ma)
Type of teaching / number of hours per week and per semester :	<p>Full-time:  3 semester: hours per week – 36 (lectures -3; labs-9; independent work of students -24);  hours per semester –540.</p>
Workload:	<p>Full-time education:  Teaching Load: 180 hours  Extracurricular Classes: 360hours  Total: 540hours</p>
Credit Points:	18 ECTS
Conditions for Examinations:	For admission to the exam, the student must score at least 50 points out of 100 available for each subject of the module
Recommended Conditions:	This module is based on the knowledge gained in the course of the following undergraduate subjects: Analysis, Simulation and Design of Information Systems
Expected Learning Outcomes:	<p><b>Knowledge:</b> evolution of quality assurance methods, general information on project management, project quality planning, software quality assurance processes, software quality control processes, methods of data collection, presentation and analysis; principles of design and implementation of information models, systems and processes; methodology of computer-based design of information systems, mathematical and simulation modeling methods, methods of constructing simulation algorithms, general ideas about the applied systems of artificial intelligence, the role of artificial intelligence</p>



	<p>and neurocomputing science in the development of computer science in general; basic principles of organization and functioning of data banks as the basis of information systems and data management, their components, properties, capabilities and applications of the most common classes and types of databases in information systems; modern computer network technologies and methods of transmission, storage, search, processing and presentation of information. <b>Knowledge:</b> modern apparatus of applied mathematics, basic concepts and system methodologies, international professional standards in the field of education, management and information technology; modern methods of processing and transformation of information by means of information technologies; concepts of information management systems in education, management and economics, their functions, applications, structure, elements and principles of action.</p> <p><b>Skills:</b> design and construction of information system projects; application of tools to assess the quality and efficiency of information systems; economic feasibility of decision-making in the field of quality information systems, to be able to create informational logical models of complex systems with the help of modern information technologies, to use elements of fuzzy sets for mathematical formalization of initial information about the studied real situation or decision-making process; to analyze and develop a strategy for managing data and knowledge of the organization, ensuring data security in networks based on modern methods and advanced scientific achievements</p> <p><b>Skills:</b> to make decisions in difficult and unusual situations in the field of organization and management of economic activity of the enterprise (firm); to conduct a survey of activities and IT infrastructure of enterprises; the use of qualitative methods of differential calculus and mathematical programming in economic analysis, organizational and managerial decision-making, planning and forecasting in various areas and levels of the economic mechanism in order to stabilize the functioning of the information system; application of modern methods of processing and transformation of information by means of computer communication technologies; application of the acquired knowledge in the design of information management systems in production activities and in education.</p> <p><b>Abilities:</b> to present the results of their work and to justify the need for the implementation of the developed projects, methods and means of automated support of complex systems, skills of automation of information processes of organizations, formalization and structuring of problem knowledge; application of concepts of intelligent systems in master's teaching and master's studies; apply the knowledge and understanding to solve data and knowledge management problems in new and unfamiliar contexts; be prepared to organize and manage an enterprise and use innovative methods to solve problems. <b>Abilities:</b> systematic understanding of the methodology of practical application of the theory of optimal management in the study of economic and administrative processes and objects; to present the results of their work and to justify the need for the implementation of projects; readiness for responsible and purposeful solution of tasks in cooperation with society or a team; be competent in matters of modern educational systems and technologies.</p>
Intendend use/applicability	Modules: Research Work 4, Research Practice
Content:	<p><b>I. IT Projects Quality Management.</b> Study of quality management issues of IT projects: modern approaches to quality management of IT projects; essence and content of project management; project management software; structure of the project model, structure of programs and projects; plan development, project monitoring, preparation of analytical materials; basic principles of information project management; basic approaches, methods and models of quality management systems of information projects. Initial information on the collective management of projects.</p>

**2. Design of Information Systems.** Formulation of problems of information system application design and methods of their solution; basic technologies of information system application design; the content of work at the stage of research and substantiation of the creation of information system applications; prospects for the development of technologies of information system application design; issues of quality assurance of IT projects; issues of design applications of information systems, selection of structure and set of software components that implement the requirements for the information system; study of modern information systems of various types; methods of scientific research on the theory of design and technology of information system development.

**3. Global computernetworks** Modern computer network technologies and methods of transmission, storage, search, processing and presentation of information; security of physical and channel levels; features of solving problems of network security; general problems of application level security services.

**4. Modern Trends in Artificial Intelligence Systems** General definition of artificial intelligence. Intelligent agents. Qualitative behavior: the concept of rationality. Problem solving through searching. Agents solving problems. Search for solutions. Heuristic functions. Compilation of admissible heuristic functions. Constraint satisfaction problems. Games. Logical agents. The world of Wumpus. Logic. Knowledge representation. Ontological engineering. Basics of planning. Time and uncertainty. Uncertainty and rational solutions. Axioms of probability. Probabilistic reasoning. Presentation of knowledge in an uncertain problem area.

**5. Data and Knowledge Management in Information Systems.** Data as the basis of the information system; data and knowledge storage (databases and knowledge bases): principles of construction and management; systems using databases and data storage; data and knowledge in modern organizations; data security in networks; data and knowledge management system in the organization; information support of knowledge management processes; intellectual technology of knowledge management; data mining tools; operational analytical processing of OLAP data; requirements for OLAP-system; varieties of OLAP-systems; methods of data mining KDD (Knowledge Discovery in Databases) and DM (Data Mining), data post-processing and interpretation of the results; customer interaction management system; study of modern DBMS.

**6. Computer Network Security.** Modern computer network technologies and methods of transmission, storage, search, processing and presentation of information; security of physical and channel levels; features of solving problems of network security; general security problems of application-level services; common methods of ensuring the security of computer networks: the means provided for in the standard protocols of building networks; cryptographic methods of protection of user information transmitted and stored in the network; special methods of identification and authentication of users.

**Information Systems in Management.** Theoretical basics of information technologies and information systems, technologies and ways of processing of various information; informatization of society; problems of increase in efficiency of information systems; information support of information technologies and information systems of the organization management; information support of the computer work station (CWS) of the manager; application programs (AP) for business-plans making, legal databases of the enterprise; technology of office automation.

**Corporate Information Systems.** Study of different approaches to the concept of corporatism and its application to management systems.

	<p>Development of skills and abilities to determine the criteria of quality and efficiency in corporate management systems. Study of functions (tasks, business processes) in corporate management systems, features of database architecture in corporate information systems, design features of corporate information systems.</p> <p><b>Information Control Systems in Education.</b> Programmed learning and its transfer to new stages of IT development. Learning environments, regularity. Activation of training by means of IT. Main directions of IT application: simulation, accounting and control, and support of the educational process. General approaches to assessing the quality of IT tools in education. Assessment of the quality of content structures, methods and techniques of computer training, control and accounting of knowledge on the basis of different approaches. Electronic and virtual libraries and catalogues. E-textbooks and online courses.</p> <p><b>Modern Information and Communication Technologies in the Education System.</b> Study of main issues related to the psychological, didactic and technological capabilities of modern computer teaching techniques and means of computer communication technologies; study of a new paradigm of education in the conditions of informatization of society; innovative technologies of training and control in the conditions of informatization of education; pedagogical communication in the conditions of informatization of education; types of information and educational environments; theoretical foundations of computer training and control technology</p>
Examination Form, module mark:	<p><b>Examination of the module including:</b></p> <p><i>IT Projects Quality Management – written control examination.</i></p> <p><i>Design of Information Systems– written control examination.</i></p> <p><i>Modern Trends in Artificial Intelligence Systems– written control examination.</i></p> <p><i>Global computer networks – written control examination.</i></p> <p><i>Data and Knowledge Management in Information Systems– written control examination.</i></p> <p><i>Computer Network Security – written control examination.</i></p> <p><i>Information Systems in Management– written control examination.</i></p> <p><i>Corporate Information Systems– written control examination.</i></p> <p><i>Modern Information and Communication Technologies in the Education System– written control examination.</i></p> <p><i>Information Control Systems in Education – written control examination.</i></p>
Technical/Multimedia Facilities:	Interactive whiteboard, multimedia system, IT room.
Study Materials:	<ol style="list-style-type: none"> <li>1. T. V. Gvozdeva. Design of Information Systems: Textbook / T. V. Gvozdeva, B. A. Ballod. – Rostov-on-Don: Phoenix, 2009. -508 p.</li> <li>2. V. I. Grekul, G. N. Denischenko, N. L. Korovkina. Design of information systems. Course of lectures. Textbook. Internet University of Information Technologies. M., 2008. -299 p.</li> <li>3. G. Butch, I. Jacobson, J. Rumbaugh. UML: User Manual / Translated from English. - M: DMK, 2010.</li> <li>4. V. A. Dubenetskiy, B. Y. Sovetov, Methods and Means of Automation of Automated Control System Designing. - L.: LETI Publishing House, 2006.</li> <li>5. Y. T. Shestopal: Quality Management. - M.: INFRA-M, 2011.</li> <li>6. I.I. Mazur et al.; Under the general editorship of I. I. Masur, V. D. Shapiro: Projects Management. - M.: Omega-L, 2009.</li> <li>7. L. N. Yasnitsky, Introduction to Artificial Intelligence: textbook for students of higher educational institutions / L. N. Yasnitsky. - 2<sup>nd</sup> ed. - Moscow: Akademiya, 2010. - 176 p. - ISBN 978-5-7695-7042-1.</li> <li>8. E. V. Borovskaya, N. A. Davydova. Basics of Artificial Intelligence; Binom. Laboratory of knowledge, Moscow, 2010. - 128 c.</li> </ol>

	<ol style="list-style-type: none"> <li>9. A. D. Khomonenko et al. Databases: Textbook for universities. – M.: Binom-Press, 2007, 736 p.</li> <li>10. C.J.Date. Introduction to Database Systems / Translated from English. 6th Ed. - K.: Dialectika. 1998.</li> <li>11. S. M. Digo. Design and Application of Databases. - M: Finance and statistics, 1995. - 208 p.</li> <li>12. T. S. Karpova. Databases: Models, Development, Implementation. - SPb.: Piter. 2002. - 304 p.</li> <li>13. Computer Networks. Principles, Technologies, Protocols / V. G. Olifer, N.A.Olifer.– SPb.: Piter, 2001. – 672 p.</li> <li>14. O. V. Mashnikova, Y. L.Shuremov, N. N. Golubeva. Computer Systems and Networks: Textbook. Finance and statistics, 2000.</li> <li>15. Automated information technologies in Bank Activity/Under the editorship of Professor G. A. Titorenko. – M: Finstatinform, 2008.</li> <li>16. V. A. Grabaurov. Information Technology for Managers. - M: Fista, 2009.</li> <li>17. Automated Information Technologies in Economics/ Under the editorship of Professor G. A. Titorenko. - M: UNITY, 2008.</li> <li>18. Automated Information Technologies in Economics / Under the editorship of I. T. Trubilin. - M: Finance and statistics, 2005.</li> <li>19. Introduction to Business Information/Under the editorship of V. P. Tikhomirov and A. B. Khoroshilov. - M: Finance and statistics, 2004.</li> <li>20. New Pedagogical and Information Technologies in the Education System: Textbook /under the editorship of E. S. Polat, M.: Akademiya. - 2007. – 272 p. – ISBN 5-7695-0811-6.</li> <li>21. G. K. Selevko. Modern Educational Technologies: Textbook / G. K. Selevko - M.: Narodnoye Obrazovaniye, 2008. - 256 p.</li> <li>22. V. P. Bepalko. Components of Pedagogical Technology /V. P. Bepalko, M.: Pedagogics, 2007. - 192 p.: with pictures.</li> <li>23. Open Education – an Objective Paradigm of the XXI Century / under the editorship of V. P. Tikhomirov - M.: International Academy of Open Education, 2007. – 288 p.</li> </ol>
Date of last amendment	20.01.2023