



საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

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Decree № 2005

Master's Education Program

Title of the program

Water Supply, Water Discharge and Rational Use and Protection of Water Resources

Faculty

Civil Engineering

Program Supervisor

Professor Alexander Davitashvili

Awarded qualification

Master of Construction in Water Supply and Water Discharge specialization

Will be awarded in the case of passing not less than 120 credits of an educational program.

Language

English

Program objective

- The Master's Program in Water Supply, Water Discharge and Rational Use and Protection of Water Resources provide its graduates with the market-demanded knowledge and skills to

independently and freely start development of construction of water supply and sewerage systems and properly manage the construction process in a sustainable and safe manner.

- Teach to provide rational use and protection of water resources in the current situation.
- Teach to solve complex engineering and environmental problems in construction of water supply and sewerage systems.
- Teach to work independently with the project related normative documentation and to transfer a construction object into exploitation oriented on quality.

Program Description

Program was developed according ECTS system, 1 credit is equal to 27 hours, which is meant as a contact, as well as independent work hours. The distribution of credits represented in the curriculum. The distribution of credits represented in the curriculum. The continuation of program is 2 years (4 semesters) and covers 120 credits (ECTS) Core courses - 75 credits and research component – 45 credits.

The first-year learning process (two semesters 21-21 weeks) is scheduled as follows: two weeks, particularly in VII and XIV week provided midterm examinations i.e., duration of learning and midterm examinations is 17 weeks. During XVIII- and XXI week provided examinations (Main and supplementary examinations).

In first semester of this year master learn 5 credit 1 subject, 7 credit 1 subject and 9 credit 2 subjects. In second semester Master learn 5 credit 2 subjects, 7 credit 1 subject, 8 credit 1 subject and Graduate Research Project/prospectus which estimated 5 credits.

The second-year learning process in third semester Master learn 5 credit 1 subject, 7 credit 1 subject, 8 credit 1 subject and Research/experimental component which estimated 10 credits.

In fourth semester Master completes the master's thesis. Master's thesis completion and presentation includes 30 credits.

Programme Prerequisites

The studying rights on Master's program is entitled person who has at least a bachelor's or equivalent academic degree and has English knowledge in the level B2.2, that must be approved by appropriate Certificate from Institution with special Accreditation, or tests providing by University in Testing Center of University. Person will be enrolled according the results of the Graduate Record Examination (based on Graduate Record Examinations and tests in specialty submitted in the English language). Samples tests will be post up on the website of Department of Education of GTU at least one month before the start of the examinations -<http://gtu.ge/study/index.php>. Admission to the Master's program without passing the examination may be established by the Ministry of Education and Science.

Learning Outcome/Competencies

Knowledge and understanding

- Has an in-depth and systematic knowledge in the field of construction and design.
- Have skills to properly identify and assess risk factors in design, construction and maintenance of the water supply and water discharge systems.
- Has skills to provide rational use and protection of water resources;
- Has a skill to understand how to solve problems that may arise in construction and project design of water supply and water discharge systems.
- Has knowledge to understand a necessity to make technically augmented organizational - economic decisions required to solve the existing problems.
- Has skills and expertise to properly make preparatory construction works and manage construction - installation works of water supply and water discharge systems.
- Has skills and knowledge to independently analyze conditions of the operational water supply and water discharge systems, and if necessary, to develop and implement their reinforcement and reconstruction works.
- Has a fundamental and systematic knowledge of construction norms and rules and of complex issues related to technological processes during construction.

Applying knowledge

- Has ability to find original ways for settle of complex problem in the construction process.
- Capable of independently planning experiments and analysis data using the latest methods and approaches.
- Has ability to work according to demands independently construct water supply and sewerage systems.
- Has ability to rational use and protection of water resources;
- Has ability to design water supply and sewerage systems and provide technological processes in sustainable and reliable manner;
- Can provide construction of water supply and sewerage systems using the modern construction techniques and technologies.

Making judgments

- Able to search complex and incomplete information from research literature and Internet; to make conclusions based on the critical analysis.
- Able to correctly understand and assess risk factors as well as to make decisions based on the critical analysis in design, construction, and operation of water supply and water discharge systems.

Communication skills

- Able to communicate conclusions, argumentation and research methods with academia and professional community.
- Able to independently provide information related to the existing problems, ideas and solution ways in writing (detailed report) and verbally to academia and professional community, when necessary applying ICT tools.
- Has an ability to participate in discussions with sector specialists. Able to communicate, clearly and in details, his/her conclusions and applied research methods.

Learning skills

- Has ability to strategically plan his/her study and to make comprehensive evaluations.
- Able to study independently and to continue studies at further stage by application of the knowledge gained.
- Able to critically assess his/her knowledge and further develop professional skills.

Values

- Able to evaluate his/her and others' attitudes to values and contribute to introduction of new values.
- A graduate has an ability to act in accordance with the fundamental laws of ethics.
- Has an ability to respect ecological systems and to assume responsibilities in terms of environmental protection.
- Able to follow professional values (honesty, civic consciousness and activism, accuracy, punctuality, objectivity, etc.).
- Participates in introduction of new values aimed to ensure public safety, health, and welfare.

Forms and Methods of achieving of the learning outcomes

Lecture Seminar (working in the group) Practical classes Laboratory classes
 Research component Consultations Practice Independent Work Master

Thesis

Teaching methods. during studying process the following methods are used to study the specifics of the course, which is given in the syllabi of the course;

1. **Collaborative work;** using this method implies dividing students into separate groups and giving

each group its own task. The group members work at their issues individually and at the same time share their opinions with the rest of the group. According to the problem raised, it is possible to shift the functions among the group members in this process. This strategy ensures the students' maximum involvement in the learning process.

2. **Demonstration method** implies presenting information with the help of visual aids. It is quite effective in reaching the required result. It is frequently advisable to present the material simultaneously through audio and visual means. The material can be presented both by a teacher and a student. This method helps us to make different steps of perceiving the teaching material more obvious, specify what steps the students are supposed to take independently; at the same time this strategy visually shows the essence of an issue/problem. Demonstration can be very simple.

3. **Verbal or oral method** comprises a lecture, narration, conversation, etc. During the process the teacher conveys, explains the material verbally, and students perceive and learn it by comprehending and memorizing.

4. **Written method** implies the following forms of activity: copying, taking notes, composing theses, writing essays, etc.

5. **Laboratory method** implies the following forms of activity: conducting experiments, showing video materials, etc.

6. **Practical methods** unite all the teaching forms that stimulate developing practical skills in students. In this case a student independently performs different kinds of activity on the basis of the knowledge acquired e.g. field study, teaching practice, field work, etc.

7. **Explanatory method** is based on discussing a given issue. In the process of explaining the material the teacher brings concrete examples the detailed analysis of which is made in the framework of the given topic.

8. **Manufacturing practice** - the forms and methods of practice see in Appendix 1 and Appendix 2.

9. **Designing and presenting a project.** While designing a project a student applies the knowledge and skills he has acquired for solving a problem. Teaching by means of designing projects increases students' motivation and responsibility. Working on a project involves the stages of planning, research, practical activity and presenting the results according to the chosen issue. The project is considered to be completed if its results are presented clearly, convincingly, and correctly. It can be carried out individually, in pairs or in groups; also, within the framework of one or several subjects (integration of subjects); on completion the project is presented to a large audience.

Student's Knowledge Assessment

Assessment is based on a 100 point grading scale.

Positive assessment is:

- **(A)** - excellent - 91% and more of the maximum grade;
- **(B)** - very good - 81-90% of the maximum grade;
- **(C)** - good - 71-80% of the maximum grade;
- **(D)** - satisfactory - 61-70% of the maximum grade;
- **(E)** - enough - 51-60% of the maximum grade;

Negative assessment is:

- **(FX)** - not passed - 41-50% of the maximum grades. It means that a student needs more individual work, and is given one more possibility to pass the exam;
- **(F)** - failed - 40% and less of the maximum grade. It means that work performed by a student was not enough and the subject should be learnt from the beginning;

The corresponding forms and methods of assessment of students' knowledge are present in syllabuses and also description of appropriate forms of assessment methods, criteria and scales.

Assessment of research component can be uploaded to the university web-site:

<http://gtu.edu.ge/study/scavleba1270552466.php>

Sphere of Employment

The knowledge acquired by graduates of the program can successfully work in such water supply and wastewater systems companies, as „Georgian Water and Power Company” and “Georgian United Water Supply Company”,“ industrial and commercial enterprises, civil organizations, government agencies, consulting firms and agencies, international organizations, energy companies, in corresponding, Ministries and their affiliated agencies; Supervision and Architecture Service of municipality; construction agencies, municipal utility services, water supply agencies, regional, municipal and national sewerage organizations and other organizations.

Possibilities for further continues education

Doctoral educational programs

Required human and material resources

The program provides the appropriate human and material resources. For more information see the attached documentation.

The number of attached syllabi: 14

Educational Program Scheme

Nº	Learning and Scientific Components	I Year		II Year		Credits
		Semester I	Semester II	Semester III	Semester IV	
	Educational Component:					
1	Educational Courses	30	25	20		75
	Research Component:					
2	Graduate Research Project/prospectus		5			5
3	Research/experimental component			10		10
4	Master Thesis				30	30
ECTS Credits	Per semester	30	30	30	30	120
	Per course	60		60		120

Map of study results

Nº	Course code	Course	Knowledge and understanding	Applying Knowledge	Making judgments	Communication skills	Learning skills	Values
1	WSSPS01	Design, Construction and Exploitation of Pumping Stations for Water Supply and Distribution Systems	X	X		X	X	
2	WSDSY01	Design, Construction and Exploitation of Water Supply and Distribution Systems	X	X		X	X	
3	SESSE01	Design, Construction and Exploitation of Sewerage Systems of Settlements	X	X		X	X	
4	SWIDS01	Design, Construction and Exploitation of Storm-Water Inlet and Drainage Systems	X	X		X	X	
5	PCBTW01	Physical, Chemical and Biological Treatment of Wastewater	X	X		X		X
6	IWSWI01	Design, Construction and Exploitation of Industrial and Agrarian Water Supply, Wastewater and Irrigation Systems	X	X		X	X	
7	ENVEN01	Environmental Engineering	X	X		X		X
8	RUPWR01	Rational Use and Protection of Natural Water Resources	X	X		X		X
9		Graduate Research Project/Prospectus	X	X	X	X	X	X
10		Theoretical / experimental study / Colloquium	X	X	X	X	X	X
11		Master Thesis	X	X	X	X	X	X
Elective courses								
12	SOMCA02	Strategic Operation Management for Competitive Advantage	X	X		X		X
13	ENVCH01	Environmental Chemistry	X	X		X		
14	DMQAM02	Decision Making and Quantitative Analysis for Management	X	X		X		
15	MANEN02	Management in Engineering	X	X		X		
16	MDWSW01	Management of Design of Water Supply and Wastewater Systems	X	X	X		X	
17	WASHM01	Watershed Management	X	X	X		X	

Program in total

Nº	Course code	Course	Prerequisite	ECTS Credits			
				I Year		II Year	
				Semester			
				I	II	III	IV
1	WSSPS01	Design, Construction and Exploitation of Pumping Stations for Water Supply and Distribution Systems	N/A	7			

Nº	Course code	Course	Prerequisite	ECTS Credits			
				I Year		II Year	
				Semester			
				I	II	III	IV
2	WSDSY01	Water Supply and Distribution Systems (Basics of Design, Construction and exploitation)	N/A	9			
3	SESSE01	Sewerage Systems of Settlements (Basics of Design, Construction and exploitation)	N/A	9			
4	SOMCA02 ENVCH01	<u>Elective courses</u> 1. Strategic Operation Management for Competitive Advantage 2. Environmental Chemistry	N/A	5			
5	SWIDS01	Storm-Water Inlet and Drainage Systems (Basics of Design, Construction and exploitation)	SESSE01 Sewerage Systems of Settlements (Basics of Design, Construction and exploitation)		7		
6	PCBTW01	Physical, Chemical and Biological Treatment of Wastewater	N/A		8		
7	IDWSW01	Industrial and Agrarian Water Supply and Wastewater Systems (Basics of Design, Construction and exploitation)	1. WSDSY01 Water Supply and Distribution Systems (Basics of Design, Construction and exploitation) 2. SESSE01 Sewerage Systems of Settlements (Basics of Design, Construction and exploitation)		5		
8	DMQAM02 MANEN02	<u>Elective courses</u> 1. Decision Making and Quantitative Analysis for Management 2. Management in Engineering	N/A		5		
9	CENSE01	Civil, Environmental and Sustainable Engineering	PCBTW01 Physical, Chemical and Biological Treatment of Wastewater			8	
10	RUPWR01	Rational Use and Protection of Natural Water Resources	N/A			7	

Nº	Course code	Course	Prerequisite	ECTS Credits			
				I Year		II Year	
				Semester			
				I	II	III	IV
11	MDWSW01	Elective courses 1. Management of Design of Water Supply and Wastewater Systems 2. Watershed Management	N/A			5	
12		Graduate Research Project/prospectus			5		
13		Research/experimental component				10	
14		Master Thesis					30
Per semester				30	30	30	30
Per year				60		60	
Total				120			

Program Curriculum

Nº	Course code	Course	Hours	ECTS Credit\ Hour	Lecture	Seminar (working in the group)	Practical classes	Laboratory Work	Industrial Practice	Midterm/Final Examinations	Independent Work
2	WSDSY01	Design, Construction and Exploitation of Water Supply and Distribution Systems	9/243	30		60		15	2/1	135	
3	SESSE01	Design, Construction and Exploitation of Sewerage Systems of Settlements	9/243	45		60			2/1	135	
4	SWIDS01	Design, Construction and Exploitation of Storm-Water Inlet and Drainage Systems	7/189	30		45			2/1	111	
5	PCBTW01	Physical, Chemical and Biological Treatment of Wastewater	8/216	45		45			2/1	123	
6	IWSWI01	Design, Construction and Exploitation	5/135	15		30			2/1	87	

		of Industrial and Agrarian Water Supply, Wastewater and Irrigation Systems								
7	ENVEN01	Environmental Engineering	8/216	45	45				2/1	123
8	RUPWR01	Rational Use and Protection of Natural Water Resources	7/189	30	45				2/1	111
12	SOMCA02	Strategic Operation Management for Competitive Advantage	5/135			45			2/1	87
13	ENVCH01	Environmental Chemistry	5/135	15	30				2/1	87
14	DMQAM02	Decision Making and Quantitative Analysis for Management	5/135	15			30		2/1	87
15	MANEN02	Management in Engineering	5/135	15	30				2/1	87
16	MDWSW01	Management of Design of Water Supply and Wastewater Systems	5/135	15		30			2/1	87
17	WASHM01	Watershed Management	5/135	15	30				2/1	87

Educational Program Supervisor

A. Davitashvili

Head of Quality Assurance of the Faculty of Civil Engineering

M. Javakhishvili

The Acting Dean of Faculty of Civil Engineering

D. Gurgenidze

Accepted at
The Council of the Faculty of Civil Engineering
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Modify by
Academic Council of GTU On Decree №6. 18.03 2016

The Head of the Faculty Council

D. Gurgenidze

Agreed with
Quality Assurance Service of GTU

G. Dzidziguri