Ministry of Education and Science of Kazakhstan

Karaganda State Technical University

"Approved by"
Chairman of the Academic Council,
rector, RK NAS academician
Gazaliev A.M.
_____
"____" _____ 2016

SYLLABUS

Course IKT 1105 - "Information and communication technologies"

Module NS 2 "Natural Sciences"

Specialty: 5B050700 «Management»

Engineering economics and management faculty

Department "Information technology and security"

2016

Preface

Syllabus developed by: associate professors V. V. Likhachev, O. A. Kan, senior lecturers A. T. Zharkimbekova, S. R. Zhakxybaeva, Z. B. Kadirova, a lecturer A. E. Suleymen, A.S. Beisenova, assistant L. S. Myhamedieva.

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It is coordinated with the department: «Management of the enterprise»
Head of Department _____ Hishaueva J.T. «_____»_____ 2016.

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The complexity of the discipline

Semester	The number of credits	ECTS credits	Form of lessons					Number of hours of SIW	Total number of hours	Form of control
			number of contact hours			Number of hours of SIWT	Total hours			
			lectures	practical training	laboratory training					
1	3	5	15	-	30	45	90	45	135	exam

Characteristics of discipline

Discipline "Information and communication technologies" is general for students of all disciplines.

The purpose of discipline

Mastering students of professional and personal competences who will give the chance to use the modem information communication technologies in different areas of professional activity, scientific and practical operation, for self-educational and other purposes. Along with the practical purpose, the course realizes the educational and educational purposes, promoting extension of an outlook of students, increase of their general culture and education.

Tasks discipline

Objectives of discipline include: teaching students the basics of algorithmic problems, the construction of efficient algorithms and the use of software packages, the study of the possibilities of modern information technologies and their development prospects, the study and the status and prospects of the hardware and software of computers and computer networks.

As a result of studies of the discipline, students must:

have general understanding of:

- to give an idea of use of application program packages;
- to give an idea of architecture of computing systems, operating systems and networks;
- to inform of the main concepts of development network and web applications, with bases of information security;
- explain the principles of information communication technologies and e-leaming;

- study possibilities of the modem information technologies and tendencies of their development.

know:

- to define the main tendencies in the field of information communication technologies;
- to know what economic and political factors promoted development of information communication technologies;
- to use information resources for search and information storage;
- to know features of different operating systems;
- to know architecture, to be able to calculate and evaluate performance measures of supercomputers;

be able to:

- to work with electronic spreadsheets, to execute consolidation of data, to build diagrams;
- to work with databases;
- to apply methods and means of information protection;

acquire practical skills:

- to project and create simple web sites;
- to make processing of vector and bitmap images;
- to create the multimedia presentations;
- to use different social platforms for communication;
- to use different forms of e-learning for extension of professional knowledge;
- learn to carry independent creative search;
- to use different cloud services.

Prerequisites

The following disciplines are a prerequisite for the study of this discipline: computer science, mathematics and physics.

Post requisites

The knowledge gained in the study of the discipline "Information and communication technologies" are helpful in the study of the following subjects: «Additional chapters of mathematics».

Thematic plan

Title Name (theme)	The complexity for occupations				
	lectures	practice	labs	SIWT	SIW
An ICT role in key sectors of development of society. Standards in the field of ICT. Definition of ICT. Subject ICT and its puiposes. An ICT role in key sectors of development of society. Standards in the field of ICT. Communication between ICT and achievement of the objectives of a sustainable development in the Millennium Declaration.	1			4	3
Introduction to computer systems. Architecture of computer systems. Review of computer systems. Evolution of computer systems. Architecture and components of computer systems. Use of computer systems. Data representation in computer systems.	1			2	3

Software. Operating systems. Software. Types of the software, purpose and characteristic. Basic concepts of OS. Evolution of operating systems. Classification of operating systems, including for mobile devices. Classification of desktop applications.	1			4	3
Human-computer interaction. User interface as means of human-computer interaction. Usability of interfaces. Types of interfaces: command line interface, text interface, graphic interface. Physical and mental characteristics of the user. Development stages of the user interface. Types of testing of interfaces (testing of users). Perspectives of development of interfaces.	1			2	3
Database systems Bases of database systems: concept, characteristic, architecture. Data models. Normalization. Integrity constraint on data. Query tuning and their processing. Fundamentals of SQL. Parallel processing of data and their restoration.Design and development of databases. Technology of programming of ORM. The distributed, parallel and heterogeneous databases	1			4	3
Data analysis. Data management. Data analysis bases. Methods of collection, classification and prediction. Decision trees. Processing of large volumes of data. Methods and stages of Data mining. Tasks Data mining. Visualization of data.	1			2	3
Networks and telecommunications. End devices, data transfer devices, transmission medium. Types of networks. Stack protocols: TCP/IP, OSI. IP addressing. Local and wide area networks. Wire and wireless network technologies. DHCP protocol. Technologies of connection to the Internet. Telecommunication technologies.	1			4	3
Cybersafety. Security risks of information and their classification. Industry of cybersafety. Cybersafety and control of the Internet. Malicious applications. Measures and means of information protection. Standards and specifications in information security field. The acts of the Republic of Kazakhstan governing legal relations in the sphere of information security. Digital signature. Encoding.	1			2	3
Internet technologies. Basic concepts Internet. The universal identifier of resources (URI), its assignment and components. Service DNS. Web technologies: HTTP, DHTML, CSS, and JavaScript. E-mail. Message format. SMTP, POP3, IMAP protocols.	1			4	3
Cloud and mobile technologies. Date centres. Tendencies of development of the modem infrastructure decisions.. Principles of cloud computing. Technologies of virtualization. Web service in the Cloud. Main terms and concepts of mobile technologies. Mobile services. Standards of mobile technologies.	1			2	3
Multimedia technologies. Representation text, audio, video and graphical information in a digital format. Basic technologies for compression of information. 3-D representations of the virtual world and animation. Instruments of development of multimedia applications. Use of multimedia technologies for planning,	1			4	3

descriptions of business processes and their visualization					
Technology Smart. Internet of things. Big data. Technology Block Chain. Artificial intelligence. Use of Smart-services. Green technologies in ICT. Teleconferences. Telemedicine.	1			2	3
E-technologies. Electronic business. Electronic training. Electronic government. Electronic business: Main models of electronic business. Information infrastructure of electronic business. Legal regulation in electronic business. Electronic training: architecture, structure and platforms. Electronic textbooks. Electronic government: concept, architecture, services. Formats of implementation of the electronic government in developed countries.	1			4	3
Information technologies in the professional sphere. Industrial ICT. The software for the solution of tasks of the specialized professional sphere. Modem IT trends in the professional sphere: medicine, power, etc. Use of search engines and electronic resources in the professional purposes. Safety issues in industrial information and communication technologies.	1			2	3
Prospects of development of ICT. Prospects of development in the sphere of the IT market: development of the free software. Forming of an ecosystem of IT of entrepreneurship and support small startup of the companies. Programs of acceleration and incubation. Development of necessary infrastructure of electronic payments and logistics. Prospects of development of E-technologies.	1			3	3
1.Computation of metrics of productivity of computer system: speed, efficiency, energy expenses, Amdal's law, CPU time.			2		
2.Determination of properties of an operating system. Operation with files and directories.			2		
3.Determination of requirements to development "convenient in application" the Web site.			2		
4.Development of database structure, creation of tables and requests.			2		
5.Design and creation of the presentations of lecture material, scientific reports, etc.			2		
6.Processing of numerical information, editing formulas and creation of charts in plate editors.			2		
7.Creation of a simple network configuration. IP addressing. Monitoring of a network. Analysis of traffic.			2		
8.Use of sniffers for the analysis of network packets. Use of hardware and software for key generation. Application of the EDS and encoding in case of message exchange by E-mail.			2		
9.Data acquisition from the server. Design of the graphic interface Web applications. Creation of styles.			2		
10.Creation of Google of accounts with use of Google Docs. Use of mobile technologies for receiving an information access, GPS navigators, GSM a signalling			2		
11.Creation of video files with use of programs: HyperCam, Adobe Premiere Pro, Windows Movie Maker, etc.			2		

12.Operation with Smart-applications: Smart TV, Smart Hub, etc.			2		
13.Operation with services on the website of the electronic government http://egov.kz/cms/rn/ govemment services/for_citizen: registration of requests, obtaining counterparts of documents, etc.			2		
14.Development of structure and the maintenance of a lesson in the environment of remote learning: Moodle, eDX, etc.			2		
15.Installation and use of application programs in the professional sphere.			2		
TOTAL	15		30	45	45

APPROXIMATE LIST OF THEMES OF LABORATORY STUDIES

1. Computation of metrics of productivity of computer system: speed, efficiency, energy expenses, Amdal's law, CPU time.
2. Determination of properties of an operating system. Operation with files and directories.
3. Determination of requirements to development "convenient in application" the Web site.
4. Development of database structure, creation of tables and requests.
5. Design and creation of the presentations of lecture material, scientific reports,etc.
6. Processing of numerical information, editing formulas and creation of charts inplate editors.
7. Creation of a simple network configuration. IP addressing. Monitoring of a network. Analysis of traffic.
8. Use of sniffers for the analysis of network packets. Use of hardware and software for key generation. Application of the EDS and encoding in case of message exchange by E-mail.
9. Data acquisition from the server. Design of the graphic interface Web applications. Creation of styles.
10. Creation of Google of accounts with use of Google Docs. Use of mobile technologies for receiving an information access, GPS navigators, GSM a signalling.
11. Creation of video files with use of programs: HyperCam, Adobe Premiere Pro,Windows Movie Maker, etc.
12. Operation with Smart-applications: Smart TV, Smart Hub, etc.
13. Operation with services on the website of the electronic government http://egov.kz/cms/rn/govemment-services/for_citizen: registration of requests, obtaining counterparts of documents, etc.
14. Development of structure and the maintenance of a lesson in the environment of remote learning: Moodle, eDX, etc.
15. Installation and use of application programs in the professional sphere.

Topics for control tasks SIW

1. An ICT role in key sectors of development of society.
2. Communication between ICT and achievement of the objectives of a sustainable development in the Millennium Declaration.
3. Review of computer systems. Evolution of computer systems.
4. Software. Types of the software, purpose and characteristic.
5. Basic concepts of OS.

6. Evolution of operating systems.
7. Classification of operating systems, including for mobile devices. Classification of desktop applications.
8. User interface as means of human-computer interaction.
9. Types of interfaces: command line interface, text interface, graphic interface.
10. Development stages of the user interface.
11. Types of testing of interfaces (testing of users).
12. Perspectives of development of interfaces.
13. Bases of database systems: concept, characteristic, architecture.
14. Data models. Normalization. Integrity constraint on data. Query tuning and their processing.
15. Fundamentals of SQL. Parallel processing of data and their restoration.
16. Data analysis bases. Methods of collection, classification and prediction. Decision trees.
17. Processing of large volumes of data. Methods and stages of Data mining. Tasks Data mining. Visualization of data.
18. End devices, data transfer devices, transmission medium.
19. Types of networks. Stack protocols: TCP/IP, OSI.
20. IP addressing. Local and wide area networks. Wire and wireless network technologies.
21. DHCP protocol. Technologies of connection to the Internet.
22. Telecommunication technologies.
23. Security risks of information and their classification.
24. Industry of cybersafety. Cybersafety and control of the Internet.
25. Malicious applications. Measures and means of information protection.
26. Standards and specifications in information security field. The acts of the Republic of Kazakhstan governing legal relations in the sphere of information security.
27. Digital signature. Encoding.
28. Basic concepts Internet. The universal identifier of resources (URI), its assignment and components.
29. Service DNS. Web technologies: HTTP, DHTML, CSS, and JavaScript.
30. E-mail. Message format. SMTP, POP3, IMAP protocols.
31. Technologies of virtualization. Web service in the Cloud.
32 Main terms and concepts of mobile technologies.
33. Mobile services. Standards of mobile technologies.
34. Basic technologies for compression of information. 3-D representations of the virtual world and animation.
35. Instruments of development of multimedia applications.
36. Use of multimedia technologies for planning, descriptions of business processes and their visualization.
37. Internet of things. Big data. Technology Block Chain.
38. Artificial intelligence. Use of Smart-services.
39. Green technologies in ICT. Teleconferences. Telemedicine.
40. Electronic business: Main models of electronic business.
41. Information infrastructure of electronic business. Legal regulation in electronic business.
42. Electronic training: architecture, structure and platforms.

43. Electronic textbooks. Electronic government: concept, architecture, services.
44. Formats of implementation of the electronic government in developed countries.
45. Modem IT trends in the professional sphere: medicine, power, etc.
46. Use of search engines and electronic resources in the professional purposes.
47. Safety issues in industrial information and communication technologies.
48. Forming of an ecosystem of IT of entrepreneurship and support small startup of the companies.
49. Programs of acceleration and incubation. Development of necessary infrastructure of electronic payments and logistics.
50. Prospects of development of E-technologies.

Criteria for assessing students' knowledge

The examination of the discipline is defined as the maximum amount of performance indicators for watershed monitoring (60%) and final certification (exam) (40%) and the value is up to 100%.

Timetable for implementation and delivery tasks for the discipline

Type of control	The purpose and content of the job	Recommended reading	Duration of execution	Form of control	Deadline	Points
1	2	3	4	5	6	7
Laboratory study №1	Computation of metrics of productivity of computer system: speed, efficiency, energy expenses, Amdal's law, CPU time.	[1], [5], [6], [7], [8], [15], lecture notes	2	Current	1 a week	3
Laboratory study №2	Determination of properties of an operating system. Operation with files and directories.	[1], [4], [8], [9], [11], [15], lecture notes	2	Current	2 a week	3
Laboratory study №3	Determination of requirements to development "convenient in application" the Web site.	[1], [3], [4], [7], [10], [15], lecture notes	2	Current	3 a week	3
Laboratory study №4	Development of database structure, creation of tables and requests.	[3], [4], [6], [7], [9], [10], lecture notes	2	Current	4 a week	3
Laboratory study №5	Design and creation of the presentations of lecture material, scientific reports,etc.	[1], [5], [6], [10], [11], [13], lecture notes	2	Current	5 a week	3
Laboratory study №6	Processing of numerical information, editing formulas and creation of charts inplate editors.	[1], [5], [8], [9], [11], lecture notes	2	Current	6 a week	3
Laboratory study №7	Creation of a simple network configuration. IP addressing. Monitoring of a network. Analysis of traffic.	[2], [3], [8], [10], [15], lecture notes	2	Current	7 a week	2
Theoretical module	Test your knowledge on the topics	All literature, lecture notes	0,5 contact hours	landmark control	7 a week	10
Laboratory study №8	Use of sniffers for the analysis of network packets. Use of hardware and software for key generation. Application of the EDS and	[1], [2], [6], [10], [13], [14], lecture notes	2	Current	8 a week	2

	encoding in case of message exchange by E-mail.					
Laboratory study №9	Data acquisition from the server. Design of the graphic interface Web applications. Creation of styles.	[4], [8], [9], [10], [13], [14], lecture notes	2	Current	9 a week	3
Laboratory study №10	Creation of Google of accounts with use of Google Docs. Use of mobile technologies for receiving an information access, GPS navigators, GSM a signalling.	[2], [3], [6], [8], [10], [12], lecture notes	2	Current	10 a week	2
Laboratory study №11	Creation of video files with use of programs: HyperCam, Adobe Premiere Pro,Windows Movie Maker, etc.	[1], [6], [8], [11], [14], [15], lecture notes	2	Current	11 a week	3
Laboratory study №12	Operation with Smart-applications: Smart TV, Smart Hub, etc.	[1], [2], [7], [9], [12], lecture notes	2	Current	12 a week	3
Laboratory study №13	Operation with services on the website of the electronic government http://egov.kz/cms/rn/govemment-services/for_citizen: registration of requests, obtaining counterparts of documents, etc.	[1], [5], [8], [10], [12], [14], lecture notes	2	Current	13 a week	2
Laboratory study №14	Development of structure and the maintenance of a lesson in the environment of remote learning: Moodle, eDX, etc.	[1], [8], [9], [10], [13], lecture notes	2	Current	14 a week	3
Laboratory study №15	Installation and use of application programs in the professional sphere.	[1], [4], [5], [7], [8], [15], lecture notes	2	Current	15 a week	2
Theoretical module	Test of knowledge on the topics	All literature, lecture notes	0,5 contact hours	landmark control	14 a week	10
Exam	Check of mastering the discipline material	The entire list of basic and additional literature	2 contact hours	Final grade	During the session	40
Total						100

Policies and procedures

In the study of discipline "Information and Communication Technologies" please observe the following rules:

1. Don’t be late for class.
2. Don’t miss classes without good reason, in case of illness please submit a certificate, in other cases - an explanatory note.
3. It is the responsibility of a student to attend all types of employment, while skipping class in the event of illness requires a doctor's certificate, in other cases - the explanatory note for the dean's signature.
4. According to the schedule of the educational process undergo all kinds of control.
5. Accomplish the missed practical and laboratory classes in the specified timeframe.

6. Be tolerant, open, frank and helpful to fellow students and teachers.

List of recommended literature

Basic:

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. Lorenzo Cantoni (University of Lugano, Switzerland) James A. Danowski (University of Illinois at Chicago, IL, USA) Communication and Technology, 576 pages.
3. Craig Van Slyke Information Communication Technologies: Concepts, Methodologies, Tools, and Applications (6 Volumes). ISBN13: 9781599049496, 2008, Pages: 4288
4. Brynjolfsson, E. and A. Saunders (2010). Wired for Innovation: How Information Technology Is Reshaping the Economy. Cambridge, MA: MIT Press
5. Kretschmer, T. (2012), "Information and Communication Technologies and Productivity Growth: A Survey of the Literature", OECD Digital Economy Papers, No. 195, OECD Publishing.

Additional:

6. Vijay K. Vaishnavi, Vijay K. Vaishnavi, William Kuechler Design Science Research Methods and Patterns: Innovating Information and Communication Technology, 2nd Edition 2015 by CRC Press
7. Hans J Schnoll E-Govemment: Information, Technology, and Transformation: Information, Technology, and Transformation (Routledge, Mar 12, 2015 - Political Science - 343 pages)
8. The Millennium Development Goals Report 2015, United Nations, New York, 2015
9. Maximizing Mobile //2012 Information and Communications for Development. World Bank, Washington D.C., 2012, 244 p.
10. Doing Business 2016 Measuring regulatory Quality and Efficiency / World bank Group Flagship Report, 2016
11. Usha Rani Vyasulu Reddi. Primer Series on ICTD for Youth. Primer 1: An Introduction to ICT for Development A learning resource on ICT for development for institutions of higher education, 235 p.
12. Likhachev V.V., Kan O.A., Zharkimbekova A.T. The tutorial: "Informatics". Karaganda, Publishing house of KSTU, 2015. - 82 page
13. V.V. Trofimov Computer science. - SPb., Yurayt, 2011
14. Ermekov N.T. Computer science. - Astana, Tome, 2011
15. Novozhilov O.P., Information Science textbook for university students. M-Yurayt, 2011 (Basic Sciences).

SYllABUS

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Module NS 2 "Natural Sciences"

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