**Module Handbook**

**Degree program**

**5В011100 Computer Science**

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| Module title: | 1. Preparation on Foreign Language |
| Module elements | Foreign language |
| Term of Study: | 1,2 |
| Person responsible for the module: | Shtro O.G. |
| Lecturer: | Foreign language - Shtro O.G. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 6;  in a semester –90.  2 semester: hours in a week – 8;  in a semester– 120. |
| Work load: | Full-time mode:  Curricular load: 140 hours  Extracurricular hours: 70hours  Total: 210 hours |
| Credits: | 9 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Minimal level of language |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the principles of communication in foreign language, a normative use of oral speech and written language of studying languages of pedagogical rhetoric and conflictology  ***Skills****:* to talk in studying language, to express one’s opinion and statement in compliance with speech norms, to ask questions and answer, to communicate on the professional themes and work with the professional-oriented scientific sources in studying language, to cooperate with polycultural, polyethnic and multiconfessional society. |
| Contents: | Lexical material on language:  Social sphere of communication, socio-cultural spheres of communication.  Grammatical material in a foreign language. |
| Results of study /examinations /forms of examinations: | *Computer test* |
| Technical/multimedia equipment: | Multimedia complex, multimedia and lingaphone classroom, interactive board |
| Literature: | 1. Foreign language: 2. Reward Elementary Practice Book, Diana Pye, Simon Greenall, 1997, Macmillan Publishers Limited 3. Reward Elementary Student’s Book, Diana Pye, Simon Greenall, 1997, Macmillan Publishers Limited 4. Reward Pre-Intermediate Practice Book, Simon Greenall, 1994, Macmillan Publishers Limited 5. Dudorova E.S. “Anglijskij yazyk dlya studentov gumanitarnyh fakul'tetov”, Inyazizdat, Sankt-Peterburg, 2005 |

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| Module title: | 2. Preparation on Official Language |
| Module elements | Kazakh (Russian) language |
| Term of Study: | 1,2 |
| Person responsible for the module: | Zhuanishpaeva S.Zh. |
| Lecturer: | Kazakh (Russian) language - Zhuanishpaeva S.Zh. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 6;  in a semester –90.  2 semester: hours in a week – 8;  in a semester– 120. |
| Work load: | Full-time mode:  Curricular load: 140 hours  Extracurricular hours: 70 hours  Total: 210 hours |
| Credits: | 9 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Minimal level of a language |
| Objectives of modules / Intended learning outcomes: | ***Knowledge****:* the principles of communication in official language, a normative use of oral speech and written language of studying languages of pedagogical rhetoric and conflictology  ***Skills****:* to talk in studying language, to express one’s opinion and statement in compliance with speech norms, to ask questions and answer, to communicate on the professional themes and work with the professional-oriented scientific sources in studying language, to cooperate with polycultural, polyethnic and multiconfessional society. |
| Contents: | Lexical material on language:  Social sphere of communication, socio-cultural spheres of communication.  Grammatical material in a foreign language. |
| Results of study /examinations /forms of examinations: | *Computer test* |
| Technical/multimedia equipment: | Multimedia complex, multimedia and lingaphone classroom, interactive board |
| Literature: | 1. A.Sh. Bekturova, Sh.K. Bekturov. Kazahskij yazyk dlya vsekh. Almaty, 2006. 2. Komp'yuternyj samouchitel' kazahskogo yazyka. Elektronnyj uchebnik. A., 2004 3. Z.K.Kajyrbekova. Kazak tіlі. Zhalpy leksika. Barlyk mamandyktar bojynsha kurs studentterіne arnalgan oku - adіstemelіk keshen. Petropavl, 2009 zh. 4. Sauytova T.A. Kazak tіlі dlya vzroslyh. P., 2004 5. Imankulova S., Egіzbaeva N., Imanalieva G., Ramazanova Sh., Omarova B., K,Mukadieva K. Kazak tіlі. Almaty, 2008- 192b. 6. Akanova D.H., Aldasheva A.M., Kadasheva K.K., Sulejmenova E.D. Kazak tіlі. Ornekter zhane kesteler.Arman, 2003. |

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| Module title: | 3. Basic Social and Humanitarian Knowledge |
| Module elements | Modern history of Kazakhstan  Manash studies |
| Term of Study: | 1 |
| Person responsible for the module: | Abuov N.A. |
| Lecturer: | Modern history of Kazakhstan – Abuov N.A.,  Manash studies – Abuov N.A. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 12;  in a semester– 180. |
| Work load: | Full-time mode:  Curricular load: 60 hours  Extracurricular hours: 120 hours  Total: 180 hours |
| Credits: | 7 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Background knowledge of the school courses of World History, History of Kazakhstan, Social Science, Ecology and Natural Science. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the tendencies of social development of society;  ethical and spiritual values, social norms and navigate to them in own professional activity.  ***Skills:*** properly orientate in different social situations; creative uptake of historical material; rethinking using the latest concepts and modern historiography of the key problems in the history of Kazakhstan; the ability to analyze problems of modern society life and environment integrally and systemically |
| Contents: | ***Modern history of Kazakhstan:*** The formation and development of human society on the territory of Kazakhstan; ethno genetic processes; political history of ancient and medieval states; the evolution of material and spiritual culture; the transformation of the Kazakh society of 19-20th centuries; the history of independent Kazakhstan.  ***Manash studies:*** North Kazakhstan State university named after academician M. K. Kozybayev. Formation of scientific thought and public education in North Kazakhstan. Research activities of M.K. Kozybayev in 1947-1958. Research activities of M.K. Kozybayev in 1958-1988. Political activity of academician M.K.Kozybayev. M.K. Kozybayev views on the formation of the Kazakh statehood. |
| Results of study /examinations /forms of examinations: | ***Modern history of Kazakhstan*** *– state exam*  ***Manash studies*** *– computer test* |
| Technical/multimedia equipment: | Power Point presentations, electronic texts and maps, multimedia complex |
| Literature: | 1. IstoriyaKazakhstana. Ocherk. - A., 1993. 2. Sheretov S.G. Novejshaya istoriya Kazakhstana (1985-2002 gg.). – A., 2009. 3. Azhenov M.S., Bejsenbaev D.E. Social'naya stratifikaciya v Respublike Kazakhstan. Almaty. Bilim.1997   4. Kozybayev M. K. Kliuch i vrata k aziatskim stranam // Kazakhstan na rubezhe vekov: razmyshleniya i poiski. V dvukh knigakh. Kniga pervaya. - Almaty: Gylym, 2000, s. 89-97.  5. Kozybayev M. K. Istoriya Rossii est’ istoriya strany, kotoraya kolonizuetsya // Kazakhstan na rubezhe vekov: razmyshleniya i poiski. V dvukh knigakh. Kniga pervaya. - Almaty: Gylym, 2000, s. 98-111.  6. Kozybayev M. K. Istoriografiya Kazakhstana (XVIII-XX vv) // Kazakhstan na rubezhe vekov: razmyshleniya i poiski. V dvukh knigakh. Kniga pervaya. - Almaty: Gylym, 2000, s. 111-166.  7. Kozybayev M. K. Otechestvennaya istoriya XX veka: mify I real’nost’ // Kazakhstan na rubezhe vekov: razmyshleniya i poiski. V dvukh knigakh. Kniga pervaya. - Almaty: Gylym, 2000, s. 194-221. |

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| Module title: | 4. Innovation in Education |
| Module elements | Philosophy  Management in education  Criteria-based assessment technology |
| Term of Study: | 3,4 |
| Person responsible for the module: | Imanov A.K. |
| Lecturer: | Philosophy – Nikiforov A.V.  Management in education – Imanov A.K.  Criteria-based assessment technology – Pustovalova N.I. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  3 semester: hours in a week – 8;  in a semester – 225.  4 semester: hours in a week –3;  in a semester–90; |
| Work load: | Full-time mode:  Curricular load: 165 hours  Extracurricular hours: 150 hours  Total: 315 hours |
| Credits: | 11 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge from a school on the following subjects: Human and Society, World history, Literature, History |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** standard and legal acts in the field of education, educational and instructional documentation, human rights (the international standard and legal acts, the legislation of Kazakhstan in the field of education and child welfare).  ***Skills:*** to develop the current educational and organizational documentation (didactic, control and measuring materials, etc.), to possess organizing abilities, to show high performing discipline. |
| Contents: | ***Philosophy:*** The origin and essence of philosophy, epochs in the development of philosophic knowledge and the issue of human existence in the world. Gnosiology and epistemology. Social philosophy. Philosophic anthropology. Philosophy of ancient India, ancient China. Classical and medieval philosophy. Philosophy of Renaissance and Reformation. Neo-European philosophy of XVII. Enlightenment philosophy. German classical philosophy. Irrational philosophy of XIX. Marxism philosophy. Russian philosophy of XX – early XXI centuries. Phenomenon of philosophy in the kazakh culture. Contemporary western philosophy.  ***Management in education***: Innovation activity. Terms and Definitions. Management of technological innovation. Innovation Management. Management of higher education quality in the conditions of the transition to a two-step training system. Pedagogical science in the conditions of the creation of a national innovation system. Pedagogical innovation: tradition, experience and prospects.  Pedagogical Systems and Technology: practical aspect.  ***Criteria-based assessment technology:*** Criteria-based assessment system. Tasks of criteria-based assessment. Functions of criteria-based assessment. Types of criteria-based assessment. Pedagogical technology of criteria-based assessment. The practical importance of criteria-based assessment |
| Results of study /examinations /forms of examinations: | ***Philosophy*** *– computer test*  ***Management in education*** *– computer test*  ***Criteria-based assessment technology*** *– computer test* |
| Technical/multimedia equipment: | Multimedia complex, video course |
| Literature: | 1. Alekseev P.V., Panin A.V. Filosofiya: Uchebnik. M.: Prospekt, 2003 2. Gubin V.D. Filosofiya: Uchebnoe posobie. M.: Omega, 2006 3. Tsyrkun I. I. Innovatsionnoe obrazovanie pedagoga: na puti k professional’nomu tvorchestvu: uchebno-metodicheskoe posobie / I. I. Tsyrkun, E. I. Karpovich – Minsk: BGPU, 2011. 4. A.A. Krasnoborova. Kriterial’noe otsenivanie v shkole. Per’m, GPTU, 2010. |

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| Module title: | 5. Pedagogics and psychology |
| Module elements | Psychology  Pedagogics  Psychological and pedagogical practice |
| Term of Study: | 4 |
| Person responsible for the module: | Samieva O.B. |
| Lecturer: | Psychology – Ashimov ZH.M.  Pedagogics- Samieva O.B.  Psychological and pedagogical practice – Markova L.N. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 12,  in a semester– 330 hours, |
| Work load: | Full-time mode:  Curricular load -180 hours  Extracurricular hours – 150 hours  Total – 330 hours |
| Credits: | 12 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Social and humanitarian disciplines of the school curriculum level |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the nature and specificity of the professional activity of the teacher; the main categories of pedagogy; know the categorical system of pedagogy sciences, have an idea about how to use pedagogical knowledge of professional activity;  ***Skills:*** to create installation in the continuous professional education, mastery of profound theoretical knowledge and professional teaching competencies; to create the need for self-development, self-improvement, to arouse an interest in pedagogical creativity; to analyze educational reality; understand relationship of pedagogy with other sciences  ***Competencies:*** the organization of complete pedagogical process, the ability to manage the educational activities, methods of selecting skills, forms and techniques of pedagogical work; to relate own opinion with the opinion of the collective, readiness to have a social responsibility for the results of own professional work. |
| Contents: | ***Psychology:*** Methods of psychology. Development of the mind and consciousness. Activity and Communication. Psychological analysis of activities. Personality during activity and communication. Psychological characteristics of the group. Psychology of cognitive processes. Sensation and perception. Memory. Imagination. Thinking. Speech. Mental properties and states. Emotional and volitional sphere. Temperament and its psychological characteristics. Character. Abilities. Fundamentals of human development. The subject of developmental psychology. The problem of age and patterns of mental development. Age periodization of mental development from the point of view of different theoretical approaches. Features of mental development at various age levels. Sources and mechanisms of occurring and overcoming crises.  ***Pedagogics:*** Basics of pedagogy science; basic pedagogical concepts and categories. Methodological foundations of modern pedagogy. Characteristics and relationship development, education and identity formation. Age and individual characteristics of children and their integration into the educational process. A holistic pedagogical process as a subject of pedagogy and object of the teacher’s activities. Laws of the pedagogical process.  The purpose of education and its social conditionality. World view as the core of the emerging personality. The content of education in a holistic pedagogical process. The system of means, forms and methods and techniques in complete pedagogical process. The process of learning as a system. The content of education in the modern school. Forms of organization of holistic learning. Modern lesson. Characteristics of teaching methods. Accounting and evaluation of the results of educational work in the holistic pedagogical prosess.  ***Psychological and pedagogical practice:*** The main directions of educational institution work. Legal and regulatory documents of teacher-psychologist and social pedagogue. Duties and responsibilities of social pedagogue. Development and formation of sustainable moral and humanistic view on social pedagogue and teacher- psychologist profession. |
| Results of study /examinations /forms of examinations: | ***Pedagogics*** *– computer test*  ***Psychology*** *- computer test*  ***Psychological and pedagogical practice*** *- assessment* |
| Technical/multimedia equipment: | PowerPoint-presentations, multimedia complex |
| Literature: | 1. Vul’fov B.Z. Pedagogika: uchebnoe posobie dlya bakalavrov / B.Z. Vul’fov, V.D. Ivanov, A.F. Menyayev; Pod red. P.I. Pidkasistyi. - M.: Iurait, 2013. 2. Krivshenko L.P. Pedagogika: Uchebnik I praktikum dlya akademicheskogo bakalavriata / L.P. Krivshenko, L.V. Iurkina. - Liubertsy: Iurait, 2015. 3. Maklakov A.G. Obshaya psihologiya: Uchebnik dlya vuzov / A.G. Maklakov. - SPb.: Piter, 2013. 4. Kulagina I.IU. Psikhologiya razvitiya I vozrastnaya psikhologiya. Polnyi zhiznennyi tsikl razvitiya cheloveka: Uchebnoe posobie. / I.IU. Kulagina, V.N. Koliutskii. - M.: Akademicheskii proekt, 2015. |

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| Module title: | 6. Age Specific Psycho-Physiological Features |
| Module elements | Physiology of schoolchildren development  Pedagogical Continuous Practice 1  Study Practice 1  Study Practice 2 |
| Term of Study: | 1,2 |
| Person responsible for the module: | Markova L.N. |
| Lecturer: | Physiology of schoolchildren development – Rakhimzhanova Zh.A.  Pedagogical Continuous Practice 1 – Markova L.N.  Study Practice 1 – Serebrenikova V.V.  Study Practice 2 – Serebrenikova V.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 3;  in a semester –90.  2 semester: hours in a week – 6;  in a semester– 120 . |
| Work load: | Full-time mode:  Curricular load: 135 hours  Extracurricular hours: 75 hours  Total: 210 hours |
| Credits: | 7 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Disciplines, which it is desirable to learn before getting the material of the course, should allow forming a philosophical understanding of human nature and the meaning of his existence: Sociology, Ecology, Foreign Language, Physical Training, Pedagogics, History of Kazakhstan. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the basic mechanisms of the psyche, the role of consciousness and self-consciousness in behavior, communication and human activities, the formation and development of personality, the ratio of natural and artificial factors in the formation of personality, systems of the practical knowledge and skills, providing acquisition, development, improvement and activation of mental and physical abilities and qualities.  ***Skills:*** to apply the methods and means of teaching to maintain their health, moral and physical self-improvement; to organize educational work taking into account the anatomical and physiological characteristics of an organism at different ages, as well as the hygienic requirements for the building and the audience, furniture and school equipment  ***Competencies:*** readiness to ensure the protection of life and health of students in the educational process and extracurricular activities |
| Contents: | ***Physiology of schoolchildren development:*** General patterns of growth and development of children and teenagers. Age features of the musculoskeletal system. Age features of blood. Age features of circulation. Age features of the respiratory system. Age features of the digestive system. Age features of the secretion. Age features of the endocrine system. Physiology of the nervous system. The higher nervous activity and its age specific. Neuroses and their prevention. Age physiology and hygiene of analyzers. Medical and hygiene and sexual education of students.  ***Pedagogical Continuous Practice 1:*** Elements of teaching process. Levels of teaching process. History of formation of school discipline “Computer science”. The content of education. Basic curriculum. The problem of place of Computer science course at school. Comparative analysis of Computer science curriculum. Education standard in Computer science. Teaching material. Requirements to the contents of teaching material in Computer science.  ***Study Practice 1:*** Education Act. State program for the development of education and science. "Kazakhstan-2050" strategy. A model school curriculum on the discipline "Computer science".  ***Study Practice 2:*** Number systems. Information systems, information technology, automatic as an essential element of information systems, abstract machines, the basic concepts of algebra of logic. The concept of the algorithm, the analysis of the efficiency and complexity of algorithms, recursive algorithms, algorithms of search and access, sorting, non-deterministic algorithms, information modeling, semantic foundations of Computer science. |
| Results of study /examinations /forms of examinations: | ***Physiology of schoolchildren development*** *– computer test*  ***Pedagogical Continuous Practice 1 -*** *assessment*  ***Study Practice 1 -*** *assessment*  ***Study Practice 2 -*** *assessment* |
| Technical/multimedia equipment: | PowerPoint presentations, multimedia complex |
| Literature: | 1. Kamenskaya V.G. Vozrastnaya anatomiya, fiziologiya i gigiena: Uchebnik dlya vuzov. Standart tretiego pokoleniya / V.G. Kamenskaya, I.E. Mel’nikova. - SPb.: Piter, 2013. 2. Lysova N.F. Vozrastnaya anatomiya, fiziologiya i gigiena. 2-e izd. / N.F. Lysova, R.I. Aizman. - M.: SUI, 2010. 3. Metodika vospitatel’noi raboty: Uchebnoe posobie dlya studentov vysshih pedagogicheskikh uchebnykh zavedenii / L.A. Baikova, L.K. Grebenkina, O.V. Eremkina i dr.; Pod red.. V.A.Slastenina – M.: Izdat.tsentr «Akademiya», 2012. 4. Khmel’ N. D. Teoriya i tekhnologiya realizatsii tselostnogo pedagogicheskogo protsessa: Uchebnoe posobie – Almaty: AGU im. Abaya, 2012. |

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| Module title: | 7. Theoretical Computer Science |
| Module elements | Information and communication technologies  Theoretical bases of Computer Science |
| Term of Study: | 3 |
| Person responsible for the module: | Klishina E.A. |
| Lecturer: | Information and communication technologies **–** Klishina E.A.  Theoretical bases of Computer Science – Kulikov V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 16;  in a semester– 240. |
| Work load: | Full-time mode:  Curricular load: 80 hours  Extracurricular hours: 160 hours  Total: 240 hours |
| Credits: | 8 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Background knowledge of the school courses of Informatics. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the most important algorithms, structures of data and problem solving patterns, including central paradigms of programming, the history of computer science, the legal aspects of computer science and their impact on society, ethical and security issues related to the use of data processing systems  ***Skills:*** the use of various techniques of developing the efficient and reliable algorithms on creating software; modeling, analyzing and using the methods of the mathematical design and logical-mathematical methods of analysis and software testing  ***Competencies:*** to program with the use of modern tools; to justify design decisions in the field of design and analysis of the complexity of algorithm, to perform the setup and execution of experiments to verify of their correctness with the methods of mathematical logic and the theory of algorithms. |
| Contents: | ***Information and communication technologies:*** The role of ICT in key sectors of society development. ICT standards. Human-computer interaction. Networks and telecommunications. Cloud and mobile technologies. Multimedia technologies. Smart technology.  E-technology. E-business. E-learning. E-government.  ***Theoretical bases of Computer Science:*** Computer Science as a unity of science and technology. Structure of contemporary Informatics. Information, its types and characteristics. Information carriers. Operations with data. Boolean mathematics. Graphs and trees. Finite state machine. Turing machine and Post machine. Logical elements of computer. Organization of computer: principles von Neumann. Memory of computer. Input and output equipment. Processing means of information. Strategy of task solving and search for solutions. Concepts and algorithms properties, algorithm realization. Main patterns of programming. Review of contemporary application software. Main concepts of operational systems. Networks and telecommunications. Information Security and its components. Anti-virus programs. Information and communication technologies. Infrastructure “Electronic Government”. Technology design and analysis of business processes. Principles of the engineering of requirements specifications. |
| Results of study /examinations /forms of examinations: | ***Information and communication technologies*** *– computer test*  ***Theoretical bases of Computer Science*** *– computer test* |
| Technical/multimedia equipment: | Multimedia complex, interactive board, computer lab |
| Literature: | 1. June J. Parsons and Dan Oja, New Perspectives on Computer Concepts 16th Edition - Comprehensive, Thomson Course Technology, a division of Thomson Learning, Inc Cambridge, MA, COPYRIGHT © 2014. 2. Kretschmer, T. (2012), “Information and Communication Technologies and Productivity Growth: A Survey of the Literature”, OECD Digital Economy Papers, No. 195, OECD Publishing. 3. Astakhova E.V. Teoreticheskie osnovy informatiki: Uchebnoe posobie. – Barnaul: Izd-vo AltGTU, 2010.   4. Zabuga A. Teoreticheskie osnovy informatiki: Uchebnoe posobie. Standart tretiego pokoleniya. Izd-vo Piter, 2014. |

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| Module title: | 8. Health-improving (beginner level) |
| Term of Study: | 1, 2 |
| Person responsible for the module: | Dmitriev I.G. |
| Lecturer: | Physical training – Shitov A.S. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 4;  in a semester – 60.  2 semester: hours in a week – 4;  in a semester – 60. |
| Work load: | Full-time mode:  Curricular load: 40 hours  Extracurricular hours: 80 hours  Total: 120 hours |
| Credits: | 4 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Schoolcourse of Physic culture, to be admitted for course students should know about an ecology of human. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the role of physical training in making up of human personality and training specialist, in acquisition, preservation and promotion of health, principles of human healthy life-style.  ***Skills:*** to be able to follow the healthy life-style, improve the psychological quality, develop freedom at the lessons with the physical exercises, choose the types of sports to promote health independently. |
| Contents: | ***Physical training:***  1st semester: athletics and basketball (beginner).  2nd semester: swimming and volleyball (beginner). |
| Results of study /examinations /forms of examinations: | Standards of presidential tests  Differentiated test |
| Technical/multimedia equipment: | Gym, swimming pool, sports ground, play court |
| Literature: | Physical training:   1. Lyogkaya atletika. Uchebnik dlya institutov fizkul'tury. Pod red. N.G.Azolina, D.P.Markova, 2-e izdanie, – M., 2002 g. 2. Basketbol. Uchebnik dlya VUZov fizicheskoj kul'tury. M., 1997 g. 3. Plavanie dlya nachinayushchih. K.Vil'ke. M.: «Knowledge», 1991 g. 4. Osnovy plavaniya. Obuchenie i put' k sovershenstvu. M.Pedroletti. M.: «Feniks», 2006 g. 5. Volejbol. Uchebnik. A.V.Belyaev, N.V.Savin. M.: «Fizkul'tura», 2000 g. |

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| Module title: | 9. Health-improving (continuing level) |
| Term of Study: | 3, 4 |
| Person responsible for the module: | Fyodorov V.N. |
| Lecturer: | Physical training - Fyodorov V.N. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  3 semester: hours in a week – 6;  in a semester – 90.  4 semester: hours in a week – 6;  in a semester – 90. |
| Work load: | Full-time mode:  Curricular load: 60 hours  Extracurricular hours: 120 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of the course: “Physical training”(beginner level) |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the basics of Physical training and the principles of healthy lifestyle, the role of Physic culture in formation of personality and in training of personnel, also in acquiring, preservation and improving of health.  ***Skills***: to be able to make up a complex of physical exercises for individual training; to be able to make high and crouch stars in sprinting; to train to have stamina; to know the rules of basketball competitions; to be able to handle the ball in movement, to dribble, to shoot at the basket; to play volleyball according to the simplified rules; to know swimming safety rules required at classes. |
| Contents: | 3rd semester: athletics  4th semester: basketball |
| Results of study /examinations /forms of examinations: | Differentiated test |
| Technical/multimedia equipment: | Gym, open area, play court |
| Literature: | Physical training:   1. Fizicheskaya kul'tura Lyogkaya atletika. Uchebnik dlya institutov fizkul'tury. Pod red. N.G.Azolina, D.P.Markova, 2-e izdanie, – M., 2002 g. 2. Basketbol. Uchebnik dlya VUZov fizicheskoj kul'tury. M., 1997 g. 3. Plavanie dlya nachinayushchih. K.Vil'ke. M.: «Knowledge», 1991 g. 4. Osnovy plavaniya. Obuchenie i put' k sovershenstvu. M.Pedroletti. M.: «Feniks», 2006 g. 5. Volejbol. Uchebnik. A.V.Belyaev, N.V.Savin. M.: «Fizkul'tura», 2000 g. 6. Fizicheskoe vospitanie. Uchebnoe posobie dlya VUZov. M.V.Sokolova. Almaty: RIK, 2005 g. 7. UMP «Podgotovka sportsmenov-orientirovshchikov» Kuz'menko D.Yu. |

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| Module title: | 10. Methodological Bases of Computer Science Teaching |
| Module elements | Methodology of Computer Science teaching  Theory and methodology of educational work  Pedagogical Continuous Practice 2 |
| Term of Study: | 4,5 |
| Person responsible for the module: | Serebrenikova V.V. |
| Lecturer: | Methodology of Computer Science teaching – Serebrenikova V.V.  Theory and methodology of educational work – Koryagina O.V.  Pedagogical Continuous Practice 2 – Kolisnichenko S.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  4 semester: hours in a week – 5;  in a semester – 150.  5 semester: hours in a week – 6;  in a semester – 135. |
| Work load: | Full-time mode:  Curricular load: 165 hours  Extracurricular hours: 120 hours  Total: 285 hours |
| Credits: | 10 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Study of the discipline is based on the knowledge of “Theory of Computer Science Teaching”, “Psychology”, “Pedagogy” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the fundamentals of pedagogic management;  ***Skills:*** to carry out teaching and upbringing activities, design and management of learners’ educational process, exercise motivational, diagnostic, correction, communicative and methodical work under the usage of contemporary pedagogical, information and communication technologies; possession of modern methods and techniques of teaching computer science, for the implementation of training programs of basic and elective courses and socialization processes, professional self-determination of students |
| Contents: | ***Methodology of Computer Science teaching:*** Elements of teaching process. Levels of teaching process. History of formation of school discipline “Computer science”. The content of education. Basic curriculum. The problem of place of Computer science course at school. Comparative analysis of Computer science curriculum. Education standard in Computer science. Teaching material. Requirements to the contents of teaching material in Computer science.  ***Theory and methodology of educational work:*** The system of methods in didactics and its function in the organization of educational process. Classification of teaching methods. Some approaches to the classification of methods in teaching Computer science. The system of tools in teaching process. Modern educational systems. Teacher’s activity system. System of educational work at school. Monitoring of training and psychoeducational diagnostics.  ***Pedagogical Continuous Practice 2:*** Contemporary lesson of Computer science. Organization of extracurricular and additional work in Computer science. Ways of improving teaching process of Computer science: construction of learning content. Ways of improving teaching process of Computer science. |
| Results of study /examinations /forms of examinations: | ***Methodology of Computer Science teaching*** *– computer test*  ***Theory and methodology of educational work*** *– computer test*  ***Pedagogical Continuous Practice2****- assessment* |
| Technical/multimedia equipment: | Multimedia complex, computer lab, specialized laboratories |
| Literature: | 1. Shkol'nye uchebnikii nformatiki Almaty 2005 2. Standart obrazovaniya. Almaty 2005 3. Innovacionnye metody obucheniya v vysshej shkole: Uchebno-prakticheskoe posobie/ Gusakov V.P.,Pustovalova N.I.,Hrushchev V.A.,Kartashova E.B.,Isakova E.K., Petropavlovsk 2007 4. Gricenko L.I. Teoriya i metodika vospitaniya: lichnostno-social'nyj podhod: Ucheb. Posob dlya stud. vyssh.ucheb. zavedenij/gricenko Larisa Ivanovna. – M.: Izdatel'skij centr «Akademiya», 2005 5. Metodika vospitatel'noj raboty: Ucheb. posobie dlya stud. vyssh. ped. ucheb. zavedenij /L.A. Bajkova, L.K. Grebenkina, O.V. Eremkina i dr., Pod red. V.A. Slastenina. – M.: Izdatel'skij centr «Akademiya», 2004 |

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| Module title: | 11. Inclusive education |
| Module elements | Inclusive education  Production (pedagogical) practice 1 |
| Term of Study: | 5,6 |
| Person responsible for the module: | Imanov A.K. |
| Lecturer: | Inclusive education – Imanov A.K.  Production (pedagogical) practice1 – Kolisnichenko S.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  5 semester: hours in a week – 3;  in a semester – 90.  6 semester: hours in a week – 4;  in a semester – 120. |
| Work load: | Full-time mode:  Curricular load: 105 hours  Extracurricular hours: 105 hours  Total: 210 hours |
| Credits: | 7 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Study of the discipline is based on the knowledge of “Theory of Computer Science Teaching”, “Psychology”, “Pedagogy”. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge*:** the development process of general education.  ***Skills*:** to apply differential training for children with speech, hearing, visual, locomotor system, intellectual disorders, with retarded mental development in a special (correctional) institutions, to apply the integrated training of children in special classes (groups) in educational institutions, to adapt inclusive education, where children with special educational needs are taught in the classroom with normal kids.  ***Competencies:*** creating the conditions based on pedagogical methods targeting primarily children in order to meet their needs. |
| Contents: | ***Inclusive education:*** Ensuring children's rights to quality education;  The implementation of inclusive education ideas;  Creating adaptive and correctional-developing environment in the organization of education that will provide full personal self-realization of children;  The introduction of innovative educational technologies with high potential competency in the educational process;  Distribution of perspective pedagogical experience, the pedagogical and parent community to get acquainted with it.  ***Production (pedagogical) practice 1***: Studying and learning of teaching process state of the class: teaching process as the component part of the entire pedagogical process; educational process as the component part of the entire pedagogical process. Psychoeducational researching students and collective. Plan own teaching and educational works for a time of pedagogical practice. |
| Results of study /examinations /forms of examinations: | ***Inclusive education*** *– computer test*  ***Production (pedagogical) practice1****- assessment* |
| Technical/multimedia equipment: | Multimedia complex, computer lab, specialized laboratories |
| Literature: | 1. N.V. Borisova “Inkliuzivnoe obrazovanie: pravo, printsipy, praktika”,M.:, 2009. 2. “Na puti k inkliuzivnoi shkole” (posobie dlya uchitelei) «Perspektiva», 2005. |

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| Module title: | 12. Professional Language Training |
| Module elements | Professional Kazakh (Russian) language  Profession oriented foreign language |
| Term of Study: | 5,6 |
| Person responsible for the module: | Sagitdinova T.K. |
| Lecturer: | Professional Kazakh (Russian) language – Koshanova Zh.T.  Profession oriented foreign language – Sagitdinova T.K. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  5 semester: hours in a week – 3;  in a semester – 90.  6 semester: hours in a week – 3;  in a semester– 90. |
| Work load: | Full-time mode:  Curricular load: 90 hours  Extracurricular hours: 90 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: “Kazakh language”, “Foreign language” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** formation of business written and oral speeches, understanding and communicating the heard (read) information, to start a professional and communicative dialogue;  ***Skills:*** freely use foreign language as a means of business communication; readiness to use skills of organizing research and project works in practice, annotating and referencing literature on the specialty, preparation of the report; preparation of abstracts (articles) on the specialty; conducting business correspondence in English.  ***Competencies:*** ability to live in the multilingual and multicultural modern world |
| Contents: | ***Professional Kazakh (Russian) language:*** Kazakstanda. Kazakstan Respublikasynyn Konstituciyasy. Tіl turaly Zan; Kazakstandagy kasіpkerlіk Memlekettіk zhane zheke kasіpkerlіk zhumyska ornalasu. Kazakstannyn ehkonomikalyk mүmkіndіkterі. Salyk. Keden. Іskerlіk bajlanys. Іskerlіk karym-katynas, іskerlіk sapar, іskerlіk kezdesu. Kazakstan zhane Halykaralyk ujymdar. Zharnama. Zharnama tүrlerі. Іs kaғazdary. Іs kagazdary ulgіlerіn zhasau.  ***Profession oriented foreign language:*** Improvement of the language skills in English: increase in level of speaking, writing, comprehending oral and written speech; studying the rules of constructing scientific and professional speech, peculiarities of the language of reports and presentations; study of the basic terms in the scope of scientific interests, consolidation of the main grammatical constructions and phenomena. |
| Results of study /examinations /forms of examinations: | ***Professional Kazakh (Russian) language*** *– oral quiz*  ***Profession oriented foreign language*** *– computer test* |
| Technical/multimedia equipment: | Language laboratory, interactive board, audio and video equipment, the Internet |
| Literature: | 1. Professional'nyj kazahskij (Russian )yazyk 2. A.M.Aldanova, D.H.Akanova. Resmi-іskerikazaktіlі. Almaty,2002zh. 3. T.A.Ahmetova. Іskerlіkkazaktіlі. Petropavl, SKMU.2005zh. 4. N.K.Muhamadieva. Kasіbikazaktіlі. І oku kіtaby. Almaty, 2006zh. 5. N.K.Muhamadieva. Kasіbi kazak tіlі. ІІ oku kіtaby. Almaty, 2006zh. 6. N.K.Muhamadieva. Kasіbi kazak tіlі. ІІІ oku kіtaby. Almaty, 2006zh. 7. Z.Ernazarova, N.Muhamadieva. Kazak tіlі. Eltanu. Almaty, 2005zh. 8. A.Aldasheva. Resmi іs kaғazdary. Almaty, 002zh. 9. Kazakstan Respublikasynyң Konstituciyasy. Almaty, 2000zh. 10. Z.Kuzenova, G.Karakusova. Kazak tіlі. Almaty, 1997zh. 11. Professional'no-orientirovannyj inostrannyj yazyk 12. D.E. Zemach, L.A.Rumisek. Academic Writing. MacMillan Press, 2006. 13. Key Concepts in Information and Communication Technology (Palgrave) by Roger I. Cartwright. 14. Holi Roddik Business Writing Makeovers, AST, Astrel', 2004. |

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| Module title: | 13. Final practice |
| Module elements | Production (pedagogical) practice 2  Pre-diploma practice |
| Term of Study: | 8 |
| Person responsible for the module: | Serebrenikova V.V. |
| Lecturer: | Production (pedagogical) practice 2 – Serebrenikova V.V.  Pre-diploma practice – Kulikova V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  Hours in a semester – 450 |
| Work load: | Full-time mode:  Extracurricular hours: 450 hours  Total: 450 hours |
| Credits: | 15 ECTS |
| Examination requirements: | Mastering of the whole educational program |
| Recommended requirements: | Knowledge of courses: “Theoretical foundations of Computer science”, “Methods of teaching Computer science”, “Information technologies of teaching”, “Design of information system applications”, “Private methods of teaching Computer science”/”Innovative methods of teaching Computer science”, Pedagogical practice |
| Objectives of modules / Intended learning outcomes: | ***Skills:*** to manage a holistic pedagogical process; to identify and solve training, developmental and educational problems of the lesson, extracurricular activities in Computer science, to choose and implement innovative teaching and educational methods, adequate to learning objectives, age and individual needs of the student; possession of modern methods and techniques of teaching computer science, for the implementation of training programs of basic and elective courses and socialization processes, professional self-determination of students; to choose and use the optimal forms and methods of extra-curricular work on computer science and in general training work; ability to orientate to modern data flows and adapt to phenomena, process changing dynamically and abilities necessary for self-education.  ***Competencies:*** self-development of pedagogical skills and a creative approach to teaching-educational activities; establishing cooperation with teachers, students, parents; research approach to teaching; scientific analysis and generalization of pedagogical experience |
| Contents: | Analysis of the work plans of the classroom teacher, the teacher of Computer science and drafting of the student’s individual plan  Analysis of the status and works of Computer science room and evaluation of its compliance with the requirements for classrooms  Study a class team during the lesson, extracurricular activities on the subject and educational events  Visiting of lessons of the teacher of Computer science and his analysis (different types of analysis)  Methodical development of the individual topics of the school program in Computer science  The development of teaching materials and lessons with the use of new information technologies.  Self-preparation and carrying out of educational events  Self-analysis of events  Working with the class journal  Working with diaries  Working with activists of the class  Making plans-summaries of the lesson and carrying out of self-examination of one of the developed lessons |
| Results of study /examinations /forms of examinations: | Filing reports on practices |
| Technical/multimedia equipment: | Smart board, multimedia complex, computer lab |
| Literature: | 1. Konceptual'noe modelirovanie informacionnyh sistem. /Pod red V.V.Fil'chakova. - SPb; SPVUREH PVO, 1998. 2. Vigers Karl Razrabotka trebovanij k programmnomu obespecheniyu/Per, s angl. 3. Mahanov M.M., Kalanova Sh.M. Osnovy nauchnyh issledovanij v vuzah, metodika napisaniya nauchnyh i metodicheskih rabot, pravila oformleniya: Uchebnoe posobie,- Taraz: TarGU, 1999. -170 s. 4. N.M. Borytko Metodologiya i metody psihologo-pedagogicheskih issledovanij. M.: Akademiya 5. Metodika prepodavaniya informatiki: Ucheb. posobie dlya stud. ped. vuzov / M.P.Lapchik, I.G.Semakin, E.K.Renner; Pod obshchej red. M.P.Lapchika 624 s. M.: Izdatel'skijcentr «Akademiya», 2001. 6. Shkol'nye uchebniki informatiki. Almaty. 2005 7. Standart obrazovaniya. Almaty. 2005 8. Stat'i iz prilozhenie k gazete «1 sentyabrya» Informatika 9. Innovacionnye metody obucheniya v vysshej shkole: Uchebno-prakticheskoe posobie/Gusakov V.P., Pustovalova N.I., Hrushchev V.A., Kartashova E.B., Isakova E.K., Petropavlovsk 2007 10. Pedagogicheskie tekhnologii Ucheb. posobie dlya stud. ped. vuzov / M.P. Smirnov, M.: Izdatel'skij centr «Akademiya», 2002. |

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| Module title: | 14. Final attestation |
| Module elements | State examination in specialty  Writing and defence of a diploma paper(project) |
| Term of Study: | 8 |
| Person responsible for the module: | Serebrenikova V.V. |
| Lecturer: | State examination in specialty – Serebrenikova V.V.  Writing and defence of a diploma paper(project) – Kulikova V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  Hours in a semester – 315  Total 315. |
| Work load: | Full-time mode:  Extracurricular hours: 315 hours  Total: 315 hours |
| Credits: | 8 ECTS |
| Examination requirements: | Writing of diploma paper |
| Recommended requirements: | Mastering of the whole educational program |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** modeling, construction, verification and testing methods typical for computer science.  ***Skills:*** to use modeling, construction, verification and testing methods typical for computer science to solve the problems, master recent methods and technologies of teaching and upbringing for implementing learning programs of basic, elective courses in the process of socialization, learners’ professional self-identification, to use different ways, methods and devices of learning and working; work in team and communicate; to use literature and modern information environments, ability to orientate to modern data flows and adapt to phenomena, process changing dynamically and abilities necessary for self-education  ***Competencies:*** to broaden and deepen the acquired knowledge independently, as well as to adjust to the changes in studied sphere of knowledge. |
| Contents: | It contains critical analysis of the problem state, suggested ways of solving the problem, confirmation of the research results pointing out its practical application and perspectives. |
| Results of study /examinations /forms of examinations: | Complex state exam on specialty. Defence of the Bachelor thesis |
| Technical/multimedia equipment: | Smart board, multimedia complex, computer lab |
| Literature: | 1. Konceptual'noe modelirovanie informacionnyh sistem. /Pod red. V.V.Fil'chakova. - SPb; SPVUREH PVO, 1998. 2. Vigers Karl Razrabotka trebovanij k programmnomu obespecheniyu/Per, s angl. 3. Mahanov M.M., Kalanova Sh.M. Osnovy nauchnyh issledovanij v vuzah, metodika napisaniya nauchnyh i metodicheskih rabot, pravila oformleniya: Uchebnoe posobie,- Taraz: TarGU,1999.-170 s. 4. N.M. Borytko Metodologiya i metody psihologo-pedagogicheskih issledovanij. M.: Akademiya 5. Metodika prepodavaniya informatiki: Ucheb. posobie dlya stud. ped. vuzov / M.P.Lapchik, I.G.Semakin, E.K.Renner;Pod obshchej red. M.P.Lapchika 624 s. M.: Izdatel'skijcentr «Akademiya», 2001. 6. Shkol'nye uchebniki informatiki. Almaty. 2005 7. Standart obrazovaniya. Almaty. 2005 8. Stat'i iz prilozhenie k gazete «1 sentyabrya» Informatika 9. Innovacionnye metody obucheniya v vysshej shkole: Uchebno-prakticheskoe posobie/Gusakov V.P.,Pustovalova N.I.,Hrushchev V.A.,Kartashova E.B.,Isakova E.K., Petropavlovsk 2007 10. Pedagogicheskie tekhnologii Ucheb. posobie dlya stud. ped. vuzov / M.P. Smirnov, M.: Izdatel'skij centr «Akademiya», 2002. |

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| Module title: | 15. Bases of Programming |
| Module elements | Algorithmization and programming bases/ Algorithms and data structures  Introduction to profession / Introduction to specialty  Programming Technology/ Programming Languages |
| Term of Study: | 1,2 |
| Person responsible for the module: | Kulikov V.P. |
| Lecturer: | Algorithmization and bases of programming/ Algorithms and data structures – Kulikov V.P.  Introduction to profession / Introduction to specialty – Serebrennikova V.V.  Programming Technology/Programming Languages - Kulikov V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 8;  in a semester – 180.  2 semester: hours in a week – 12;  in a semester– 270 |
| Work load: | Full-time mode:  Curricular load: 300 hours  Extracurricular hours: 150 hours  Total: 450 hours |
| Credits: | 15 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Possession of the basic concepts of school mathematics, computer science. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the most important algorithms, structures of data and problem solving patterns, including central paradigms of programming, the history of computer science, the legal aspects of computer science and their impact on society, ethical and security issues related to the use of data processing systems  ***Skills:*** the use of various techniques of developing the efficient and reliable algorithms on creating software; modeling, analyzing and using the methods of the mathematical design and logical-mathematical methods of analysis and software testing  ***Competencies:*** to program with the use of modern tools; to justify design decisions in the field of design and analysis of the complexity of algorithm, to perform the setup and execution of experiments to verify of their correctness with the methods of mathematical logic and the theory of algorithms. |
| Contents: | ***Algorithmization and bases of programming/*** ***Algorithms and data structures:*** Introduction to Programming Systems. Executable statement. Predefined types of variables (simple). Arrays. Structure types. String type. Sets. Subprograms. Records. File type of data. Graphics in Pascal. Static and dynamic variables. Types of recursive data. Formal systems of programming.  ***Introduction to profession/ Introduction to specialty:*** Legislative basis of higher professional education. General characteristics of the teaching profession. The professional activity of the teacher and his personality. Characteristics of pedagogical activity styles. Pedagogical culture of the teacher's personality. Communication as a basis for teaching. Professional formation of the teacher.  ***Programming Technology/Programming Languages:*** Theoretical foundations of object oriented programming. Basic principles of OOP. Classes. Delphi Pascal object model. Main concepts and principles of visual programming system. Event-driven programming. Methods of Network programming. Creation of own components. Creation of built-in inquiry system. Programming for Internet. |
| Results of study /examinations /forms of examinations: | ***Algorithmization and bases of programming/ Algorithms and data structures*** *– computer test*  ***Introduction to profession / Introduction to specialty*** ***-*** *computer test*  ***Programming Technology/Programming Languages****– computer test* |
| Technical/multimedia equipment: | Smart board, multimedia complex, computer lab |
| Literature: | 1. Arkhangel’skii A.Ya. Programmirovanie v Delphi: Uchebnik po klassicheskim versiyam Delphi / A.Ya. Arkhangel’skii. - M.: Binom, 2013.  2. Eidlina G.M. Delphi: programmirovanie v primerakh I zadachakh. Praktikum: Uchebnoe posobie / G.M. Eidlina, K.A. Miloradov. - M.: ITS RIOR, NITS INFRA-M, 2012.  3. Ezdakov A.L. Funktsional’noe I logicheskoe programmirovanie: Uchebnoe posobie / A. L. Ezdakov. - M.: Binom. Laboratoriya znanii, 2011.  4. Fokin V.A. Psikholog. Vvedenie v professiu: Uchebnoe posobie dlya studentov uchrezhdenii vysshego professional’nogo obrazovaniya/ V.A  Fokin, T.M. Buyakas, O.N. Rodina; Pod red. E.A. Klimova. - M.: ITS Akademiya, 2011. |

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| Module title: | 16. Legal training |
| Module elements | Basics of law and anti-corruption culture/ Prevention of mental health and suicide prevention/ Ecology and sustainable development/ Ethics and psychology of business communication |
| Term of Study: | 1 |
| Person responsible for the module: | Bulatova A.S. |
| Lecturer: | Basics of law and anti-corruption culture – Shatilov S.F.  Prevention of mental health and suicide prevention – Markova L.N.  Ecology and sustainable development - Bulatova A.S.  Ethics and psychology of business communication – Markova L.N. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 3;  in a semester – 90. |
| Work load: | Full-time mode:  Curricular load: 45 hours  Extracurricular hours: 45 hours  Total: 90 hours |
| Credits: | 3 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Background knowledge of the school courses of Ecology and Natural Science |
| Objectives of modules / Intended learning outcomes: | ***Knowledge***: legislative acts of the Republic of Kazakhstan in the field of emergency situations, the basic laws that determine the interaction of living organisms with their environment;  regulatory and legal documents in education, training and guidance documentation, human rights (international regulations, legislation of Kazakhstan in the field of education and child protection), the basics of psychology.  ***Skills***: to control parameters of negative impacts and assess their levels, to analyze regularities of environmental processes related to anthropogenic impact on the environment; the ability to analyze problems of modern society life and environment integrally and systemically.  ***Competencies:*** in the decision on the issues of life safety applications; analysis of ecological processes and the setting of specific objectives and priorities in environmental work; the use of the acquired knowledge to solve environmental problems, the use of the acquired knowledge about the regularities of the interaction of living organisms and the environment in practice; in conflict solution. |
| Contents: | ***Basics of law and anti-corruption culture:*** Bases of Legal culture. Law relations. Legal liability. Constitutional law of Kazakhstan. Administrative law of Kazakhstan. Civil law of Kazakhstan. Family law of Kazakhstan. Financial law of Kazakhstan. Labor Law of the RK. Criminal Law of the RK. General characteristics of environmental and land rights of the Republic of Kazakhstan. The procedural law of the Republic of Kazakhstan.  ***Prevention of mental health and suicide prevention:***On measures of suicide prevention among children and adolescents.Suicidal behavior psychodiagnosis.Suicide methods. Prevention of suicide attempts.Survey scheme for suicidal patients.Suicidal behavior.  ***Ecology and sustainable development****:* The body and the environment. The general laws of organisms depending on environmental factors. General principles of adaptation. Life forms and ecological groups of organisms. The ecological relationships of organisms. Characteristics of the population and the basic processes occurring in them. The dynamics of populations. Environmental demographics. Ecosystems and trophic relations in the ecosystem. The cycle of matter in nature. Natural resources and environmental management. The anthropogenic impact on the atmosphere. The anthropogenic impact on the hydrosphere. The anthropogenic impact on the lithosphere. Specially protected natural areas.  ***Ethics and psychology of business communication:*** Subject, basic categories and tasks of psychology and ethics of business communication. Problems of the personality and interpersonal communication psychology. The main directions of modern psychology. The determination of a person's behavior in business communication. Business communication and psycho-diagnostics. Conflicts and ways of solving them. |
| Results of study /examinations /forms of examinations: | **Basics of law and anti-corruption culture** **-** *computer test*  ***Prevention of mental health and suicide prevention -*** *computer test*  ***Ecology and sustainable development*** *- computer test*  ***Ethics and psychology of business communication****- computer test* |
| Technical/multimedia equipment: | Power Point presentations, electronic texts and maps, multimedia complex |
| Literature: | 1. Dulatbekov N.O. Osnovy gosudarstva I prava sovremennogo Kazakhstana: uchebnoe posobie / S.K. Amandykova, A.V. Turlayev.- Astana, 2015.  2. Aminov I.I. Psikhologiya delovogo obsheniya: Uchebnoe posobie/ I.I. Aminov. - M.: IUNITI, 2013.  3. Askarova U.B. Ekologiya I ustoichivoe razvitie. Uchebnik dlya vuzov. Almaty, 2011. |

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| Module title: | 17. Social and economic knowledge |
| Module elements | Gender perspective in education/ Energy-saving technologies in modern sectors of the economy/ Fundamentals of life safety/  Cultural studies / Fundamentals of financial literacy / Psychology/  Political and Social Sciences / Economics and Business/ Information Management and Quality Management / Culture and Religion |
| Term of Study: | 3,4 |
| Person responsible for the module: | Skvortsova E.P. |
| Lecturer: | Gender perspective in education – Pustovalova N.I.  Energy-saving technologies in modern sectors of the economy – Demyanenko A.V.  Fundamentals of life safety – Skvortsova E.P.  Cultural studies – Nikiforov A.V.  Fundamentals of financial literacy – Tsapova O.A.  Psychology – Markova L.N.  Political and Social Sciences – Abuov N.A.  Economics and Business – Legostayeva L.V.  Information Management and Quality Management – Pogrebitskaya M.V.  Culture and Religion – Abuov N.A. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  3 semester: hours in a week – 3,  In a semester – 90 hours,  4 semester: hours in a week – 5,  In a semester– 135 hours. |
| Work load: | Full-time mode:  Curricular load -120 hours  Extracurricular hours – 105 hours  Total – 225 hours |
| Credits: | 8 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Prior knowledge of school courses of history, economics and science. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge***: legislative acts of the Republic of Kazakhstan in the field of emergency situations, the basic laws that determine the interaction of living organisms with their environment; basics of economic theory, the culture of other countries.  ***Skills***: to control parameters of negative impacts and assess their levels, to analyze regularities of environmental processes related to anthropogenic impact on the environment; the ability to analyze problems of modern society life and environment integrally and systemically; to understand the current political situation in the Republic of Kazakhstan and the world; to compare the political problems in different regions of the world, applying theoretical knowledge.  ***Competencies:*** research of political processes and relationships by analysis and interpretation methods of concepts of politics and state power; to carry out a diagnosis of the problem-political situation state and the forecast for the development of problem-political situation; to assess the costs and benefits of different options for solutions to problems, analytical thinking, competent search for ways to solve social and economic problems in view of the institutional features of Kazakhstan's model of social market economy; formation of the economic outlook and active citizenship in the implementation of government economic and social policy.  to relate their views to the collective opinion, the willingness to take the social responsibility for the results of their professional work. |
| Contents: | ***Gender perspective in education:*** Application of gender perspective for solving theoretical and practical problems of pedagogy. Patterns of gender education for boys and girls. Prospects of application in social and family education. Sex differences. Gender pedagogy. Gender education.  ***Energy-saving technologies in modern sectors of the economy:*** Strategy of industrial-innovative development of Kazakhstan. Energy saving. Energy conservation. Energy-saving technology. Alternative sources of energy. Energy resources. Regulatory support of energy conservation. The world practice of energy-saving technologies creation and implementation..  ***Fundamentals of life safety****:* The basic concepts that characterize emergencies, emergency stages. The concept of acceptable tolerable risk. System analysis of safe behavior. Emergencies of peacetime. Natural disasters. Organization of aid and rules of conduct. Meteorological hazards. Hydrological hazards. Geophysical hazards. Mass human cases. The behavior and actions of people in an autonomous existence. The behavior and actions of people in an autonomous existence in the desert. The behavior of people in life-threatening situations criminogenic nature. Home Safety. Rescue and other urgent works in the centers of emergency. Psychological aspects of emergencies. The threat of a terrorist attack.  ***Cultural studies:*** Subject and structure of cultural studies. Culture and culture. Theories of "local civilizations". Art and art culture. Primitive culture and civilization of the ancient world: India, China, Mesopotamia, Egypt. Ancient culture. The culture of the European Middle Ages and Renaissance. Culture of New Times in Europe.  ***Fundamentals of financial literacy:*** Equity and prosperity. Balance and capital contact with revenue and expenditure. Structuring of personal assets. Loans and prosperity. The nuances of the use of credit cards. Risk and profitability. Family budget. Financial diagnostics. Types of real estate investments.  ***Psychology:*** Introduction to Psychology. Personality psychology. Cognitive and emotional and volitional processes. Biosocial structure of personality. Temperament and character: the ability and professionalism. Psychology of mutual understanding and cooperation in the group. Communication, interpersonal relationships in the group. Conflicts and their prevention: psychology of professional activity and psychology of management.  ***Political and Social Sciences:*** The formation of political science, the issues of authority, state, political processes and relations, the peculiarities of political institutes’ development and functioning.  Political regimes. Subjects of Politics. Political crises and conflicts. World politics and international relations. The formation history and development of sociology. Methodology and methods of sociological research. Society as a sociocultural system. Culture as a system of values and norms. Personality. Socialization of personality. The social structure of society and social stratification. Social institutions and social organizations.  ***Economics and Business:*** The planning system in the enterprise. Information and methodological planning support. Business planning. The main sections of the plan for economic and social development of the enterprise and their contents. The organization of the production process. Wage payment organization in the enterprise.  ***Information Management and Quality Management:*** Elements of organization and management. Functions of management and communication process. Group dynamics and leadership. Leadership theory. The effectiveness of the head and personal improvement. Bases of quality management. Informational logistics. Business reengineering.  ***Culture and Religion:*** The main problems and principles of culture and religion: myth and religion. Cultural studies and religious studies systems of Eliade, Carlos Castaneda, R. Girard, F. Ares, Freud. Cultural analysis of religion as a system. The cultural reception of Christianity. |
| Results of study /examinations /forms of examinations: | *Gender perspective in education - computer test*  ***Energy-saving technologies in modern sectors of the economy*** *- computer test*  ***Fundamentals of life safety****- computer test*  *Cultural studies*  - *computer test*  *Fundamentals of financial literacy - computer test*  *Psychology - computer test*  *Political and Social Sciences - computer test*  ***Economics and Business*** *- computer test*  *Information Management and Quality Management - computer test*  *Culture and Religion - computer test* |
| Technical/multimedia equipment: | Power Point presentations, electronic texts and maps, multimedia complex |
| Literature: | 1. Kletsina I.S. Psikhologiya gendernykh otnoshenii: teoriya i praktika. SPb., 2009.  2. Glushkova V.G. Ekonomika prirodopol’zovaniya: Uchebnik dlya bakalavrov / V.G. Glushkova, S.V. Makar. - Liubertsy: Iurait, 2015.  3. [Arustamov E.A.](http://www.knigafund.ru/authors/32268), [Voloshenko A.E.](http://www.knigafund.ru/authors/32269), [Gus’kov G.V.](http://www.knigafund.ru/authors/32270), [Prokopenko N.A.](http://www.knigafund.ru/authors/32271), [Kosolapova N.V.; pod red. E.A. Arustamova](http://www.knigafund.ru/authors/32272). [Bezopasnost' zhiznedeyatel’nosti: Uchebnik](http://www.knigafund.ru/books/174189) dlya bakalavrov /  Dashkov i K, 2015.  4. [Drach G. V.](http://www.labirint.ru/authors/85203/), [Shtompel’ L. A.](http://www.labirint.ru/authors/68500/), [Shtompel’ O. M.](http://www.labirint.ru/authors/68499/) Kul’turologiya. Uchebnik dlya vuzov /[Piter](http://www.labirint.ru/pubhouse/104/), 2013.  5. Kuptsov M.M. Denezhnoe obrashenie, finansy, kredit I nalogovaya sistema: Uchebnoe posobie / M.M. Kuptsov.. - M.: ITS RIOR, 2013.  6. Kulagina I.IU. Psikhologiya razvitiya I vozrastnaya psikhologiya. Polnyi zhiznennyi tsikl razvitiya cheloveka: Uchebnoe posobie / I.IU. Kulagina, V.N. Koliutskii. - M.: Akademicheskii proekt, 2015.  7. Galaganov V.P. Obshaya sotsiologiya / V.P. Galaganov. - M.: KnoRus, 2011.  8. Dubrovin I.A. Bizness-planirovanie na predpriyatii: Uchebnik dlya bakalavrov. / I.A. Dubrovin. - M.: Dashkov i K, 2012.  9. Abakumova O.G. Upravlenie kachestvom: Konspekt lektsii / O.G. Abakumova. - M.: A-Prior, 2011.  10. Religiya v istorii i kul’ture: ucheb. dlya stud. vuzov / red. M. G. Pismanik. - 2-e izd., dop. i pererab. - M.: IUNITI, 2012. |

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| Module title: | 18. Computer literacy |
| Module elements | Theory of Computer Science Teaching/ Theoretical bases of computer science education  Architecture of Computer Networks/Computer architecture |
| Term of Study: | 3,4 |
| Person responsible for the module: | Serebrenikova V.V. |
| Lecturer: | Theory of Computer Science Teaching/ Theoretical bases of computer science education – Serebrenikova V.V.  Architecture of Computer Networks/Computer architecture – Kulikov V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  3 semester: hours in a week – 6;  in a semester – 135.  4 semester: hours in a week – 8;  in a semester– 180. |
| Work load: | Full-time mode:  Curricular load: 210 hours  Extracurricular hours: 105 hours  Total: 315 hours |
| Credits: | 11 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: “Algorithmization and bases of programming”, “Theoretical bases of Computer Science” |
| Objectives of modules / Intended learning outcomes: | **Knowledge:** the places and importance of Computer science in the formation of fully developed personality, learning objectives of the school course Computer science in all three aspects: education, development, upbringing, the basic concept of training to Computer science, the content of the teacher's work on the organization, planning and maintenance of Computer science lessons, teaching methods, management of mental activity of pupils; different organizational forms of classes.  **Skills:** to classify, summarize material, using various types of analysis, organize extra-curricular activities in computer science for the development of interest in the subject among students of different age groups; to choose and use the optimal forms and methods of extra-curricular work on computer science and in general training work  ***Competencies:*** solving problems of organization and planning of the educational process in Computer science |
| Contents: | ***Theory of Computer Science Teaching/*** ***Theoretical bases of computer science education:*** Levels of teaching process. History of formation of school discipline “Computer science”. The content of education. Basic curriculum. The problem of place of Computer science course at school. Comparative analysis of Computer science curriculum. Education standard in Computer science. Teaching material. Requirements to the contents of teaching material in Computer science. The system of methods in didactics and its function in the organization of educational process. Classification of teaching methods. Some approaches to the classification of methods in teaching Computer science. The system of tools in teaching process. Main elements and their functions. Computer as the main tool in teaching Computer science. Forms of organizing teaching process. Interrelation between the methods and forms of organizing. Interrelation between the elements of teaching process and its integrating character on the example of teaching Computer science. Conditions for realization of teaching process of Computer science. Teacher in teaching process.  ***Architecture of Computer Networks/Computer architecture:*** General information about digital machines. Notation, number representation in various notations. Information presentation at the computer. Logical bases of computer, elements and nodes. Types of architecture. Organization the memory at the computer. Microprocessor systems’ architecture. Interfaces. Off-station facilities. |
| Results of study /examinations /forms of examinations: | ***Theory of Computer Science Teaching/*** ***Theoretical bases of computer science education*** *– defence of a course paper*  ***Architecture of Computer Networks/Computer architecture*** *– computer test* |
| Technical/multimedia equipment: | Interactive smart board, multi-media complex, computer lab |
| Literature: | 1. Sofronova N. V. Teoriya I metodika obucheniya informatike. / N.V. Sofronova. - M.: Vysshaya shkola, 2004. 2. Tanenbaum E. Arkhitektura kompiutera. (6-e izdanie), 2013. |

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| Module title: | 19. Hardware support of the educational process |
| Module elements | Bases of organization of scientific-pedagogical research/ Bases of scientific research and innovative activities organization  Organization of Computer Networks / Global and computer networks |
| Term of Study: | 5,6 |
| Person responsible for the module: | Shmigirilova I.B. |
| Lecturer: | Bases of organization of scientific-pedagogical research/ Bases of scientific research and innovative activities organization – Shmigirilova I.B.  Organization of Computer Networks/ Global and computer networks – Kulikov V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  5 semester: hours in a week – 6;  in a semester – 135.  6 semester: hours in a week – 6;  in a semester– 135. |
| Work load: | Full-time mode:  Curricular load: 180 hours  Extracurricular hours: 90 hours  Total: 270 hours |
| Credits: | 10 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Study of the discipline is based on the knowledge of “Theory of Computer Science Teaching”, “Psychology”, “Pedagogy”, “Philosophy” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the bases of scientific research methodology. central concepts and systems of computer science; current scientific state of the studied field, architecture and functions of computer, structure of information systems (operation systems, systems of keeping data, communication systems); basic principles of complex information systems, that are compatible with up to-date modern technologies;  classification of computer networks, features of modern network technologies, hardware and software of computer networks, means and modes of transmission, transformation and presentation of information in networks;  ***Skills:*** to organize educational and research training in the use of modern information and pedagogical technologies, to own modern methods of analysis, evaluation and interpretation of the results of scientific and pedagogical research, testing and evaluation of the relation between theory and empirical data, preparing of reporting documentation and compilation of data in the form of scientific articles and reports; to complement and extend knowledge independently, to adapt to changes in the studied field of knowledge. to implement the system software of computers; to carry out the installation and configuration of network hardware in modern operating systems; to ensure the security of information systems; to integrate knowledge and competencies in a wider context; to carry out the installation and configuration of network hardware in modern operating systems; to ensure the assignment of access, password protection and backup of the file system, to share to use hardware and software resources of the network in common;  ***Competences:*** planning and organization of fundamental, research, applied scientific-research works and scientific and pedagogical activity. the methods of designing of local networks to deal with specific practical tasks; prospects and trends of modern network technologies related to the processes of transfer, storage, retrieval, processing and presenting of information; possession of experience of adequate operating with complex information systems. |
| Contents: | ***Bases of organization of scientific-pedagogical research***/ ***Bases of scientific research and innovative activities organization:*** Bases of scientific and pedagogical research methods. Logic of science. Language and style of scientific speech. Publication of scientific and pedagogical research results. Methods of thesis and Master's thesis writing.  Methodological recommendations for the thesis defense. The system of scientific pedagogical stuff training in Kazakhstan.  ***Organization of Computer Networks / Global and computer networks:*** General principles of computer networks. LANs and WANs. Networks of departments, campuses, corporations. Standardization of network solutions. Sources of standards. The main functions of the physical, channel, network, transport, session, representative and applied levels. Stack OSI. Standards IEEE 802.х. ТСР/IР stack. ISP/SPXstack. NETBIOS/SMB stack. SNA stack. DECnet stack. Functional compliance of communication equipment with levels of the OSI model. Constructionand operation technologies of local networks. Other technologies of local networks. Constructionand operation technologies of WAN. Tendencies and prospects of development of network technologies. Network software. |
| Results of study /examinations /forms of examinations: | ***Bases of organization of scientific-pedagogical research/*** ***Bases of scientific research and innovative activities organization*** *– computer test*  ***Organization of Computer Networks/ Global and computer networks***– *computer test* |
| Technical/multimedia equipment: | Multimedia complex, computer lab, specialized laboratories |
| Literature: | 1. Dobren’kov V.I. Metodologiya I metody nauchnoi raboty: Uchebnoe posobie / V.I. Dobren’kov, N.G. Osipova. - M.: KDU, 2012.  2. Kuz’menko N.G. Komp’uternye seti I setevye tekhnologii / N.G. Kuz’menko. - SPb.: Nauka I tekhnika, 2013. |

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| Module title: | 20. Pedagogical Systems Modeling |
| Module elements | Current trends in robotics / School robotics  Management of information projects/Management of Information Systems  Nonstandard tasks solving in Computer Science/Practical work of task solving in Computer Science  Methods of pedagogical systems modeling/Mathematic methods of pedagogical researches processing  Innovative methods of Computer Science teaching/Private methods of Computer Science teaching |
| Term of Study: | 7 |
| Person responsible for the module: | Serebrenikova V.V. |
| Lecturer: | Current trends in robotics / School robotics – Kulikova V.P.  Management of information projects/Management of Information Systems - Kadochnikova E.L.  Nonstandard tasks solving in Computer Science/Practical work of task solving in Computer Science - Serebrenikova V.V.  Methods of pedagogical systems modeling/Mathematic methods of pedagogical researches processing  – Shmigirilova I.B.  Innovative methods of Computer Science teaching/Private methods of Computer Science teaching - Serebrenikova V.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 30;  in a semester– 675. |
| Work load: | Full-time mode:  Curricular load: 450 hours  Extracurricular hours: 225 hours  Total: 675 hours |
| Credits: | 25 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: Theoretical bases of computer science, methodology for teaching computer science, algorithmization and bases of programming, computer systems architecture |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** basic concepts related to basic principles, functions and methods of IT-projects managing. Numbering systems; transfer of numbers from one number system to another; basics of propositional algebra; algorithms, representation and main frames, methodology for teaching computer science.  ***Skills:*** to manage IT-projects throughout the project life cycle; to apply modern methods and techniques of project management, to design, implement and manage the educational process and evaluate the consequences of organizational and administrative decisions, to use the basic theoretical knowledge, practical skills and abilities to solve organizational and administrative tasks;  ***Competencies:*** development of IT - strategies; work in “team” when creating of information projects; work in MS Project program; evaluation of the economic efficiency of the development or implementation of IT- project; application of these knowledge in solving various tasks of various complexity; independent work, work in small groups, with reference books, with the computer. |
| Contents: | ***Current trends in robotics / School robotics:*** Aims and objectives of robotic systems use in the school. The content of the training course on robotics at different stages of general education. Integration of educational robotics in the educational process of the initial stages of general education. The standard design of robots. Organization of design and research activities in different areas of modern IT industry.  ***Management of information projects/Management of Information Systems:*** The concept of project. Project life-cycle. Organizing of project management. Risk management process. Principles and methods of evaluating IT projects efficiency. Justification of the problem of information security in information systems and technical facilities of information security.  ***Nonstandard tasks solving in Computer Science/Practical work of task solving in Computer Science:*** Combinatorial tasks. Recursion. Search algorithms. Sorting. Long arithmetic. Dynamic programming. Graph algorithms. Trees. Cycles. Path finding. Search in state space. Search algorithms in the depth and width of graph. Heuristic search. Combinatorial tasks.  ***Methods of pedagogical systems modeling/Mathematic methods of pedagogical researches processing:*** Data representation. Methods of descriptive statistics. The distribution of the trait. The concept of sample. Statistical hypothesis and criteria. Classification of problems and solving methods. Methods of correlation analysis. Identification of differences on the level of studied trait. Reliability evaluation of the shift in the value of studied trait. Identification of differences in trait distribution. Regression analysis. Methods of multivariate analysis.Dispersion analysis. Factor analysis.  ***Innovative methods of Computer Science teaching/Private methods of Computer Science teaching:*** Influence of ICT on the learning environment. Multimedia technologies. Evolution and brief description of the main approaches to the design of systems and business-processes information models. Educational work in Computer science. Extracurricular work in Computer science. Participation in methodical and research work. |
| Results of study /examinations /forms of examinations: | ***Current trends in robotics / School robotics*** - *computer test*  ***Management of information projects/Management of Information Systems*** - *computer test*  ***Nonstandard tasks solving in Computer Science/Practical work of task solving in Computer Science*** - *oral exam*  ***Methods of pedagogical systems modeling/Mathematic methods of pedagogical researches processing*** - *computer test*  ***Innovative methods of Computer Science teaching/Private methods of Computer Science teaching*** - *computer test* |
| Technical/multimedia equipment: | Smart board, multi-media complex, computer lab |
| Literature: | 1. 123 eksperimenta po robototekhnike / M. Predko; per. s angl. V.P. Popova. - M.: NT Press, 2007.  2. Dzhalota, P. Upravlenie proektami v oblasti informatsionnykh tekhnologii / P. Dzhalota. - M.: Lori, 2014.  3. V. Gai Sbornik zadach po informatike. Uglublennyi uroven’, 2012.  4. M.V. Pogrebitskaya. Osnovy primeneniya matematicheskikh metodov v psikhologii i pedagogike. g. Petropavlovsk. SKGU im. M. Kazybayeva, 2009.  5. Lapchik M.P. Metodika prepodavaniya informatiki. Uchebnoe posobie, 2005. |

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| Module title: | 21a. Mathematics |
| Module elements | Computer mathematical systems  Elementary mathematics |
| Term of Study: | 1,2 |
| Person responsible for the module: | Kulikova V.P. |
| Lecturer: | Computer mathematical systems – Kulikova V.P.  Elementary mathematics – Serebrenikova V.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 3;  in a semester – 90.  2 semester: hours in a week – 10;  in a semester– 225 |
| Work load: | Full-time mode:  Curricular load: 195 hours  Extracurricular hours: 120 hours  Total: 315 hours |
| Credits: | 11 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | The module is based on knowledge acquired by students during secondary school courses of “Algebra”, “Geometry”, “Computer Science”. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** mathematical symbols, definitions and formulations of theorems provided by the program; to express the mathematical idea in solving problems accurately and concisely; to decide commonly occurring standard mathematical tasks;  ***Skills:*** to apply mathematical knowledge to solve practical tasks; to solve mathematical tasks with bringing solutions to a practically acceptable results (formulas, numbers, graphics, high-quality output, etc.) and develop on this basis of logical and algorithmic thinking; to use the mathematical basis to analyze, to design and to develop information systems, including training information systems  ***Competencies:*** to select and use appropriate computational methods and tools (computers, reference books, tables) in order to obtain practical recommendations. |
| Contents: | ***Computer mathematical systems:*** Maple and MathCad symbolic computation software packages. Structure of Maple and MathCad screens. Arithmetic operations. Integer and rational numbers, constants. The command syntax. Standard functions. Convert mathematical expressions. The solution of equations and inequalities. 2D and 3D graphing. Mathematical analysis: Differential and integral calculus. The solution of ordinary differential equations. Solution of differential equations in partial derivatives.  ***Elementary mathematics:*** Elements of mathematical logic. The sets and elements of combinatorics. The correspondences and relationships. Binary compliance, their properties: functionality, completely defined, injective, surjective, bijective. Binary relations, their properties: reflexivity, symmetry, transitivity, etc. Classification of relationship by types. **Quotient set,**  partition. Operations on sets and their properties. |
| Results of study /examinations /forms of examinations: | ***Computer mathematical systems*** *– computer test*  ***Elementary mathematics*** *– computer test* |
| Technical/multimedia equipment: | Multimedia complex, computer lab |
| Literature: | 1. Elementarnaya matematika. Uchebnoe posobie dlya starsheklassnikov I abiturientov. Ch.1 i Ch.2. Khoroshilova E.V. M.: Izd-vo MGU, 2010.  2. Kompiuternaya matematika s Maxima: Rukovodstvo dlya shkol’nikov I studentov / E. A .Chichkaryov — M. : ALT Linux, 2012. |

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| Module title: | 22a. Applied Mathematics |
| Module elements | Theory of Databases  Solving of tasks in Mathematics using a computer  Development of Internet Applications  System and Application Software  Information Technologies of Mathematics Teaching |
| Term of Study: | 5,6 |
| Person responsible for the module: | Pyatkova T.V. |
| Lecturer: | Theory of Databases - Pyatkova T.V.  Solving of tasks in Mathematics using a computer  – Serebrenikova V.V.  Development of Internet Applications – Kukharenko E.V.  System and Application Software – Kulikov V.P.  Information Technologies of Mathematics Teaching – Rvanova A.S. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  5 semester: hours in a week – 18;  in a semester – 405.  6 semester: hours in a week – 28;  in a semester– 630 |
| Work load: | Full-time mode:  Curricular load: 690 hours  Extracurricular hours: 345 hours  Total: 1035 hours |
| Credits: | 36 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: Theoretical bases of computer science, methodology for teaching computer science, algorithmization and bases of programming, computer systems architecture |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the theoretical foundations of databases, database development principles and means of working with them; system and application software, information technology of mathematics teaching.  ***Skills:*** to work in various media such as computer networks and DBMS, to develop a database to solve practical problems; to design logical model of databases, to solve math problems on the computer, to apply information technology of mathematics teaching  ***Competencies:*** to apply methods for developing the database, various technologies for teaching mathematics. |
| Contents: | ***Theory of Databases:*** Information and data. Databases and data banks. Functions of DMS (database management systems). Data models. Data scheme. Systems of relational calculus. Architecture of database management system. Methodology of database design. Physical design of databases. DMS overview. Functional capabilities of DMS. DMS efficiency. Providing data integrity on the level of the database. Security support. Access to the data through SQL query language. Query capabilities and tools of application programs development. The generalized technology scheme of working in DMS. DMS concept. Functions of DMS. Models of databases. Relational model and its characteristics. Integrity in relational model. Relational algebra.  ***Solving of tasks in Mathematics using a computer***: The linear approximation. Other forms of approximation. Solution of systems of linear algebraic equations by the iteration method. Numerical differentiation. Differentiation methods. Solution of systems of linear algebraic equations by Cramer’s method. Numerical integration. Formulation of the problem. The simplest quadrature formulas. Solution of systems of linear algebraic equations. Numerical integration of ordinary differential equations. Statement of the problem and general information on the methods of solution. Interpolation. Interpolation formulas. Classical methods for solving ordinary differential equations. Other methods of solution. Linear regression. Monte Carlo methods. The essence of the Monte Carlo methods. Numerical integration of functions.  ***Development of Internet Applications:*** Primary functions of Web-site. Statistic units of HTML. Use of JavaScript in generating Web-pages. Design of Internet-oriented data base. Distributed systems. Generating Internet-oriented and client-server programmes. Generating Web-servers. Flash-technologies. Audio- and video- materials processing.  ***System and Application Software:*** Operating system function and assignment. Modular construction of operating system and its shipping. Processor control. Input output management. File system. Memory management. Management of telecommunications access.  ***Information Technologies of Mathematics Teaching:*** Influence of ICT on the learning environment. Multimedia technologies. Tools of teaching Mathematics. Analysis of the modern software products used in training Mathematics. Computer models in Mathematics course. Psychological and pedagogical research of the learners and staff. Planning of the own educational work during the pedagogical practice. Educational work in Computer science. Extracurricular work in Computer science. Participation in methodical and research work. |
| Results of study /examinations /forms of examinations: | ***Theory of Databases -*** *Computer test*  ***Solving of tasks in Mathematics using a computer***  ***-*** *defence of a course paper*  ***Development of Internet Applications -*** *Computer test*  System and Application Software ***-*** *Computer test*  ***Information Technologies of Mathematics Teaching -*** *defence of a course paper* |
| Technical/multimedia equipment: | Interactive Smart board, multimedia complex, computer lab |
| Literature: | 1. Burakov P.V., Petrov V.IU. Vvedenie v sistemy baz dannykh. Uchebnoe posobie: Izdatel’stvo: SPbGU ITMO, 2010.  2. Suleimanov R.R. Kompiuternoe modelirovanie matematicheskikh zadach. Elektivnyi kurs. Uchebnoe posobie / R.R. Suleimanov - M.: Binom. Laboratoriya znanii, 2011.  3. Piurival Sammy Osnovy razrabotki veb-prilozhenii: Izdatel’stvo: Piter, 2015.  4. Manyakhina V.G. Sistemnoe I prikladnoe programmnoe obespechenie. M.: Prometei, 2011. |

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| Module title: | 23a. Mathematical modeling |
| Module elements | Mathematical modeling on computer |
| Term of Study: | 3 |
| Person responsible for the module: | Kulikova V.P. |
| Lecturer: | Mathematical modeling on computer – Kulikova V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 8;  in a semester– 180. |
| Work load: | Full-time mode:  Curricular load: 120 hours  Extracurricular hours: 60 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of school courses: “School mathematics”, “Computer science” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** principles of modeling, classification of ways of information processes models presenting; techniques, methods, ways of the objects, processes, phenomena formalization and their implementation on a computer; advantages and disadvantages of different ways of information processes models presenting; information processes simulation results fixation and processing algorithms; planning methods of computer experiments with models; the basic concepts of the theory of algorithms for solving linear algebraic equations and non-linear algebraic equations; algorithms for constructing quadrature formulas and algorithms for constructing difference schemes for solving the Cauchy problem for ordinary differential equations.  ***Skills:*** to possess modeling technology; to present a model in the mathematical and algorithmic form; to evaluate the quality of the model; to show model theoretical base; to conduct statistical modeling of information processes; to simulate processes in information systems and networks; to explore the convergence of the iterative algorithms and difference schemes for the approximation and stability.  ***Competencies:*** in creating simulation models of information processes; to obtain conceptual models of information processes; in creating modeling algorithms;  programming in GPSS modeling system. |
| Contents: | Modeling theory. Statistical modeling on computer. Information process modeling tools. Introduction to the methods of calculations. Numerical methods of linear algebra. Numerical methods for solving nonlinear equations. Elements of the approximation theory. Numerical integration. Numerical methods for solving ordinary differential equations. |
| Results of study /examinations /forms of examinations: | *Computer test* |
| Technical/multimedia equipment: | Interactive Smart board, multimedia complex, computer lab |
| Literature: | Tarasevich IU.IU. Matematicheskoe I kompiuternoe modelirovanie. Vvodnyi kurs: Uchebnoe posobie / IU.IU. Tarasevich. - M.: LIBROKOM, 2013. |

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| Module title: | 24a. Training systems |
| Module elements | Modeling of interactive educational systems in Mathematics |
| Term of Study: | 7 |
| Person responsible for the module: | Rvanova A.S. |
| Lecturer: | Modeling of interactive educational systems in Mathematics – Rvanova A.S. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 8;  in a semester – 180. |
| Work load: | Full-time mode:  Curricular load: 120 hours  Extracurricular hours: 60 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: “Methodology of teaching mathematics”, “Theory of Databases” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** modern educational software and the theoretical foundations and principles of their development; features of mathematics teaching and their account at the design, development and use of information training resources, advanced computational algorithms for solving mathematical tasks;  ***Skills:*** to design and develop educational software for teaching in mathematics lessons while the organization of monitoring and evaluation of learning outcomes, training and controlling educational software, to work in teams and make a presentation of the developed educational product, to use advanced computational algorithms for solution of a variety of applications, resulting from mathematical modeling of real processes and phenomena, with their subsequent realization on a computer; to use the mathematical basis to analyze, to design and to develop information systems, including training information systems  ***Competencies:*** to conduct self-education activity of students in the selection of teaching material for mathematics and its representation in the form of digital educational resources to work independently with both academic and special mathematical literature and electronic educational resources; to produce and consciously apply this knowledge |
| Contents: | ***Modeling of interactive educational systems in Mathematics:*** The use of universal software in teaching mathematics. The use of specialized educational software in teaching mathematics. The use of modern technology in teaching mathematics. Design of interactive educational technologies in mathematics. Selection of methods for the implementation of projects. The method works in a software environment. |
| Results of study /examinations /forms of examinations: | ***Modeling of interactive educational systems in Mathematics*** *– defence of a course paper* |
| Technical/multimedia equipment: | Interactive Smart board, multimedia complex, computer lab |
| Literature: | 1. Bashmakov A.I., Bashmakov I.A. Razrabotka kompiuternykh uchebnikov I obuchaiushikh sistem - M.: Informatsionno-izdatel’skii dom “Filin”, 2003. |

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| Module title: | 21b. Mathematics for programmers |
| Module elements | Computer Mathematics  Numerical information processing methods |
| Term of Study: | 1,2 |
| Person responsible for the module: | Kukharenko E.V. |
| Lecturer: | Computer Mathematics - Kukharenko E.V.  Numerical information processing methods – Kulikov V.P. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  1 semester: hours in a week – 4;  in a semester – 90.  2 semester: hours in a week – 10;  in a semester– 225 |
| Work load: | Full-time mode:  Curricular load: 210 hours  Extracurricular hours: 105 hours  Total: 315 hours |
| Credits: | 11 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: school mathematics and computer science |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** mathematical symbols, definitions and formulations of theorems provided by the program; to express the mathematical idea in solving problems accurately and concisely; to decide commonly occurring standard mathematical tasks;  ***Skills:*** to apply mathematical knowledge to solve practical tasks;to solve mathematical tasks with bringing solutions to a practically acceptable results (formulas, numbers, graphics, high-quality output, etc.) and develop on this basis of logical and algorithmic thinking; ***Competencies:*** to select and use appropriate computational methods and tools (computers, reference books, tables) in order to obtain practical recommendations. |
| Contents: | ***Computer Mathematics:*** The symbolic conversion and numerical algorithms. Coding. Visualization of functions of one and several variables. Simulation of the motion of a material point. Simulation of extreme challenges. The symbolic and numerical linear algebra.  ***Numerical information processing methods:*** Conversion of analogue signals into digital signals. Orthogonal transform in digital signal processing. Discrete Fourier Transform. Fast Fourier Transform method. Orthogonal sinusoidal function. Walsh functions. Streamlining Hadamard. spatial processing. Prospective formats and spatial data standards. Integral Fourier transform. Particular types of signals. The delta function and white noise. Analysis of the linear system. Momentum Representation. The frequency representation. |
| Results of study /examinations /forms of examinations: | ***Numerical information processing methods:*** *– computer test*  ***Computer Mathematics*** *– computer test* |
| Technical/multimedia equipment: | Multimedia complex, computer lab |
| Literature: | 1. Titov K. V. Kompiuternaya matematika. Uchebnoe posobie. Izdatel’stvo INFRA-M RIOR, 2015.  2. B. Yane. Tsifrovaya obrabotka izobrazhenii. 2007. |

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| Module title: | 22b. Programming |
| Module elements | Databases and Bases of Knowledge  Operational Systems and System Programming  Artificial intelligence and design of intelligent information systems  Client-server applications development  WEB-technologies and programming |
| Term of Study: | 5,6 |
| Person responsible for the module: | Nikishina O.V. |
| Lecturer: | Databases and Bases of Knowledge - Nikishina O.V.  Operational Systems and System Programming – Kulikov V.P.  Artificial intelligence and design of intelligent information systems – Kulikov V.P.  Client-server applications development – Kukharenko E.V.  WEB-technologies and programming– Otinova I.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  5 semester: hours in a week – 18;  in a semester – 405.  6 semester: hours in a week – 28;  in a semester– 630 |
| Work load: | Full-time mode:  Curricular load: 690 hours  Extracurricular hours: 345 hours  Total: 1035 hours |
| Credits: | 36 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of computer networks organization, algorithms and data structures, programming technology. |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** issues and challenges related to the issues of the course, methods of implementation of application systems based on databases, research results, which are the basis of the discipline, the place of the discipline among others, the main practical application of acquired knowledge, the model database.  ***Skills:*** to define and study the mechanism of interaction with the database on the basis of transaction data, to characterize the means of maintenance of the integrity and security of the database, practical - to design Infological database model and the relational database structure, to form queries in SQL to the database in an interactive mode and from programs of high-level language to program database access from object-oriented languages;  ***Competencies:*** infological database model design, relational database design, development of applications with databases on the high-level language. |
| Contents: | ***Databases and Bases of Knowledge:*** Information and data. Databases and data banks. Functions of DMS (database management systems). Data models. Data scheme. Systems of relational calculus. Architecture of database management system. DMS concept. Functions of DMS. Models of databases. Relational model and its characteristics. Integrity in relational model. Relational algebra. Issues of database design. Database design. Normal forms of relations. Database design with the entity-relationship method. ER- diagrams. SQL language. Database security support. Database physical organization: storage structures and access methods. Query optimization. Failure recovery. DMS technologies. Modern post-relational models of DMS.  ***Operational Systems and System Programming:***  Operating system function and assignment. Modular construction of operating system and its shipping. Processor control. Input output management. File system. Memory management. Management of telecommunications access.  ***Artificial intelligence and design of intelligent information systems:***  The methodology of artificial intelligence (AI). Mathematical and philosophical aspects of AI. Design and application of AI systems. Technology of tasks programming from the field of AI. Tools of creating AI systems: LISP, PROLOG programming languages, the shell of expert systems. Applications fields of AI: decision making, planning, machine learning, qualitative reasoning, theorem proving, heuristic search, problem solving, word processing natural language, gaming. Knowledge and presentation techniques. Knowledge engineering. Knowledge base. Methods for processing data structures.  Expert systems. Deductive and inductive mechanisms for drawing conclusions. Explanatory component of expert systems. Artificial neural networks.  ***Client-server applications development:*** Introduction. Subject of study and structure of discipline. Organization of the Internet. Internet Services. Technologies of Web - applications creation.  ***WEB-technologies and programming:*** The notion of transmission and data processing of Web-technologies. Hypertext and web-pages. Images. Cascading lists of CSS styles. JavaScript. Perl and PHP. ZOPE, Java, Flash technologies. MySQL database. |
| Results of study /examinations /forms of examinations: | ***Databases and Bases of Knowledge -*** *Computer test*  ***Operational Systems and System Programming -*** *Computer test*  ***Artificial intelligence and design of intelligent information systems*** *- defence of a course paper*  ***Client-server applications development*** *- Computer test*  ***WEB-technologies and programming*** *- defence of a course paper* |
| Technical/multimedia equipment: | Interactive Smart board, multimedia complex, computer lab |
| Literature: | 1. Shelokov S.A. Bazy dannykh. Orenburgskii gosudarstvennyi universitet, 2014. 2. E.S. Tanenbaum, Kh. Bos Sovremennye operatsionnye sistemy. Izdatel’stvo Piter, 2015.  3. Pavlov S. N. Sistemy iskustvennogo intellekta, Chasti 1 i 2, 2011.  4. Dzhonson G. Razrabotka klientskikh veb-prilozhenii na platforme NET Framework: ekzamen 70-528 / G. Dzhonson. - M.: Russkaya redaktsiya, 2008.  5. P.B. Khramtsov, S.A. Brik, A.M. Rusak, A.I. Surin Osnovy web-tekhnologii. Kurs lektsii. Internet-Universitet Informatsionnykh Tekhnologii, 2013. |

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| Module title: | 23b. Modeling of information systems |
| Module elements | Modeling of information systems |
| Term of Study: | 3 |
| Person responsible for the module: | Pyatkova T.V. |
| Lecturer: | Modeling of information systems – Pyatkova T.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  3 semester: hours in a week – 8;  in a semester– 180 |
| Work load: | Full-time mode:  Curricular load: 120 hours  Extracurricular hours: 60 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: “Numerical information processing methods”, “Databases and Bases of Knowledge” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the basic concepts and statements included in the content of the discipline, the methods of solving problems of the graph theory and algebra of logic; the theory, methods and techniques of analysis and modeling of systems.  ***Skills:*** to build mathematical models of the problems solved by using the graph theory; using of standard algorithms to solve the problems of finding an Euler cycle, the shortest path, maximum flow, etc.; to minimize Boolean functions and investigate the system of Boolean functions to be complete; to simulate different systems, to apply systems modeling techniques;  ***Competencies:*** to use software packages for the solution of tasks of discrete mathematics using the new information technologies |
| Contents: | Mathematical modeling and computational experiment. The subject of computational mathematics. On the computational science. Classification errors of solving tasks. Cost-effective, stable algorithms. Correctness. The approximation (digitization). The tools of the computational algorithms. |
| Results of study /examinations /forms of examinations: | Modeling of information systems – *computer test* |
| Technical/multimedia equipment: | Multimedia complex, computer lab |
| Literature: | Shelukhin O. Modelirovanie informatsionnukh system, 2011. |

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| Module title: | 24b. Design of Information Systems Applications |
| Module elements | Design of Information Systems Applications |
| Term of Study: | 7 |
| Person responsible for the module: | Nikishina O.V. |
| Lecturer: | Design of Information Systems Applications – Nikishina O.V. |
| Language: | Russian |
| Curriculum relation: | 5В011100 Computer Science |
| Mode of study/ number of hours per week and per term: | Full-time mode:  hours in a week – 8;  total in a semester – 180 |
| Work load: | Full-time mode:  Curricular load: 120 hours  Extracurricular hours: 60 hours  Total: 180 hours |
| Credits: | 6 ECTS |
| Examination requirements: | To be admitted for the examination the student must have at least 50 out of 100 points assigned for each discipline of the module. |
| Recommended requirements: | Knowledge of courses: “WEB-technologies and programming”, “Modeling of info-management systems” |
| Objectives of modules / Intended learning outcomes: | ***Knowledge:*** the formulation of problems of information systems applications design and methods for their solution; the core technologies of information system applications design; the content of works at the stage of research and study on developing of information systems applications; prospects for the development of information systems applications design technologies; methods of research on the design theory and development technologies of information systems;  ***Skills:*** to formulate and solve tasks of information system applications design using a variety of techniques and solutions; to formulate the basic technical and economic requirements of projectible applications of information systems; to use the mathematical basis to analyze, to design and to develop information systems, including training information systems  ***Competencies:*** to develop and implement information systems applications; to work with packages in Microsoft Visio, Rational Rose, BPwin. |
| Contents: | Modern technologies of object-oriented analysis and design of information systems.  Conceptual model of the UML. Elements of graphical notation options diagrams use. The specification of requirements and guidelines for writing effective use cases. Elements of the graphical notation of the class diagram. Graphic image of the class, its attributes and operations. Relationships and its graphic representation in the class diagram. Elements of graphical notation collaboration diagrams. Destination collaboration diagrams. Elements of graphical notation of sequence diagrams. Appointment of sequence diagrams. Elements of the graphical notation of state diagram. Simulation of parallel behavior using the state diagrams. Elements of graphical notation of activity diagrams. Diagram of activities and features of its construction. Elements of graphical notation of diagrams components. Assignment component diagram, its basic elements. Elements of graphical notation of deployment diagrams. Deployment diagram, features of its construction. Design patterns and their representation in the UML notation. Systems and models. |
| Results of study /examinations /forms of examinations: | Design of Information Systems Applications – *defence of a course paper* |
| Technical/multimedia equipment: | Interactive Smart board, multi-media complex, computer lab |
| Literature: | 1. Gvozdeva T.V. Proektirovanie informacionnyh sistem: ucheb. posobie / T.V. Gvozdeva, B.A. Ballod. – Rostov n/D: Feniks, 2009. –508 s. 2. Grekul V.I., Denishchenko G.N., Korovkina N.L. Proektirovanie informacionnyh sistem. Kurs lekcij. Uchebnoe posobie. Internet-Universitet Informacionnyh tekhnologij. M., 2008. -299 s. 3. Buch G., Dzhekobson I., Rambo Dzh. UML: Rukovodstvo pol'zovatelya / Per. s angl. - M.: DMK, 2010. |