



საქართველოს ტექნიკური უნივერსიტეტი  
GEORGIAN TECHNICAL UNIVERSITY

Approved by  
Academic Council of GTU  
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## Master's Education Program

### Title of the program

Agronomy

### Faculty

Agriculture Sciences and Biosystems Engineering

### Program Supervisor

David Maghradze  
Elijah Sukjoo Chang

### Awarded qualification

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

### Credits

120 credits

### Language

English

### Program objective

The main objective of this program is to prepare students to become agricultural leaders, specialists, and scientists in order to meet the demands of worldwide industrial, social, and governmental needs. The program will provide a broad knowledge and understanding in various aspects, such as, professional communication skills handling in current issues in agronomy in the world, effective approaches in agricultural market production in various cultures, and application of current knowledge and techniques in agro-industry for contributing to local and national agriculture development. This program provides practical techniques and introduces current knowledge of biotechnology, organic farming, and conventional breeding methods so that students can handle agricultural issues in various and specific ways to improve plant varieties, species, cultivars and genetic resources according to human needs and market demands for increasing individual, industrial, and national profits. Therefore,

this program is designed to educate and train students to become agricultural professional leaders and specialists with knowledge and experience in the state of the art agricultural science so that they can act effectively and confidently involve themselves in solving agricultural barriers at their work place and their respective countries. Moreover, by focusing on the state of art research interests in the world, students will be able to work not only in conventional fields of agriculture but also in applied agronomic fields such as the sports field industries, natural resources industries, garden industries, biomedical industries and so on.

### **Program Description**

The program was developed according ECTS system, 1 credit is equal to 25 hours, which is meant as a contact, as well as independent work hours. The distribution of credits is represented in the curriculum. The duration of the program is 2 years (4 semesters) and covers 120 credits (ECTS).

One semester includes 20 weeks, from which the training process takes place 15 weeks.

GTU Rector will be published before the semester and the academic calendar is published on the website.

Core courses - 75credits, which are scheduled as follows: mandatory courses in specialization 65 credits; elective course 5 credit; Field practice-5 credits and research component – 45 credits. Practice will be held in vineyard and nursery, based on the agreement signed between GTU and proper organization.

**In the first semester** of given year master learns 5 subjects with 5 credits and 1 subject 5 credits (elective). In second semester master learns 5 subjects with 5 credits and Graduate Research Project/prospectus, which estimated as 5 credits.

**The second-year learning process** (one semester 20 weeks) is scheduled as follows: one week, provided midterm examinations i.e., duration of learning and midterm examinations is 16 weeks. During XVII- and XX week provided examinations (Main and supplementary examinations).

**In the third semester** Master learns 3 subjects with 5 credits and Research/experimental component, which estimated as 10 credits, 5 credits is foreseen for field practice.

**In the fourth semester** Master prepares and completes the master's thesis according to established plan. Master's thesis completion and presentation include 30 credits.

### **Research Component**

Student fulfills the research component according to the established plan. Research component is carried out in GTU and/or in the proper organization (based on the signed agreement with GTU and the organization)

#### **Master Research Project - prospectus**

Master Research Project - the prospectus is the outcome of review and analysis of research, master's thesis preliminary findings. The student should complete prospectus in the second semester

#### **Theoretical / experimental research - Colloquium**

Theoretical / experimental study's main goal is to graduate students for independent work skills, a clear picture of the main tasks of a professional, modern research methods training, while working independently formulate and solve the issues.

#### **Theoretical / experimental research - Colloquium**

Theoretical / experimental study's main goal is to develop student's independent working skills, to create a clear picture for solution of the fields main tasks, to teach the modern research methods. To give ability

to formulate issues raised during working process and solve the problems

### **Qualification thesis and defense**

Qualification thesis is part a major of research component. The completed qualification thesis is the result of student's independent research. Qualification thesis should contain an obtained from theoretical/experimental research.

### **Program Prerequisites**

The studying rights on a 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, that must be approved by appropriate Certificate from Institution with special Accreditation, or tests providing by the University. The person will be enrolled according the results of the Graduate Record Examination (based on the Graduate Record Examinations, and tests in specialty submitted in the English language). Sample tests will be posted up on the website of the Department of Education of GTU at least one month before the start of the examinations. 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:**

- The deep and systematic knowledge of crop science.
- Knowledge and understanding of how agricultural productivity can improve food security and assist societies with the ability to streamline more efficient food production methodologies.
- By combining research with in-depth instruction in agronomy, students will have proper knowledge and understanding of the function of the majority of important agronomical genes that can improve useful agronomical characters.
- The knowledge of cultural history and geography of crop growing in agronomic regions worldwide.
- Additionally, students will gain knowledge and understanding of plant anatomy; experience site analysis and improving cultivar; learn the methods of conventional selection and marker assisted selection, nutrient needs of plants, diseases and insect pests management, crop regulation, breeding, and crop management decision.
- Other key objectives include: Understanding of genomics and chemistry of plants; Knowledge of international crop producing regions, major crop by the region and culture; Knowledge and understanding of agronomy's problem and current issues; Understanding the main determination factors of food quality; Knowledge and understanding of technological processes and methods of plant improvement; Knowledge and understanding of sports field management and turfgrass management;
- Knowledge of systems of organic agriculture;
- Understanding of the important issues of soil composition and ecology;
- Knowledge of modern approaches for development and management fruit and ornamental gardening.
- Understanding of the key points of wine business development and management .

#### **Applying knowledge:**

- Ability of independently planning and implementing the necessary research and measures for maintaining crop field, by consideration of crop variety and cultivar, soil composition and environmental conditions.
- Ability to identify genes for specific resistant and characters and develop marker.
- Ability to select desired variety by marker assisted selection.
- Ability to improve crop, fruit, and turf cultivar in desirable agronomic character.
- Ability to diagnose nutrient and plant condition, and disease problems and searching for original ways of their solution.
- Ability to recognize common nutrient deficiencies and pest infestations and their complex resolution.
- Ability of usage of newest methods, materials and devices for production high quality products by genetic marker, proper to world market demands.
- Ability of independently carrying out quality control in the agronomic field and products. The assessment of risks through unforeseen circumstances and action in new non-predictive multi disciplinal reality.
- Ability to perform laboratory trials on final products over a broad range of addition rates.

**Making judgments:**

- Ability to select proper variety to develop superior cultivar in certain circumstance.
- Ability to analyze abstract data of agronomy's field, using various methods.
- Ability of understanding the scope of work in manufacturing and research processes.
- Ability of making predictive analyses and proper inferences about current situation during implementation of technological operations.
- Ability to evaluate historical reasons for successful crop production in different regions of the world.
- Ability to evaluate soil and climate data of a potential crop field site to determine: how to prepare it for planting; which crop and which cultivar will grow best there; and what kind of fertilizer or herbicides will work best for the site

**Communication skills:**

- Ability to communicate concerning agronomical issues with international scholars for the purpose of introducing and explaining the superiority of one's own products.
- Ability to present to the target audience and carry out interpersonal communication.
- Ability to use scientific vocabulary to describe basic process steps involved with developing varieties and cultivar.
- Ability to prepare a research paper focusing on a chosen aspect of the history of research.
- Ability to interpret, analyze and evaluate journal, text publications in agronomy

**Learning skills:** Assessment of the personal learning process in a coherent and versatile way. Understanding the learning characteristics of the process. Ability of finding, learning and usage of the literature, technical and technological methods for new objectives while acquiring with the accomplishment in agronomy field. Ability to work on publications and to foresee the literature sources during the researches, carried out plants and environment, plants cultivation and growing issues. Identification of further learning needs in agronomy field, based on strategic planning and management of future learning.

**Values:**

Maintenance and protection of significant definitive professional ethics for agronomist in accordance with the basic laws of action. Based on professional values, the statement of agronomy's field

development necessity in the political, economic and social aspects on local and international level. Reception of the agro-scientist with the professional, ethical responsibility and values. Apply academic and professional ethics and values during their internship and while critically evaluating their experience.

### Forms and Methods of achieving the learning outcomes

Lecture  Seminar (working in the group)  Practical classes  Laboratory class's  Field Work/Practice  Course Work/Project  Consultation Hours  Independent Work  Midterm/Final examinations  Master Thesis.

During the teaching process, according to specificity of course, are used following methods, which are described in courses.

Teaching and Learning Methods:

1. Discussion/debates. This is the most widely spread method of interactive teaching. A discussion process greatly increases the quality of students' involvement and their activity. A discussion may turn into an argument and this process is not merely confined to the questions posed by the teacher. It develops students' skills of reasoning and substantiating their own ideas.
2. Cooperative teaching is a teaching strategy in the process of which each member of a group not only has to learn the subject himself, but also to help his fellow-student to learn it better. Each member of the group works at the problem until all of them master the issue.
3. 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.
4. Problem-based learning (PBL) is a method which uses a concrete problem as the initial stage both for acquiring new knowledge and integration process.
5. Heuristic method is based on the step-by-step solving of a given problem. It is realized by means of independent fixing of the facts in the teaching process and determining the ties among them.
6. Case study – the teacher discusses concrete cases together with the students and they study the issue thoroughly. E.g., in the sphere of engineering safety it can be a discussion of a concrete accident or catastrophe, or in political science it can be a study of a concrete, e.g., Karabakh problem (Armenian-Azeri conflict).
7. Role-playing games and simulations – games played according to a previously prepared scenario enable students to estimate the problem from different standpoints. They help students to form alternative points of view. Such games as well as discussions help students to develop skills of independently expressing their own ideas and participating in discussions.
8. 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.

9. Inductive method determines such a form of conveying any kind of knowledge when in the process of learning the train of thought is oriented from facts towards generalization, i.e. while presenting the material the process goes from concrete to general.
10. Deductive method determines such a form of conveying any kind of knowledge which presents a logical process of discovering new knowledge on the basis of general knowledge, i.e. the process goes from general to concrete.
11. Analytical method helps us to divide the whole teaching material into constituent parts. In this way the detailed interpretation of separate issues within the given complex problem is simplified.
12. Synthetic method implies forming one issue from several separate ones. This method helps students to develop the ability of seeing the problem as a whole.
13. 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.
14. Written method implies the following forms of activity: copying, taking notes, composing theses, writing essays, etc.
15. Laboratory method implies the following forms of activity: conducting experiments, showing video materials, etc.
16. 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.
17. 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.
18. Activity-oriented teaching implies teachers' and students' active involvement in the teaching process, when practical interpretation of the theoretical material takes place.
19. 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.

The concrete teaching methods are described in the proper syllabuses.

### **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;

Descriptions of the methods, criteria, and scales of student knowledge assessment are described in syllabuses. Also, it is uploaded to the university web-site and can be find via the following link:

<http://gtu.ge/quality/new/Evaluating%20students.pdf>

### **Sphere of Employment**

- Governmental and non-governmental (NGO) organization research centers, working in agro technological fields.
- Scientific-research and certification laboratories working in agrarian field;
- Domestic or international fruit growing and processing, seed production companies and nursery gardens, bioorganic farms.
- International and local companies which are selling the food and agronomic products.

### **Possibilities for further continues education**

Doctoral Educational Programs

### **Reared human and material resources**

The program provides the appropriate human and material resources.

**The number of attached syllabi: 17**

**Program in total**

№	Course	Prerequisites	ECTS credits			
			I year		II year	
			Semester			
			I	II	III	IV
1	Plant Biotechnology	N/A	5			
2	Advanced Plant Pathology	N/A	5			
3	Organic Agriculture	N/A	5			
4	Integrated Pest Management	N/A	5			
5	Professional English in Agriculture I	N/A	5			
	<b>Elective</b>	N/A				
6 <sup>1</sup>	Entrepreneurship and World Wine Bussness	N/A	5			
6 <sup>2</sup>	Systemic Production and Marketing Technique of Wine in the World	N/A				
6 <sup>3</sup>	Management of Food Safety	N/A				
7	Advanced Plant Breeding	Plant Biotechnology		5		
8	Soil Ecology	Organic Agriculture		5		
9	Turfgrass Development and Management	Integrated Pest Management Advanced Plant Pathology		5		
10	Professional English in Agriculture II	Professional English in Agriculture I		5		
11	Modern gardening: Fruit and Grape Growing	Advanced Plant Pathology Integrated Plant Management			5	
12	Sustainable Agriculture	Organic Agriculture Advanced Plant Breeding			5	
13	Field Practice in Viticulture and Fruit Growing	Modern gardening: Fruit and Grape Growing			5	
14	Ornamental Gardening	Turfgrass Development and Management			5	
15	Soil Fertility and Plant Nutrition	Soil Ecology			5	
Semester			<b>30</b>	<b>25</b>	<b>20</b>	
				<b>75</b>		
<b>Research Component:</b>						
1	Graduate Research Project/prospectus	N/A		5		
2	Research/experimental component	Graduate Research Project/prospectus			10	
3	Master Thesis	Research/experimental				<b>30</b>



		component							
		Per semester:		30	30	30	30		
		Per course:		60		60			
		Total:		120					

### Map of study results

Nº	Course	Knowledge and understanding	Applying Knowledge	Making judgments	Communication skills	Learning skills	Values
1	Plant Biotechnology	X	X		X	X	
2	Advanced Plant Pathology	X	X	X	X	X	X
3	Organic Agriculture	X	X	X			X
4	Integrated Pest Management	X	X	X	X		
5	Professional English in Agronomy I	X	X		X		
	<b>Elective</b>						
6 <sup>1</sup>	Entrepreneurship and World Wine Bussness	X	X		X		X
6 <sup>2</sup>	Systemic Production and Marketing Technique of Wine in the World	X	X		X		X
6 <sup>3</sup>	Management of Food Safety	X	X	X	X	X	X
7	Advanced Plant Breeding	X	X	X	X	X	
8	Soil Ecology	X	X	X	X	X	
9	Turfgrass Management	X	X	X	X	X	
10	Professional English in Agronomy II	X	X		X		
11	Modern gardening: Fruit and Grape Growing	X	X	X	X	X	X
12	Sustainable Agriculture	X	X	X	X	X	
13	Field Practice in Viticulture and Fruit Growing		X		X	X	
14	Ornamental Gardening	X	X		X	X	
15	Soil Fertility and Plant Nutrition	X	X		X	X	

Research Component:							
1.	Graduate Research Project/prospectus	X	X	X	X	X	X
2.	Research/experimental component	X	X	X	X	X	X
3.	Master Thesis	X	X	X	X	X	X

### program curriculum

Nº	Code	Course	ECTS Credits/hours	Lecture	Seminar (working in the group)	Practical classes	Laboratory classes	Practice	Course Work/Project	Mid-semester exam	Final exam	Independent Work
1	BRS22310E1-LS	Plant Biotechnology	5/125	15	30					1	1	78
2	BRS15110E1-LB	Advanced Plant Pathology	5/125	30			15			1	1	78
3	AGC19310E1-LS	Organic Agriculture	5/125	15	30					1	1	78
4	AGC19410E1-LS	Integrated Pest Management	5/125	15	30					1	1	78
5	LEH13510E3-LP	Professional English in Agronomy I	5/125	15		30				1	1	78
6	Elective:									1	1	
6 <sup>1</sup>	BUA79310E1-LS	Entrepreneurship and World Wine Bussness	5/125	30	15					1	1	78
6 <sup>2</sup>	BUA54010E1-LS	Systemic Production and Marketing Technique of Wine in the World	5/125	30	15					1	1	78
6 <sup>3</sup>	HHS10410E1-LP	Management of Food Safety	5/125	15		30				1	1	78
7	BRS15210E1-LS	Advanced Plant Breeding	5/125	15	30					1	1	78
8	ENV13310E1-LB	Soil Ecology	5/125	30			15			1	1	78
9	EET31110E2-LS	Turfgrass Management	5/125	15	30					1	1	78
10	LEH13610E3-LP	Professional English in Agronomy II	5/125	15		30				1	1	78
11	AGC21310E1-LS	Modern gardening: Fruit and Grape Growing	5/125	15	30					1	1	78
12	BUA79410E1-LS	Sustainable Agriculture	5/125	15	30					1	1	78
13	AGC21410E1-R	Field Practice in Viticulture and Fruit Growing	5/125					45		1	1	78

14	AGC21510E1-LS	Ornamental Gardening	5/125	15	30					1	1	78
15	ENV13410E1-LS	Soil Fertility and Plant Nutrition	5/125	15	30					1	1	78

Educational Program Supervisor

David Maghradze

Elijah Sukjoo Chang

The Head of Quality Assurance Service of the Faculty

Vakhtang Ugrekheldze

The Dean of the Faculty

Giorgi Kvartskhava

**Agreed with**

Quality Assurance Service of GTU

Irma Inashvili

**Approved by**

Academic Council of GTU

On 21 June, 2016 by Decree № 2048

**Modified by**

Agriculture science and biosystems engineering

At the meeting of Faculty Board

27.02.2018

Chairman of the Faculty Board

Giorgi Kvartskhava