



Curriculum

Program	Environmental Engineering
Degree awarded	Doctor of Philosophy in Environmental Engineering and Safety
Faculty	Faculty of Technological Engineering
Program coordinator/coordinators	Gintaras Denafas, Professor, Kaunas University of Technology (Lithuania); Tsitsino Turkadze, Professor, ATSU
Length of the program (semester, ECTS)	180 credits (1 credit point equals 25 hours) 4500 hours in all
Language of the Program	Georgian
Program development and renewal date of issue	Developed in December, 2011, accredited – on 19.04.2012, updated – in September 2017
Program prerequisites	
<p>Program prerequisites are:</p> <ol style="list-style-type: none"> 1. Master’s degree in Engineering, Natural Sciences, Agricultural Sciences, Ecology/Environmental Science or the equivalent academic degree in other related area, field/specialty and sub-field/specialization; 2. Knowledge of Foreign language (English, German, French) at B2 level (it is necessary to pass exam at ATSU or submit appropriate certificate. 3. Examination in the specialty. <p>Particular conditions of the admission exam in specialty are established by the ATSU’s Academic Council by Resolution No1 of 5 September 2007 “On basic principles of conducting Doctoral studies at Akaki Tsereteli State University” (http://www.atsu.edu.ge)1.</p>	
Aim of the Program	
<p>Program is aimed at training of top category, highly qualified and competitive academic staff with qualification of Doctor in Environmental Engineering and Safety. The educational program is mainly oriented towards achieving the level of knowledge, skills and values adequate to the requirements specified within framework of qualifications of higher education of Georgia. Consequently, the program is designed to ensure achieving branch and general competences consistent with the third level of higher education.</p>	
Learning outcomes (the map of competences - see attached document 2)	
Knowledge and understanding	<p>After the completion of the program, a graduate is expected:</p> <ul style="list-style-type: none"> - to have in-depth and systemic knowledge about environmental engineering and technological activities based on the latest achievements in the field, on the basis of which Doctoral student is expected to enhance existing knowledge and use innovative methods, as well as to develop new, original ideas (at the level of standards required for publication in peer-reviewed journals;

	- to be aware of an updated framework of knowledge on the basis of reconsideration and partial reassessment of knowledge existing in the field of environmental protection engineering.
Applying knowledge	After the completion of the program, a graduate is expected: - to independently design, implement and supervise innovative research in the field of environmental engineering and safety; - to be able to develop innovative analytical-research methods and approaches for preventing and restricting environmental impacts in various branches of industry, which are oriented towards the creation of new knowledge and will be reflected in publications in the international peer-reviewed journals. knowledge and will be reflected in the publications in international peer-reviewed journals.
Making judgement	After the completion of the program, a graduate is expected: - to be able to take independently the right and effective decisions on the issues of environmental protection measures (technological, economic, administrative-legal, educational. international); - to be able to provide critical analysis, synthesis and assessment of new, complex and contradictory ideas and approaches that facilitates the development of new methodology.
Communication skills	After the completion of the program, a graduate is expected to demonstrate adequately and clearly interrelation of new and existing knowledge, as well as to engage in arguing with the international scientific community in foreign language in Georgian and foreign languages over the taken conclusions, found arguments, formulated methods and approaches in the field environmental protection and safety.
Learning skills	After the completion of the program, a graduate is expected to have willingness to develop new ideas or processes in teaching and professional activities, including in research process.
Values	After the completion of the program, a graduate is expected: to be able to explore ways to entrench values in the field of ecology and environmental protection, as well as to develop innovative methods for their entrenching.
Teaching methods	
<p>To attain the Program's aims, different methods are used in teaching-learning process, which complement and passing through each other: verbal or oral method (narrative approach, lecture, seminar, heuristic (question-answer) method, bookwork method (explanatory reading method, independent reading method); writing method (writing summary, exercises, conference topic); laboratory method and demonstrative method, electronic learning method, induction, deduction, method of analysis and synthesis, practical methods (practical training, work experience internship).</p> <p>Proceeding from the specificity of course, teacher uses appropriate methods:</p> <ul style="list-style-type: none"> - during the lectures, the following methods are used: explanatory method, demonstrative method, case analysis, problem-based learning, discussion; - in practical exercises, the following methods are used: explanatory method, discussion, action-oriented method, electronic method; - in laboratory exercises, the following methods are used: explanatory method, action-oriented method, 	

- teamwork, collaborative teaching;
- in individual studies, there are used heuristic and electronic methods.

Structure of the Program

Doctoral program's educational component makes up 60 credits, and research component – 120 credits.

see attached document 1

Assessment System

The assessment system of the academic performance of students in higher education programs is in compliance with the Order of the Minister of Education and Science of Georgia of 5 January 2007 No 3 “On approving the calculation rules of credits for higher education programs” (as at 1 September 2016).

The students grading scheme includes,

a) five types of positive assessment:

(A) Excellent – 91-100 points.

(B) Very good – 81-90 points.

(C) Good – 71-80 points.

(D) Satisfactory – 61-70 points.

(E) Acceptable – 51-60 points.

b) two types of negative assessment:

(FX) Student could not pass examination – 41-50 point that means that she/he is required to work more for passing the exam, and that s/he is entitled to retake exam only once after individual work;

(F) failed to pass –40 points and lower that means that the work done by student is not sufficient and she/he has to redo the course.

Within the training component of educational program, in case of FX assessment, a makeup exam is appointed no later than 5 days since the announcement of the examination results.

Maximum course assessment score is 100 points.

The assessment of the academic performance of student in each course consists of the interim and final assessments, of which the conclusive one is a Final Examination.

The maximum score for final examination is 40 points. Student has the right to take the final exam, if his/her minimum assessment score at mid-term examination is 18 points. The minimum assessment score of student at Final Examination is 15 points.

The number of points received in a makeup examination is a final assessment score and is not added to the final assessment received by student, and it will be reflected in final assessment of the training component.

With account for the assessment received in the educational component, in case of final assessment score 0-50 points, student is assessed at F-0 point. The assessment schemes for each particular course are given in syllabuses presented in annexes to this Program.

The assessment of the academic performance of Doctoral student in separate disciplines can be carried out in accordance with various activities, such as: mid-term examination, final examination, targeted written tests, individual assignment and so on. The assessment criteria are different in line with the specificity of individual disciplines that is set down in syllabuses.

The assessment of educational practice is carried out in accordance with an educational practice record list form adopted by Resolution No 76 (10/11) of 28 April 2011 of the Academic Council of Akaki Tsereteli State University.

Seminar classes are assessed in accordance in accordance with a special mid-term exam and seminal record list adopted by the University.

The following assessment systems are used for the assessment of Doctoral student's dissertation paper:

a) Excellent (summa cum laude) –with highest honor;

b) Very good (magna cum laude) – with great honor;

- c) Good (cum laude) – with outstanding honor;
- d) Mean (bene) – meets all requirements;
- e) Satisfactory (rite) – meets requirements, despite some shortcomings;
- f) Unsatisfactory (insufficiens) – does not meet requirements because of substantial shortcomings;
- g) Far from satisfactory (sub omni canone) – failed outright.

Earning of 120 credits intended for research component is confirmed as a result of successful completion of dissertation paper. Prerequisites for presentation of Doctoral thesis to the public discussions before the Dissertation Commission are as follows:

1. Submission of a spreadsheet confirming earning 60 credits envisaged for educational component to the Faculty's Dissertation Council. This spreadsheet is issued by Office of Doctoral Studies and it is signed by Rector and Head of Office.
2. Submission of a protocol of the completion of at least three colloquiums envisaged for educational component of the Doctoral program to the Faculty's Dissertation Council. The completion of colloquiums is confirmed by the certificate issued by Office of Doctoral Studies, which certifies the completion of at least three colloquiums and the assessments of colloquiums. This certificate is signed by rector of University and Head of Office of Doctoral Studies. Methodology for assessing these colloquiums is determined by the Order No 3 of 5 January 2017 of the Minister of Education and Science of Georgia (Article 4, paragraph 17). The assessment of the colloquium is considered positive, if he/she receives a), b), c), d) and e) assessments envisaged by this Article. In case of f) assessment, Doctoral student has the right to pass the revised version of the same colloquium in the next semester, but in case of g) assessment. Doctoral student has to redo the colloquium.
3. The number of publications determined by the Faculty's Dissertation Council, in the editions approved by the Faculty's Dissertation Council, which are confirmed by submitting the article; the author of dissertation can also submit a monograph. This monograph is a printed publication of the obtained results of research relating to the topic of dissertation paper, ISBN, ISSN, at least 100 copies, the certificate from the print shop and receipt of payment.
4. Participation in the conferences, the number of which is determined by the Faculty's Dissertation Council and making presentation relating to the topic of dissertation paper, which is confirmed by publishing relevant papers in the conference proceedings and its submitting.
5. Assessment of articles carried out by experts in an anonymous assessment, the number of which is determined by the Faculty's Dissertation Council.
6. Review of the completed dissertation paper at a special meeting of the Department.
7. Provision of official experts by the Faculty's Dissertation Council, who are to be presented to Rector for approval; the number of official experts and content of their work are determined in accordance with Regulation No 1 (Article 19) of 5 September, 2007 of the Academic Council of Akaki Tsereteli State University.
8. In case of positive assessment from official experts, 2 or 3 reviewers are provided by the Faculty's Dissertation Council, who are to be presented to Rector for approval; decision on whom to appoint as official reviewers is made in accordance with Regulation No 1 (Article 20) of 5 September 2007 of the Academic Council of Akaki Tsereteli State University, and Resolution No 40(14/15) of 22 December 2014 of the Academic Council of Akaki Tsereteli State University; if more than half the reviewers assess dissertation negatively, Doctoral student is not permitted to defend his/her dissertation; if one of two reviewers makes negative conclusion on dissertation paper, the Dissertation Council is to provide the third reviewer within a period of 10 days.
9. In case of positive assessment from official reviewers, Doctoral student is permitted to present publicly dissertation to the Dissertation Commission provided by the Faculty's Dissertation Council. The Dissertation Commission provided by the Faculty's Dissertation Council is presented to Rector for approval; the composition of the Dissertation Commission is determined in accordance with Regulation No 1 (Article 21) of 5 September 2007 of the Academic Council of Akaki Tsereteli State University, Resolution No

17 (09/10) of 6 November 2009 of the Academic Council of Akaki Tsereteli State University and Resolution No 61 (14/15) of 7 May 2015 of the Academic Council of Akaki Tsereteli State University.

10. Rules for the assessment of dissertation paper are specified in paragraph 17 of article 4 of Order No 3 of 5 January 2007 of the Minister of Education and Science of Georgia, and in Resolution No 17 (09/10) of 6 November 2009 of the Academic Council of Akaki Tsereteli State University.

11. In case of successful completion of dissertation paper, the Faculty's Dissertation Council is to present to Rector for approval the project awarding the Doctor's academic degree to Doctoral student.

In case of issuance of Rector's Order on awarding the Doctor's academic degree, 120 credits are considered completed.

see Study Schedule in attachment

Employment opportunities

- Higher education institutions; colleges, teaching university, university, research institutions;
- Vocational education system; vocational colleges, public colleges, general education institution (which implements vocational education programs);
- The the management services of the Ministry of Environment Protection, Ministry of Energy, Ministry of Economic Development, Ministry of Public Health, Ministry of Infrastructure and Regional Development, Ministry of Sericulture, central, regional and local governments engaged in environmental protection and safety, sustainable development and rational resource management;
- Private and State-owned large and small industrial enterprises, extractive and processing enterprises, different corporations and petroleum companies
- Waste management state and private structures, waste polygons, waste recycling enterprises;
- Non-governmental organizations engaged in the field of environmental protection and safety.

Supportive resources

Research component of the Doctoral program will be implemented in the laboratories of the Akaki Tsereteli State University's Department of Chemical and Environmental Technology and environmental organizations and institutions, and in scientific libraries of the University and Science Center.

The Department, where the experimental studies are planned to be carried out, as well as appropriate division of the Science Center, are provided with modern computer technologies and the Internet connection.

Number of Doctoral students to be admitted

Proceeding from human and material resources, Akaki Tsereteli State University can admit to the specialty in Chemical-Pharmaceutical and Biological Technology 4 Doctoral students in the field of Environmental Protection Engineering.

Akaki Tsereteli State University
Faculty of Technological Engineering
Doctoral Program
Environmental Engineering
Study Schedule 2017-2020

No	Course title	Number of credits	Distribution of credits					
			Semesters					
			I	II	III	IV	V	VI
1.	Modern teaching methods and technologies	5	5					
2.	Modern methods of experimental data processing and analysis	5	5					
3.	Global climate change	5	5					
4.	Persistent organic pollutants	5	5					
5.	Engineering ecology – Pollution Prevention Technologies	5		5				
6.	Sustainable development and environmental quality management	5		5				
7.	Safety and environment risk assessment	5		5				
8.	Assistance	5		5				
9.	Research seminar	10	10					
10.	Research seminar	10		10				
11.	Research component / research work (colloquiums, Doctoral dissertation) including: <ul style="list-style-type: none"> • I colloquium of Doctoral student • II colloquium of Doctoral student • III colloquium of Doctoral student • Completion of Doctoral dissertation, Preparation of publications, participation in the conferences, defense of dissertation. 	120			120			
	Total	180	30	30	120			