



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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2012.06.07
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Bachelor's Educational Program

Name of the program

გეოინფორმატიკა

Geoinformatics

Faculty

სამთო-გეოლოგიური

Mining and Geology

Program manager

Invited Professor Elena Nikolaeva (a)

Qualification and program credits

საინჟინრო გეოდეზიისა და გეოინფორმატიკის ბაკალავრი
(Bachelor of Geoinformatics and Engineering Geodesy)

The language of teaching

Georgian

Precondition for admission to the program

The right to study a bachelor's degree is available only to a person who has completed general education and holds a state certificate or a document identical to it and who will be enrolled under the laws of the Georgian legislation.

Description of the program

The duration of the program is 4 years (8 semesters) and includes 240 credits, where 220 credits are the basic specialty and 20-free components. Based on ECTS system 1 credit is 25 hours.

Every academic year includes 60 credits. Each academic year continues for 40 weeks, where I semester - 20 weeks and II semester - 20 weeks. Every semester study takes place within 15 weeks. The interim assessment includes current activities and mid-examination exams. Maximum score of current activity is 30, minimum score is 15 points. Maximum score of mid-semester exam is 30 and minimum score is 7.5 points. The final exam is in XVIII-XIX-semester, the maximum score of each is 40, the minimum score is 10.

If the student fails to pass the final exam, the score is 41-50 points means that the student needs more work to pass, and he / she is allowed to pass the exam once more with independent work. The additional examination shall be appointed at least 5 days after the final test results are declared in the final examination schedule.

The first academic year includes 60 credits, where 12 credits are devoted to specialty subjects: introduction to geoinformation systems, introduction to remote sensing and introduction to digital photogrammetry, each 4 credits. Engineering geodesy 1 and 2 (3 + 6 credits) subjects are in I and II semesters. The other credits are dedicated to general subjects. Mathematics is taught in four semesters (5-4-4-4 credits), foreign language is taught in two semesters (3-3 credits), physics A, B - two semesters (4-4 credits). Computer graphics subject has 3 credits and elective humanitarian subjects - 3 credits.

The second academic year includes 60 credits, where 26 credits are dedicated to the specialty; the rest of the credits are covered by subjects of natural, general, general engineering and information technologies.

The third year includes 60 credits, where 48 credits are dedicated to the subject of specialty. In addition, V semester is taught geodesy 3 (7 credits) and free components have 5 credits.

The last year includes 60 credits, where 15 credits are free components, 10 credits for bachelor's work and 5 credit practices, the rest 30 credits are for specialty subjects.

The purpose of the program

The program aims are to prepare a competent specialist and provide them information in the field of geoinformation systems and remote sensing technologies. In particular, the program prepares a specialist, who owns a modern system, methods, GIS and remote sensing technology, analytical knowledge, which will enable the successful accomplishment of various GIS and remote sensing develop firm, enterprise, organization. They will be able to develop and implement modern geoinformation systems and remote sensing technologies (both desk and server). In addition, acquiring the theoretical and practical knowledge of the educational program in basic and special issues of engineering geodesy.

Outcomes/competences (general and sectoral)

Knowledge and understanding:

- Receive systematic, methodological and analytical knowledge of the modern level in geoinformation-technological directions
- Participation in designing Geoinformation Systems and Remote Sensing Technologies
- Participation in the development of the firm, enterprise, organization's geoinformation and remote sensing systems
- To obtain relevant theoretical knowledge in the basic and special issues of engineering geodesy

Ability to use knowledge in practice:

- Ability to use geoinformation technologies, including desk and server software systems
- Ability to use modeling and programming in practice
- Collecting geographies, their visualization and analysis skills
- Ability to use modern techniques and technologies for solving practical tasks

- Ability to participate in the design, processing, integration and implementation of geoinformation systems
- Ability to find, process and interpret new technological information in the field of geoinformatics
- Ability to efficiently use information-communication technological resources for achieving work objectives
- Ability to secure security, risk management and control mechanisms in geoinformation technologies

Making judgments:

- Analysis of the capabilities of modern technologies for the solution of different types of geospatial fields and the ability to formulate grounded conclusions on them
- Ability to receive, process and analyze new information

Communicating skills:

- Ability to write in a concise and comprehensible manner
- Ability to create logically organized written constructors
- Ability to prepare relevant presentations or written information
- Ability to Write Complex Issues
- Communication skills in native and foreign languages (B2 level)
- Ability to verbal verbal issues of complex issues
- Public awareness of their opinions with relevant knowledge and logic, their clear evidence to the experts and non-publications

ability to learn:

- Ability to determine consistency and multilateral assessment of their own learning process (to determine the need for further learning), as well as the ability to determine the direction of learning in a variable and unexpected environment

Values:

- Ability to maintain and establish professional values (accuracy, punctuality, objectivity, transparency, organization and etc.)
- Ability to protect the norms of ethics and morals

Methods of achieving learning outcomes (teaching and learning)

- Lecture
 Seminar (team working)
 Practice
 Laboratory
 Practice
 Course paper/project
 Consultation
 Independent work

Based on the specific course of study in the learning process, the relevant below listed activities of the teaching-learning methods are used, which are reflected in the relevant training courses (syllabus):

(Discussion, debate, presentation, group work, etc.)

1. Discussion / debate are one of the most common activities of interactive teaching. Discussion process increases the quality and activity of students' engagement. Discussion can be turned into arguments and this process is not limited to the questions asked by the teacher. It develops the ability of the student to reason and justify their opinion.
2. Cooperative learning is a learning strategy when each member of the group is obliged not only to examine himself but also to help his/her team-mate to study the subject better. Each member of the group works on the problem, until all of them master the issue.
3. Collaborative work – By using this activity, teaching implies division of the students' group and assignment of teaching tasks to them. The group members individually work on the issue and in parallel share their opinions with other members of the group. Due to the set objective, it is possible to divide the functions among the members during the group's working process. This strategy provides all students maximum engagement in the learning process.
4. Problem based learning is an activity which uses a specific problem as the initial stages of obtaining new knowledge and integration process.

5. Case study - the teacher will discuss concrete cases with the students, and study the issue thoroughly.
6. Brain storming – this activity implies to form and promote radically different opinion, idea on concrete issue/problem. This activity contributes to the development of a creative approach to the problem. Its application is effective in case of a large number of students and consists of several main stages: Problem / issue determination in a creative perspective;– In a certain period of time, without criticism, note the ideas expressed by the– listeners (mainly on the board); Determination of assessment criteria to determine the establish the conformity of– the idea with the aim of the research; Assessment of selected ideas with predetermined criteria;– By process of elimination, distinguish those ideas that are most relevant to the– issue. Demonstration of the highest evaluation idea as the best way to solve the set– problem.
7. Role and situational games – games that are fulfilled according to predefined scenario allow students to look at the issue differently. It helps them to develop an alternative viewpoint. Like discussions, these games also formulate the student's ability to express and protect his/her position independently.
8. Implication. It is quite effective in terms of achieving the result. In many cases, it is better to provide the students with audio and visual materials simultaneously. The study material can be demonstrated by both the teacher and the student. This activity helps us to demonstrate different levels of learning material, to specify what students will have to do independently; at the same time, this strategy visually reflects the essence of the topic/ problem. Demonstration may be simple.
9. Induction is such a form of transmitting any knowledge when the process of thinking in the course of the study is directed towards generalization, in other words when delivering the material the process is going from concrete to general.
10. Deduction is such a form of transmitting any knowledge, which based on general knowledge represents logical process of discovering new knowledge in other words, the process is going from general to concrete.
11. Analysis helps us to divide the study material into constituent parts. This will simplify the detailed coverage of individual issues within a difficult problem.
12. The synthesis implies the composition of one whole by grouping individual issues. This activity contributes to the development of the problem to be seen as a whole.
13. Verbal or orally transmitted. Narration, talking and so forth belong to this activity. In this process the teacher orally transmittes and explaines study material and the students actively perceive and learn it through listening, remembering and thinking.
14. The script implies the following activities: making extracts, records, notes, theses, abstract or essay and other.
15. Explanation is based on the discussion on the issue. The teacher gives a concrete example from the material, which is discussed in detail within the given topic.
16. Action-oriented training requires active involvement of the teacher and student in the teaching process, where the practical interpretation of theoretical material is of special significance.

Student knowledge assessment system

Grading system is based on a 100-point scale.

Positive grades:

- (A) - Excellent - the rating of 91-100 points;
- (B) – Very good - - the rating of 81-90 points
- (C) - Good - the rating of 71-80 points
- (D) - Satisfactory - the rating of 61-70 points
- (E) - Enough - the rating of 51-60 points

Negative grades:

- (FX) - Did not pass - 41-50 points of rating, which means that the student needs more work to pass and is given the right to take the exam once more with independent work;
- (F) – Failed - 40 points and less, which means that the work carried out by the student is not enough and he/she has to learn the subject from the beginning.

Field of employment

Ministries of:

Environment Protection and Agriculture, Energy, Defense, Interior, Economy and Sustainable Development, Labor, Health and Social Affairs;

- Ministry of Justice (Public Registry);
- Mining profiling enterprises;
- Oil and gas exploration and extraction companies;
- Building organizations;
- Project Workers;
- Delivery companies;
- Other companies are collecting, processing, analysis, visualization and exchange of spatial data.

Opportunity to continue learning

Master's Educational Programs

Human and material resources necessary for the implementation of the program

The description of human and material resources are in the attached syllables and files.

Number of attached syllabus: 71

Program subject load

№	Subject	Precondition of admit	ECTS Credits								
			I Year		II Year		III Year		IV Year		
			Semester								
			I	II	III	IV	V	VI	VII	VIII	
1	Elements of Linear Algebra and Calculus	does not have	5								

2	General Physics A	does not have	4							
3	Computer Technologies	does not have	4							
4	Introduction to GIS	does not have	4							
5	Basics of engineering graphics	does not have	3							
6	English for Technical Specialities - 1	does not have	3							
7	German for Technical Specialities - 1	does not have								
8	French for Technical Specialities - 1	does not have								
9	Russian for Technical Specialities- 1	does not have								
10	Engineering geodesy 1	does not have	3							
11	Introduction to remote sensing	does not have	4							
12	Elements of Mathematical Analysis	Elements of Linear Algebra and Calculus	5							
13	General Physics B	General Physics A	4							
14	Humanitarian subjects by choose: 1. The basics of philosophy 2. Introduction to Psychology 3. History of Georgia 4. Introduction to Sociology 5. Culture and modernity 6. The Modern Language of Communications Technologies 7. History of technical design 8. Academic writing elements	does not have	3							
15	English for Technical Specialities - 2	English for Technical Specialities -1	3							
16	German for Technical Specialities - 2	German for Technical Specialities - 1								
17	French for Technical Specialities - 2	French for Technical Specialities -1								
18	Russian for Technical Specialities- 2	Russian for Technical Specialities - 1								
19	Engineering geodesy 2	Engineering geodesy 1	6							
20	Introduction to fotogrammetry	does not have	4							
21	Bases of programming (based on C++)	does not have	5							
22	Integral Calculus and Introduction to Differential Equation	Elements of Mathematical Analysis	4							
23	Object-oriented Programming – 1 (based	Bases of	5							

	on C++/C#)	programming (based on C++)							
24	Geoinformation systems A	does not have			4				
25	Fundamental of geology	does not have			4				
26	Remote sensing 1	does not have			3				
27	Basic of cartography	does not have			3				
28	Digital fotogrammetry 1	does not have			4				
29	Engineering geoecology	does not have			5				
30	Fundamental of geomorphology	does not have			3				
31	Geoinformation systems B	Geoinformati on systems A			4				
32	Remote sensing 2	Remote sensing 1			4				
33	Probability Theory and Mathematical Statistics	Elements of Linear Algebra and Calculus			4				
34	Object-Oriented Programming 1 (Visual Basic)	Bases of programming (based on C++)			5				
35	GIS cartography	does not have			4				
37	Digital fotogrammetry 2	does not have			4				
38	Engineering geodesy 3	Engineering geodesy 2				7			
39	GIS server	does not have				7			
40	Database design program realization (based on SQL server)	does not have				5			
41	GeoDatabases	Introduction to GIS				7			
42	Basics of Web Technologies	does not have				4			
43	Web-Systems Programming: JavaScript	Basics of Web Technologies					5		
44	GIS object library	Object- oriented Programming – 1 (based on C++/C#)					7		
45	Digital cartography	does not have					6		
46	Desktop GIS	Introduction to GIS					7		
47	Land cadastre	does not have						5	
48	Remote sensing and GIS systems	Introduction to remote						5	

		sensing								
49	Remote sensing data management	Introduction to remote sensing							5	
50	Triangulation and creation of digital terrain	does not have							5	
51	Aerial photography	does not have							5	
52	GIS applications	does not have							5	
	Free credits (each has 5 credits):							5		15
53	1. Numismatics and Bonistics 2. Financial institutions and markets 3. Administration of land 4. History of religion 5. Tourism 6. Glass and ceramics 7. Cultural Heritage and Tourism 8. Chromatics 9. Teknospero and ecosystem 10. The basics of industrial aesthetics and ergonomics 11. All about oil	does not have does not have does not have does not have does not have does not have does not have does not have does not have does not have does not have								
54	Bachelor's Thesis									10
55	Practice									5
Per semester			30	30	27	33	30	30	30	30
Per year			60		60		60		60	
Total			240							

Map of learning outcomes

№	Subject	Knowledge and understanding	Ability to use knowledge in practice	Making judgments	Communication skill	Ability to learn	Values
1	Elements of Linear Algebra and Calculus	X	X			X	
2	General Physics A	X		X		X	
3	Computer Technologies	X	X	X			
4	Introduction to GIS	X	X	X			
5	Basics of engineering graphics	X	X		X	X	
6	English for Technical Specialities - 1	X	X		X	X	
7	German for Technical Specialities - 1	X	X		X	X	
8	French for Technical Specialities - 1	X	X		X	X	
9	Russian for Technical Specialities- 1	X	X		X	X	
10	Engineering geodesy 1	X	X	X			
11	Introduction to remote sensing	X	X	X			
12	Elements of Mathematical Analysis	X	X			X	
13	General Physics B	X		X		X	
14	The basics of philosophy	X	X				X
15	Introduction to Psychology	X	X		X		
16	History of Georgia	X	X	X	X		
17	Introduction to Sociology	X	X	X			X
18	Culture and modernity	X	X				X
19	The Modern Language of Communications Technologies	X	X		X		
20	History of technical design	X		X			X
21	Academic writing elements	X	X		X		
22	English for Technical Specialities - 2	X	X		X	X	
23	German for Technical Specialities - 2	X	X		X	X	
24	French for Technical Specialities - 2	X	X		X	X	
25	Russian for Technical Specialities- 2	X	X		X	X	
26	Engineering geodesy 2	X	X	X			
27	Introduction to fotogrammetry	X	X	X			
28	Bases of programming (based on C++)	X	X			X	
29	Integral Calculus and Introduction to Differential Equation	X	X	X			
30	Object-oriented Programming – 1 (based on C++/C#)	X	X			X	
31	Geoinformation systems A	X	X	X			
32	Fundamental of geology	X	X	X		X	
33	Remote sensing 1	X	X	X			
34	Basic of cartography	X	X	X			
35	Digital fotogrammetry 1	X	X	X			
36	Engineering geoecology	X	X	X			

37	Fundamental of geomorphology	X	X	X			
38	Geoinformation systems B	X	X	X			
39	Remote sensing 2	X	X			X	
40	Probability Theory and Mathematical Statistics	X	X	X			
41	Object-Oriented Programming 1 (Visual Basic)	X	X	X		X	
42	GIS cartography	X	X	X			
43	Digital fotogrammetry 2	X	X	X			
44	Engineering geodesy 3	X	X	X			
45	GIS server	X	X	X			
46	Database design program realization (based on SQL server)	X	X			X	
47	GeoDatabases	X	X	X			
48	Basics of Web Technologies	X		X			
49	Web-Systems Programming: JavaScript	X	X			X	
50	GIS object library	X	X	X			
51	Digital cartography	X	X			X	
52	Desktop GIS	X	X	X			
53	Land cadastre	X	X	X			
54	Remote sensing and GIS systems	X	X	X			
55	Remote sensing data management	X	X	X			
56	Triangulation and creation of digital terrain	X	X	X			
57	Aerial photography	X	X	X			
58	GIS applications	X	X	X			
	Free components:						
59	Numismatics and Bonistics	X	X	X	X		
60	Financial institutions and markets	X	X	X	X	X	
61	Administration of land	X	X	X		X	X
62	History of religion	X	X	X	X	X	X
63	Tourism	X	X	X	X	X	X
64	Glass and ceramics	X	X	X		X	
65	Cultural Heritage and Tourism	X		X			X
66	Chromatics	X		X	X		
67	Teknospero and ecosystem	X	X	X	X	X	X
68	The basics of industrial aesthetics and ergonomics	X	X		X	X	X
69	All about oil	X			X		X
70	Bachelor's Thesis	X	X	X	X	X	X
71	Practice	X	X	X	X	X	X

Program curriculum

№	Subject code	Subject	ECTS Credit/Hours	Hours								
				Lecture	Seminar (work in the group)	Practical classes	Laboratory	Practice	Course work/project	Mid-semester exam	Final exam	Independent work
1	MAS34308G1	Elements of Linear Algebra and Calculus	5/125	15		30				1	2	77
2	PHS51208G1	General Physics A	4/100	15			15			1	2	67
3	ICT10303G2	Computer Technologies	4/100	4			26			3	1	66
4	ICT39603G1	Introduction to GIS	4/100	15		15				1	1	68
5	EET78405G2	Basics of engineering graphics	3/75	15		15				1	1	43
6	LEH15012G1	English for Technical Specialities- 1	3/75			30				1	1	43
7	LEH14412G1	German for Technical Specialities - 1	3/75			30				1	1	43
8	LEH14612G1	French for Technical Specialities- 1	3/75			30				1	1	43
9	LEH14912G1	Russian for Technical Specialities- 1	3/75			30				1	1	43
10	PHS41803G1	Engineering geodesy 1	3/75	15			15			1	1	43
11	PHS42503G1	Introduction to remote sensing	4/100	15		15				1	1	68
12	MAS33308G1	Elements of Mathematical Analysis	5/125	15		30				1	2	77
13	PHS51308G1	General Physics B	4/100	15			15			1	2	67
14	HEL30212G1	The basics of philosophy	3/75	15	15					1	1	43
15	SOS30312G1	Introduction to Psychology	3/75	15	15					1	1	43
16	HEL20212G1	History of Georgia	3/75	15	15					1	1	43
17	SOS40312G1	Introduction to Sociology	3/75	15	15					1	1	43
18	SOS40112G1	Culture and modernity	3/75	15	15					1	1	43
19	LEH12012G1	The Modern Language of Communications Technologies	3/75	15	15					1	1	43
20	ART20305G1	History of technical design	3/75	15	15					1	1	43
21	LEH12112G1	Academic writing elements	3/75	15	15					1	1	43

22	LEH15112G1	English for Technical Specialities - 2	3/75			30				1	1	43
23	LEH14512G1	German for Technical Specialities - 2	3/75			30				1	1	43
24	LEH14712G1	French for Technical Specialities -2	3/75			30				1	1	43
25	LEH14812G1	Russian for Technical Specialities- 2	3/75			30				1	1	43
26	PHS41903G1	Engineering geodesy 2	6/150	15			15	42		1	1	76
27	PHS42803G1	Introduction to fotogrammetry	4/100	15		15				1	1	68
28	ICT10408G1	Bases of programming (based on C++)	5/125	30		15				1	2	77
29	MAS32108G1	Integral Calculus and Introduction to Differential Equation	4/100	15		15				1	2	67
30	ICT31008G2	Object-oriented Programming – 1 (based on C++/C#)	5/125	15			30			1	1	78
31	ICT39303G1	Geoinformation systems A	4/100	15		15				1	1	68
32	PHS31003G1	Fundamental of geology	4/100	15			15	24		1	1	44
33	PHS22103G1	Remote sensing 1	3/75	15		15				1	1	43
34	PHS41703G1	Basic of cartography	4/100	15			15			1	1	68
35	ICT30503G2	Digital fotogrammetry 1	4/100	15		15				1	1	68
36	PHS31703G2	Engineering geoecology	5/125	15	30					1	2	77
37	PHS30803G1	Fundamental of geomorphology	3/75	15		15				1	1	43
38	ICT39403G1	Geoinformation systems B	4/100	15		15				1	1	68
39	PHS22203G1	Remote sensing 2	4/100	15		15				1	1	68
40	MAS31608G1	Probability Theory and Mathematical Statistics	4/100	15		15				1	2	67
41	ICT31208G2	Object-Oriented Programming 1 (Visual Basic)	5/125	15			30			1	1	78
42	ICT39703G1	GIS cartography	4/100	15		15				1	1	68
43	ICT30603G2	Digital fotogrammetry 2	4/100	15		15				1	1	68
44	PHS43503G1	Engineering geodesy 3	7/175	30		30				1	2	112
45	ICT30303G2	GIS server	7/175	30		30				1	1	113
46	ICT24708G1	Database design program	5/	15			15		15	1	2	77

		realization (based on SQL server)	125									
47	ICT24303G1	GeoDatabases	7/175	15		45				1	1	113
48	BWEBT08GA2	Basics of Web Technologies	4/100	4			26			2	1	67
49	WPJ1208GA2	Web-Systems Programming: JavaScript	5/125	15			30			2	1	77
50	ICT30103G2	GIS object library	7/175	30		30				1	1	113
51	ICT39803G1	Digital cartography	6/150	30		30				1	1	88
52	ICT24403G1	Desktop GIS	7/175	15		45				1	1	113
53	SOS56803G1	Land cadastre	5/125	15		30				1	1	78
54	PHS42603G1	Remote sensing and GIS systems	5/125	15		30				1	1	78
55	PHS42703G1	Remote sensing data management	5/125	15		30				1	1	78
56	ICT30703G2	Triangulation and creation of digital terrain	5/125	15		30				1	1	78
57	PHS42803G1	Aerial photography	5/125	15		30				1	1	78
58	ICT30203G2	GIS applications	5/125	15		30				1	1	78
59	BUA22213G1	Numismatics and Bonistics	5/125	15	30					1	1	78
60	BUA28113G1	Financial institutions and markets	5/125	15	30					2	2	76
61	BUA43013G1	Administration of land	5/125	15	30					1	1	78
62	HEL10112G1	History of religion	5/125	15	30					1	1	78
63	PESI0213G	Tourism	5/125	15	30					2	2	76
64	EET16004G2	Glass and ceramics	5/125	15	30					1	1	78
65	PIS15813G1	Cultural Heritage and Tourism	5/125	15	30					1	1	78
66	AAC60106G1	Chromatics	5/125	15	30					1	2	77
67	HHS27903G1	Teknospero and ecosystem	5/125	30	15					1	1	78
68	HHS24303G1	The basics of industrial aesthetics and ergonomics	5/125	15	30					1	1	78
69	MAP41603G2	All about oil	5/125	15	30					1	1	78
70	ICT39003G2-K	Bachelor's Thesis	10/250						120	1	1	128
71	ICT39103G2-R	Practice	5/125					60		1	1	63

Program Principle

Elena Nikolaeva

Faculty Name

Head of Quality Assurance Service

Shalva Keleprishvili

Dean of the Faculty

Anzor Abshilava

Agreed with

Quality Assurance Service of GTU

Irma Inashvili

Approved by

Faculty Name

At the meeting of Faculty Board

30.03. 2018

Chairman of the Faculty Board

Anzor Abshilava