



PhD Educational Program

Program Title

აგრორული ტექნოლოგიები

Agricultural Technology

Faculty

აგრორული მეცნიერებების და ბიოსისტემების ინჟინერინგი

Faculty of Agricultural Science and Bio-system Engineering

Program Head/Heads

Professor Guram TKEMALADZE

Qualification to be Awarded

Doctor in Agricultural Sciences

is awarded if the educational component of the educational program (60 credits) and the research component are completed. The duration of the program is at least 3 years.

Language of Teaching

Georgian

Prerequisite for Admission to the Program

Master's degree in agricultural sciences, chemistry, and biology/life sciences/applied biological sciences or its equivalent academic degree diploma. Scientific publications, participation in scientific conferences, and other documents and materials related to educational/research activities (certificates, honorary certificate, patents, etc.) are taken into account. For more information, please refer to the website.

Results of the examination results for one of the foreign languages (English, German, French, Russian) to be held at the University testing center. Interview with the interim faculty commission. For more information see the website.

Program Description

The program is compiled using the ECTS system. 1 credit is equal to 25 hours, including contact and independent work hours. The distribution of credits is presented in the program curriculum.

The program lasts at least 3 years (6 semesters). The tasks of the educational component are sectoral and methodological preparation of doctoral students to implement the goals of the educational program of doctoral studies. The educational component helps the doctoral student in the successful preparation of the thesis, in further pedagogical and scientific activity. The educational component of the PhD program consists of 60 credits, as detailed in the program's subject loading.

Before the beginning of the semester, the Rector of the University issues an order on the progress of the academic process, which will be posted on the website.

The second and subsequent semesters provide for the completion of the research components, which include: research project/prospectus, colloquium-1, colloquium-2, colloquium-3, preliminary defense, thesis completion and defense.

The research component is assessed once, at the thesis defense stage, with a final grade. Detailed information can be found on the GTU website

Program Objective

The objective of the program is to prepare highly qualified personnel in the specialty of agronomy with knowledge based on the latest achievements, who will be able to expand the existing knowledge, as well as develop and use innovative methods; will know the latest technologies of care and cultivation of plants, including field crops, improvement of energy security and competitiveness of production, updating the range of agricultural crops; protection of the existing gene pool; development of modern methods of improvement and adaptation of production, nutrition, irrigation and other regimes for field crops; determination of biochemical mechanisms of metabolism of substances and energy in plants in order to increase their biological potential.

Learning Outcomes/Competences (general and sectoral)

a) **Knowledge and Understanding** - has knowledge based on the latest scientific advances in the field of agriculture, which allows expanding knowledge or using innovative methods in agricultural sciences (at the level of the standard required for reference publication); Knowledge of specific data, terminology, procedures, ways and means of working with specific data, rules and laws, classifications and categories, criteria and methods: is able to develop research and analytical methods and approaches to create new knowledge that is reflected in an international refereed publication;

realizes the updated scope of knowledge through rethinking and partial reassessment of existing knowledge; in the process of plant growth and development revealed patterns of biochemical reactions, as well as enzyme systems and mechanisms of action that determine the biological potential of plants and ensure productivity and high quality.

Understanding of modern agro-technologies for cultivation of field crops, principles of biodiversity and ecosystem management.

b) **Ability to apply knowledge in practice** - is able to independently plan, organize, implement and monitor the latest, innovative research in the field of agricultural technologies; use of knowledge in different situations (contexts); to perform tasks, works according to the pattern (following the learned rule); identify a pattern framework; choose environmentally safe measures to protect plants from pests and practically plan and use them; seek original ways to solve complex problems and freely use proven methods, including elements of research; evaluate the quality of plant products; monitor and control the ecological condition of the soil; develop and use biotechnological methods;

Is able to perform industrial, technological, and organizational practical work and recognize facts, rules, principles, theories, dates, processes, objects, styles, and events; memorize and reproduce auditory, written, and graphic information in similar or accurate form; identify current directions of activities to increase production and processing to improve quality; plan experimental work, use its traditional and modern methods, perform and evaluate.

c) **Ability to make conclusions** - ability to critically analyze, synthesize and evaluate new, complex and contradictory ideas and approaches, thus developing a new methodology - contributing to development; ability to independently make correct and effective decisions to solve problems; ability to define a scientific problem, formulate a task and research plan; ability to judge, critically analyze and objectively evaluate the results of biochemical, biotechnological, agrochemical studies of soil and agricultural plants. ability to make correct and effective conclusions as a result of analyzing problems that arise; the ability to logically prove scientific hypotheses resulting from experimental research.

d) **Communication skills** – on the basis of seminars, conferences, the ability to constantly renew ties with international scientific organizations dealing with agrarian issues; ability to communicate objective and critical-analytical thoughts about new ideas to the public, oral and written communication skills; ability to effectively use modern computer and communication technologies, as well as libraries and other sources of information. ability to participate in thematic polemics with the international scientific community.

e) **Ability to learn** - continuous willingness to introduce new innovative ideas and methods based on knowledge gained through study and research.

f) **Values** - students will develop new research values that ensure the safety, health, welfare and morality of society; humanity, tolerance and equality; freedom of conscience, choice, decision-making, speech and expression; objectivity, fairness and transparency of decision; academic freedom, responsibility and integrity.

Methods of Achieving Learning Outcomes (teaching-learning)

Lecture Seminar (group work) Practical Laboratory Scientific and thematic seminar
 Independent work Consultation Research component Structure of the thesis
 Thesis defense

In the learning process, depending on the specifics of a particular study course program, the following activities of the teaching-learning methods are used, which are outlined in the relevant study course programs (syllabi): (discussion, debate, presentation, group work, etc.)

1. **Discussion/debate** – 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 in reasoning and substantiating their own ideas.

2. **Collaborative work** - 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.

3. **Problem-based learning (PBL)** - a method that uses a specific problem as the initial stage of the process of acquiring and integrating new knowledge.
4. **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.
5. **Case study** - the teacher discusses case studies with students and thoroughly teaches the subject matter as a result of judgment and analysis.
6. **Brain storming** -this method involves facilitating the formation and expression of as many, preferably radically different, opinions and ideas on a particular issue/problem within the theme as possible. The mentioned method stipulates the development of a creative approach to the problem. The use of the method is effective when there are large groups of students and consists of several basic stages:
 - definition of the problem/issue from a creative point of view;
 - during a certain period of time, uncritical recording of thoughts expressed by listeners on a problem (mostly on the board);
 - definition of the evaluation criteria to determine whether the idea corresponds to the purpose of the research;
 - evaluation of the chosen ideas according to predetermined criteria;
 - through exclusion, to highlight those ideas that are most relevant to the issue;
 - identification of the idea with the highest score as the best way to solve the problem.
7. **Inductive method** - determines the form of transfer of any knowledge when, in the process of learning, the course of thought is directed from facts to generalization, i.e., when transferring the material, the process goes from the specific to the general.
8. **Deductive method** - determines the form of transferring any knowledge, which is a logical process of discovering new knowledge based on general knowledge, i.e., the process goes from the general to the specific.
9. **Method of analysis** - helps to break down the learning material as a whole into its component parts. This facilitates detailed coverage of individual issues within a complex problem.
10. **Synthesis method** - involves grouping separate issues into a whole. This method helps to develop the ability to see the problem as a whole.
11. **Verbal or oral method.** This method includes lecture, narration, conversation, etc. In the above process, the teacher conveys and explains the learning material through words, and students actively perceive and internalize it by listening, memorizing, and understanding.
12. **Writing work method** - implies the following forms of activity: copying, taking notes, making a synopsis of the material, composing theses, writing an abstract or essay, etc.
13. **Practical methods** - combines all forms of learning that provide students with practical skills. In this case, the student independently performs this or that action on the basis of acquired knowledge.
14. **Activity-based learning** - requires the active involvement of the teacher and the student in the learning process, where the practical interpretation of theoretical material is especially important.

15. **Project development and presentation** - during the work on the project, the student uses the acquired knowledge and skills to solve a real problem. Project-based learning increases students' motivation and responsibility. The work on a project includes the stages of planning, research, practical activity, and presentation of the results in accordance with the chosen issue. A project is considered to be realized if its results are presented in a clear and convincing manner and in a correct form. It can be done individually, in pairs, or in groups. It can also be done within one subject or within several subjects (subject integration). Once completed, the project will be presented to a wider audience.

16. **Laboratory method** - allows a student to visualize a process more clearly, which enhances the process of perception. In the laboratory, the student learns how to conduct an experiment.

17. **Demonstration method** - this method implies a visual presentation of information. It is quite effective in terms of achieving results. In many cases, it is better to present the material to students in both audio and visual form simultaneously. The material being studied can be demonstrated by both the teacher and the student. This method helps to make visible the different stages of understanding the learning material, to clarify what students will have to do independently; At the same time, this strategy visualizes the essence of the issue/problem. The demonstration can take a simple form.

Student's Knowledge Assessment System

Assessment is done on a 100-point system.

Assessment of the learning component:

Positive grades are:

- (A)-Excellent - 91-100 points;
- (B)-Very Good – 81-90 points;
- (C)-Good – 71-80 points;
- (D)-Satisfactory – 61-70 points;
- (E)-Sufficient – 51-60 points.

Negative grades are

- (FX) - Failed to pass – 41-50 points, which means that the student needs more work to pass and is allowed to take an additional exam once with independent work;
- (F) - Failed - 40 points or less, which means that the work done by the student is insufficient and he/she will have to study the subject again.

In case of FX, an additional examination is scheduled no later than 5 days after the announcement of the results. The grade received at the additional examination is not summarized with the grade received at the final assessment.

Assessment of the scientific research component(s):

- a) with the highest praise (summa cum laude) - excellent performance;
- b) with great praise (magna cum laude) - result exceeding the requirements in all parameters;
- c) with honor (cum laude) - a result that exceeds the requirements;
- d) satisfactory (bene) - an average level work that meets the basic requirements;
- e) sufficient (rite) - a result that, despite its shortcomings, still meets the requirements;
- f) insufficient - an unsatisfactory level work that cannot meet the requirements due to significant deficiencies in the work;
- g) completely unsatisfactory (sub omni canone) - a result that completely fails to meet the requirements

The research component is evaluated once, at the stage of dissertation defense, with a final grade.

Fields of employment

- Ministry of Environmental Protection and Agriculture of Georgia and all regional divisions and agencies under its jurisdiction;
- Large and small farms;
- Greenhouse farms;
- Relevant service facilities of the retail network;
- Agricultural laboratories;
- Agricultural production services;
- Governmental and non-governmental agricultural organizations;
- Research and consulting service centers;
- Educational institutions.

Human and material resources needed to implement the program

The program is provided with adequate human and material resources.

Number of attached syllabi: 14