

 ASTANA IT UNIVERSITY	MINISTRY OF EDUCATION AND SCIENCE OF THE REPUBLIC OF KAZAKHSTAN "ASTANA IT UNIVERSITY"	F-AITU-8
Graduate Model «Astana IT University»		Editorial Board 1

«УТВЕРЖДАЮ» APPROVED BY»

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« ____ » _____ 2019

Отформатировано: английский (США)

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GRADUATE MODEL "ASTANA IT UNIVERSITY"

Bachelor of Educational Programme 6B06101 «Computer Science»

Nur-Sultan, 2019

INTRODUCTION

The development of a competence model of a graduate becomes an unconditional condition for the implementation of the main directions of the Bologna process and a requirement of the modern labor market. The competency model of a graduate (bachelor's degree) is designed to answer the question of what professional tasks a specialist of a certain rank (position), this or that profile should be able to solve. The formation of a modern graduate model that meets the needs of stakeholders and all interested parties is the main strategic goal of "Astana IT University" and is provided with the necessary resources for the educational process, including staff, educational and methodological, information and material and technical support. The university pursues a targeted staff policy and systematic improvement of the material and technical base of the university to ensure the quality of training a graduate - bachelor, in demand in the labor market.

The normative-legal base of the model of the graduate - bachelor on specialities of the University is based on the following documents:

- The Law of the Republic of Kazakhstan "About Education" № 319-III of July 27, 2007 (as amended and supplemented on 11.07.2017).

- The government program of education development of RK for 2011-2020, approved by the Decree of the President of RK № 1118 from 07.12.2011.

- GMSHE № 604 from 31. 10. 2018.

- Rules "Organization of educational process on credit technology of education" (№ 152 from 20.04.2011 with amendments and additions № 563 from 12. 10. 2018)

- Typical rules of activity of educational organizations that implement educational programs of higher education. Resolution No. 181 of the Government of the Republic of Kazakhstan dated 7 April 2017. Qualification directory of positions of managers, specialists and other employees, approved by Order of the Minister of Labor and Social Protection of the Republic of Kazakhstan from May 21, 2012 № 201-p-m as amended on 17.04.2013).

1. The direction of Computer Science, current state, as well as the development and prospects of this direction.

The modern world is so computerized that it is almost impossible to find an industry where information and communication technologies and systems are not used. Each year there is a rapid development of various technologies, where the main elements are software and computer systems, respectively, a large number of highly qualified professionals for this industry. One of the most popular educational programs is "Computer Science", as it covers a wide range of industries related to information and communication technologies.

The direction of computer sciences is a relatively young science, but at the same time a serious industry, which requires the involvement of a team of professionals. Their main competence is building software systems. A specialist of the direction should not only have a solid luggage of knowledge and practical experience, but also constantly improve, delving into the subject and getting acquainted with new developments and achievements in computer technology.

The main task of Computer Science direction is to achieve strategic goals of different organizations through the use of information and communication technologies, in particular through the use of computer systems, technical developments, testing and maintenance of software products. Also, another important task of Computer Science direction is to achieve compliance with various external and internal requirements. Advanced organizations should strive to meet quality requirements, international and local standards, regulatory requirements, legislation, generally accepted approaches and methodologies in the field of information and communication technologies. The number of such requirements has increased significantly in recent years. Many of the international requirements are also becoming relevant for Kazakhstan.

Skills that encompass technical knowledge can provide a graduate with long-term career security, high earning potential and jobs that offer interesting and diverse jobs. At the same time, a young specialist with a bachelor's degree can solve a whole range of tasks. He will be able to use computer systems effectively, develop specific software products and engage in research and development activities. It should be noted that "Computer science specialist", also often called "IT specialist (information technology specialist)" is an exciting profession, which includes a certain creative component. It presupposes the ability to cover a problem as a whole, considering all ways of solving a complex problem. After all, professional implementation involves not only the creation of new programs, but also the improvement of old software systems. It is expected that in the next few years, professions in the field of information and communication technologies will grow rapidly, in particular professions related to the development and maintenance of computer systems, as there is active automation of large organizations. According to the U.S. Bureau of Labor Statistics (BLS), vacancies in the information and communications technology sector are expected to grow by 13% over the period 2016-2026, approximately twice as fast as the overall labor market growth of 7%.

Whereas virtually every industry today requires computer specialists who not only develop and maintain computer systems, but also process large amounts of data and secure the systems under development in various sectors of the economy, such as:

- Healthcare
- Finance and banking
- Production
- Government

In the career of a specialist in computer systems, university graduates will need to constantly improve, as technologies are developing rapidly, and what was relevant today, will not be relevant tomorrow. Also, for a specialist in computer systems, or IT specialist it is important to have an idea of the work of the business structure to understand the strategic goals of this development, which is provided through the analysis of business needs and development of technological solutions that meet these needs. In addition, these specialists may specialize in areas of ICT with high requirements, such as systems security or data analysis.

Working in the field of information and communication technologies gives the opportunity to solve problems and work with teams of technology specialists. Employers also offer high growth rates and the potential for high salaries.

Below are several career paths available to Bachelor of Science graduates:

1. Programmer (software developer)

Programmer - a person engaged in direct writing of codes, "body" of any computer program. Any computer program is a sequence of actions recorded according to certain rules. In a sense, a program can be called a special instruction written in a language understandable to machines: how and to what to react under what conditions. In the opinion of many programmers, their profession is creative, so like other creative professions, the profession of a programmer requires constant self-improvement. You cannot remain a good programmer without constantly studying your field. A good specialist should constantly study new programming languages, look for new solutions, try to solve unfamiliar, unusual tasks on his own. For a programmer to get a job, it is first of all important to have a good portfolio - education in most companies is a secondary requirement. Quite often companies look for programmers who have experience in development of this or that type of programs: for example, "Programmer 1C" or "mobile applications developer".

2. A tester (a tester of computer and software systems)

The tester will check computer programs created by the programmer, looking for possible errors and vulnerabilities. Tester's work requires a special mindset - the tester must be able to think outside the box. The tester should try to take all possible actions to find any vulnerabilities: for example, if an online banking program is being tested, the tester should check for possible errors when entering especially long or short user names, when operating with especially large or especially small amounts, when interrupting actions (let's say, whether the amount from the account will not be lost, if during the operation the bank user's connection was suddenly interrupted) and so on. The work of the tester is also quite secluded. In most companies, only experience is required to work as a tester - educational requirements are not so frequent.

3. System administrator (IT specialist)

A system administrator is a specialist for maintaining already created information systems. Unlike other specialists in information technology, system administrators are professionally

involved in the maintenance of computer systems. Typical tasks of a system administrator usually include such tasks as preparing and saving backup copies of data, installing and configuring necessary updates, installing and configuring new software, maintaining user accounts, responsibility for information security, troubleshooting. The system administrator profession requires readiness for multi-tasking.

4. System Architect

The system architect is an expert position. The system architect is neither involved in creating new software nor in maintaining it; his work is knowledge. The system architect must have all the skills of a skilled programmer. His task at work is to suggest the best ways of solving the problem, principles of architecture of this or that new program. Proceeding from his knowledge, the system architect will tell you from what sources it will be possible to get the necessary data, what ways to provide security and what tools should be developed from scratch. After that the system architect will have to defend his decision: to justify the terms, sizes of the budget and so on. Thus work of the system architect does not suppose administrative loading. It is expert work - evaluation and defense of his judgment. The system architect must have a deep expertise in his sphere. He practically needs higher education and an impressive work experience is absolutely necessary.

5. System analyst

Unlike the above-mentioned IT specialists, the system analyst has a rather large management load. His task is to draw up terms of reference for programmers and control the work. After the system architect makes the basic principles of functioning of the new program, the system analyst divides these principles into separate blocks and describes, what exactly technical moves it is necessary to undertake for the decision of tasks in view: for example, to use concrete type of inquiries with concrete methods of protective coding. After that the system analyst distributes concrete tasks on subordinate programmers and supervises their work.

2. Components at formation of model of the graduate of educational program "Computer Science" (Computer Science).

The key components of forming the model of an educational program alumni include information about the goals and objectives of the educational program, objects, types and directions of professional activity, specialist competence model (Attachment1), including descriptors, a variety of competencies in accordance with the educational program, the results of the educational program.

2.1 Purpose of the Educational Programme

The goal of the educational program is to provide practical-oriented training of highly qualified specialists in the field of computer sciences for enterprises with general cultural and professional competence in the field of information technologies, as well as to create conditions for continuous professional self-improvement, development of social and personal competencies of specialists, expansion of social mobility and competitiveness in the labor market.

2.2 Objectives of the Educational Programme

The objectives of the educational program "Computer Science" (Computer Science) are:

- 1) Provide highly qualified specialists in the field of computer science in private and public companies.
- 2) Provide students with a wide range of competencies in the field of computer science, based on the results of the educational program, necessary to start working as a Junior IT specialist in various companies, including small businesses with up to 10 employees, and ending with large national and private organizations with more than 1000 employees.
- 3) Development in students of flexible (soft) qualities required to develop in them leadership and patriotic parties necessary to form them as successful and committed leaders in their industry.

2.3 General and professional competences of the Educational Programme

General and professional competences as learning outcomes are the knowledge, skills and abilities acquired at the end of a discipline or course and reflecting the requirements.

List of General Competences (GC) and Professional Competences (PC) of the Computer Science educational program:

GC1. Ability to understand the driving forces and regularities of the historical process, a person's place in the historical process and ability to understand philosophy as a methodology of human activity, readiness for self-knowledge, self-activity, mastering cultural wealth as a factor of harmonization of personal and interpersonal relations.

GC2. Ability to form and develop skills and competences in the field of organization, planning and production management, ability to apply the acquired knowledge for understanding of environmental reality, ability to generalize, analyze, predict when setting goals in the professional sphere and choose the ways of their achievement with the use of scientific methodology of research.

GC3. Ability for written and oral communication in the state language and language of international communication, as well as in foreign (English) language. Ability to use foreign sources of information, possess communication skills, to make public speeches, argue, debate and debate in a foreign language.

GC4. Ability to be competent at a choice of methods of ICT and mathematical modelling for the decision of concrete engineering problems, ability to be ready to reveal naturally scientific

essence of the problems arising in the course of professional activity, and ability to involve for its decision the corresponding mathematical device.

PC1. Ability to understand modern standards, regulatory framework, basics of economic knowledge, scientific ideas about project management and technological entrepreneurship.

PC2. Ability to professionally operate modern computer equipment, network components, computer programs and complex computer systems (in accordance with the objectives of the program), as well as to use the rules of safety, industrial sanitation, fire safety and health standards.

PC3. Ability to possess skills in using and applying algorithms, data structures and modern methods to create (develop) and further support various software systems.

PC4. Ability to use basic regulations and methods to solve management tasks, the ability to perform project documentation in a software environment using computer graphics for various types of projects.

PC5. Ability to be competent at a choice of methods of mathematical modelling for the decision of concrete applied program problems, including readiness to reveal naturally scientific essence of the problems arising in the course of professional activity, and ability to involve for its decision the corresponding mathematical device.

PC6. Ability to design architectures of components of information systems, including man-machine interface of hardware-software complexes, to choose operating systems and methods of information protection.

PC7. Ability to develop information and software of information system on the basis of modern methods and development means.

PC8. Ability to collect, process and analyze data using existing in the organization methodological and technological infrastructure.

PC9. Ability to manage stages of life cycle of a methodological and technological infrastructure of software working out, the analysis of the data, designing of IT infrastructure in the various organizations.

PC10. Ability to use modern programming environments to design and implement software solutions and databases for information and communication technologies.

PC11. Ability to apply elements of the theory of probability and the mathematical statistics underlying models and methods of a science on the data, correctly to choose methods of the analysis of the data, machine learning and artificial intelligence for the decision of practical problems.

PC12. Ability to develop and implement safe and tested solutions based on new methods and technologies of information protection used in information and communication technologies.

2.4 Matrix of correlation of educational program results with the competences to be formed

	LO1	LO2	LO3	LO4	LO5	LO6	LO7	LO8	LO9	LO10
PC 1	√	√								
PC 2	√	√								
PC 3			√							
PC 4		√				√				
PC 5							√			
PC 6				√	√			√		
PC 7			√							
PC 8						√		√	√	
PC 9					√			√		√
PC10				√					√	
PC11							√		√	
PC12										√

2.5 Personal qualities of a computer science specialist

Due to the huge growth of digital transformation in organizations around the world, there is a high need for computer systems specialists. At the same time, there is already a large number of experienced software developers and this leads to fierce competition in the market. Below are some personal qualities, also often referred to as soft (flexible) qualities, which are additionally embedded in the graduate model of the student so that they can position themselves as competitive and ready for responsibility specialists in information and communication technologies:

1. Leadership skills - qualities that show that students have developed the skills of a leader. This quality is determined by the behavior of the student, his communication with his classmates and can be developed in the same way as professional qualities;
2. Continuous self-development skills - qualities that show how well students have developed skills for continuous development and learning. This quality is determined by how much the student is interested in improving in the disciplines in addition to what is given during the lessons. In other words, what additional materials he or she uses, how he or she shapes the questions, etc.;
3. Time management skills - qualities that show the student's ability to manage their time. This quality is determined by when he or she submits lab work, how he or she comes to class, how he or she allocates time in class, and can be developed in the same way as professional skills;
4. Friendliness and manners skills - qualities that show the student's manners and friendly attitude. These qualities are defined in relation to students' attitudes towards teachers and their classmates and can be developed in the same way as professional qualities;

5. enthusiasm and optimism - qualities which show a positive attitude of the student. These qualities are determined by the student's mood and attitude towards learning and can be developed in the same way as professional qualities;

6. Focus - qualities that determine how much a student focuses on a particular module. For example, if he or she constantly checks the phone or social network, then he or she is not focused on getting knowledge in a particular discipline. As in past cases, this quality can be developed as well as other professional qualities.

7. Teamwork skills - the qualities of teamwork. They are defined by the results of teamwork and show how much a student is a team player, which is a very important quality in our time.

8. Communication skills - qualities that show how well students have the skills to build a conversation properly, negotiation skills, persuasion skills, and listening to the interlocutor properly.

CONCLUSION

The market economy of Kazakhstan is increasingly moving to the digital format of management, and the state programs "Digital Kazakhstan", the program of Industrial Development of Kazakhstan and other programs positively contribute to the development of information and communication technologies. The direction of "Computer Science" (Computer Science) as a whole, and support of computer and software systems and means in particular, becomes the main and one of the most popular directions of economic development of many countries. Such concept as "digital culture" is being formed, where the main idea is the need to introduce new information and communication technologies in various organizations. Many companies consider the digital "culture" as an important mechanism in a positive organizational environment for company development. In this regard, employers' attitude towards the company's personnel has also changed.

High competition for vacant positions has led to the fact that professional knowledge and experience are not the only requirements for a specialist to "enter" the company. The latter is particularly true for young graduates, whose knowledge acquired in universities has not been confirmed by experience in solving production problems. The lack of such experience dramatically reduces the advantages for young people in hiring and determining the cost of their work. The risks for employers are too great. For such specialists, an important criterion for the successful completion of a job competition is the assessment of the personal potential of a young university graduate. In other words, it is important for the company how the specialist will grow and develop within the company, or what is his potential at the "entrance". In this case, the following questions remain open: what is the concept of potential, which is the guarantor of investment in the formation of the personnel reserve, or what employers expect from young specialists who have just graduated, or what can make inexperienced graduates competitive in the eyes of employers. For employers at the stage of hiring young specialists it is important to use young energy, activity, openness to new things, dynamism, the possibility to use young potential at a lower cost and easy integration into the organizational culture of the company. Thus, despite all this, the graduate should possess basic knowledge on information technologies, in particular, possess good bases of knowledge in the field of development of program systems. In addition to professional skills, the graduate should have personal qualities, or soft (flexible) qualities that will allow him or her to develop his or her career and form the qualities of business etiquette and management skills.

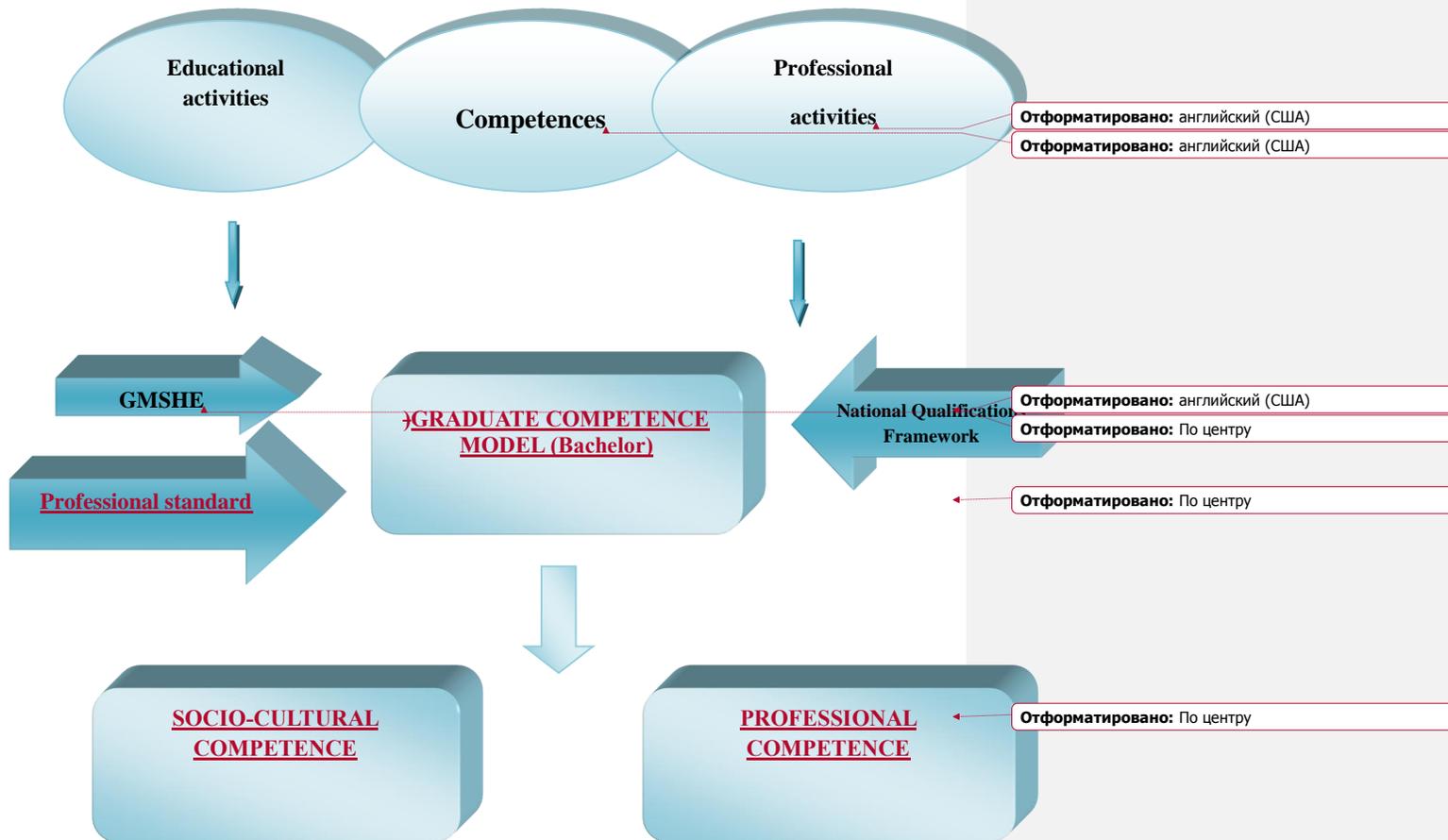
Despite the recognition of the undoubted advantages of young specialists, employers are in no hurry to recruit them to their enterprises. There are many reasons for this, some of which may be imposed by general notions, such as: there is no stability and reliability in fresh graduates; young people lack responsibility; there is no ability to work for results (which means to "hold" the goal, find ways to overcome obstacles on the way to it, to show independence and perseverance); there is no adequacy in perceiving oneself as an employee: exaggerated expectations both in terms of salary and evaluation of one's work and the nature of the work one wants to do. Some of these factors may occur, but if the students' reality is properly formed, these factors can be minimized.

On the basis of the above, it can be concluded that, in addition to special knowledge, the

personal qualities of a potential employee (receptivity, dynamism, willingness to learn, readiness to start small) are the key issues for employers in hiring or not hiring a young graduate. As for the availability of higher education, many employers consider it to be a sign that a priori distinguishes a university graduate from those who do not have higher education. Thus, employers consider a young graduate as a whole as a source of activity, dynamism and modern knowledge for the enterprise, on the one hand, and on the other hand, as an alarming combination of reduced responsibility with increased ambitions. When employers decide whether or not to hire a young graduate, they proceed in principle from one of two market advantages: 1. Special knowledge, for which the market demand is high and which cannot be compensated by personal qualities; 2. special personal qualities, which are required in a market economy and which distinguish one graduate from a number of his own classmates. These qualities can make their carriers competitive even if they have obtained a specialty for which the supply exceeds the demand, respectively, one of the goals of the educational program is to develop in students such qualities that are modeled in graduates of the educational program "Computer Science" (Computer Science) in Astana IT University.

Attachment 1

Competent model of the graduate (Bachelor of «Computer Science»)



Отформатировано: английский (США)

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