School of Engineering

## Programme Title

Engineering

## Qualification Awarded

PhD in Engineering

## Programme Credits

180 ECTS

## Language of Instruction

Georgian

## Objectives of the programme

The objective of the programme is to prepare specialist in engineering sphere, particularly in tool-making, automation and control systems, construction, mechanical engineering and technology and agricultural engineering, who will be competitive on the labour market at both local and international level.

In the scope of the programme doctoral student acquires the knowledge based on the latest achievements of the field, creates new knowledge and after the doctoral academic degree is awarded, he or she is able to conduct academic and scientific work in higher education organizations and in scientific research institutes in Georgia and abroad.

## Career Options

Upon completion of the programme, graduates will be able to work:

- as a scientist or researcher in private and public organizations and structural units;
- as academic personnel in the universities;
- as consultant, leading analyst/researcher in private and in public organizations on local and international level.

## Admission Prerequisites

For the enrolment in the programme the person should have a master's or equivalent academic degree and comply with the Georgian legislation. Also satisfy requirements of the university defined by the provision of doctoral programme.

Enrolment is carried out in accordance with Georgian legislation and university regulations.

## Learning Outcomes

The graduates of the programme will have following general and specific competences:

### Knowledge and Understanding

Graduates will possess knowledge based on the latest achievements, which enables him or her to widen the knowledge and apply innovative methods (at the level required for the referential publication). Through critical analyses and assessment of the current knowledge, graduate can acknowledge the extend of updated knowledge.

### Applying Knowledge to Practice

Graduate will be able to plan, implement and monitor innovative research independently; develop new research and analytical methods and approaches, which are oriented on creation of new knowledge and reflected in international referential journals; can plan and lead research projects.

### Ability to Make Conclusion

Graduates will be able to conduct complex and critical analyses, synthesis and assessment of new, complicated and contradictory ideas, theories, data and approaches. This can support creation/development of new methodology and finding correct and effective ways for problem resolution independently.

### Communication Skills

Graduates will be able to argumentatively and clearly present new knowledge in connection with the current knowledge; participate in discussions in the foreign language with the international society of scientists; is able to communicate with the colleagues and students effectively and professionally.

### Ability to Learn

With the knowledge based on the latest achievements of the field, the graduates will be ready to develop new ideas and processes in order to support the study, research or any other scientific work. The graduate is able to determine the needs for continuous learning and research, select the methods and sources and take next steps.

### V
### Values

The graduates will acknowledge professional, collegial, intellectual property and scientific ethical norms and comply with them.

## Learning and Teaching Methods

The studying process is conducted through lectures, seminars, practical works and simulations.

During the study process methods of relevant component is used: team-working, case study, discussion, problem-based learning, brain-storming, collaborative studying, etc.

Within the framework of academic freedom, the lecturer is entitled to specify and use methods that are not included in the programme and/or not use some of the learning and teaching methods from the programme, based on the course content. The method is defined in the syllabus of the relevant component.

For measuring learning outcomes formative and summative methods are used, such as: homework, tests, oral and practical exams, presentations, essays, discussions of the performed work, reports and so on.

In order to achieve the learning outcomes, the programme lead or person involved in the studying process is entitled to use one or more methods or any other method for the concrete learning-research outcomes.

## Students Assessment System

Student's knowledge is assessed by score system out of 100 points. The assessment in multicomponent and meets the rules of calculating higher educational program credits approved by the Order N3 issued on 5 January 2007 by the Minister of Education and Science of Georgia.

During the assessment of student's knowledge, all the academic staff and any invited personnel are obliged to use the above-mentioned rule. Following scheme is used to assess the knowledge:

1. **Five types of positive assessment:**

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

2. **Two types of negative assessment:**

   (FX) Fail to pass – score between 41-50, which means that the student needs to work more and he or she is able to redeliver exam after the independent preparation;

   (F) Fail – score 40 and below, which means that work done by students is not sufficient and he or she must study the course again.

**Thesis Evaluation Scale:**

- Excellent *(summa cum laude)* - excellent work;
- Very good *(magna cum laude)* - the result is above all requirements;
- Good *(cum laude)* - the result exceeds the requirements;
- Average *(bene)* - the result meets all the requirements;
- Satisfactory *(rite)* - the result meets the requirements despite the shortcomings,
- Inadequate *(insufficienter)* - the result does not meet the requirements due to significant shortcomings;
- Completely unsatisfactory *(sub omni canone)* - the result does not meet the set-out requirements.

In case of receiving:

- excellent, very good, good, average and satisfactory assessment - the PhD student is awarded the PhD academic degree;
- unsatisfactory assessment - the PhD student has the right to re-submit thesis in one year;
- completely unsatisfactory assessment - the PhD student loses the right to present the same thesis paper.

## Study Plan

The study plan consists of two components:

- Learning component – 45 ECTS
- Research component – 135 ECTS

| **Learning component** | ECTS |
|---|---|
| Academic writing for doctoral students | 6 |
| Preparation of thesis research | 6 |
| Quantitative research methods | 8 |
| Scientific project management | 6 |
| Teaching in higher educational system | 4 |
| Doctoral Seminar I | 5 |
| Doctoral Seminar II | 5 |
| Doctoral Seminar III | 5 |

| **Research component** | ECTS |
|---|---|
| create modern and complete bibliography on research topic; search for published works; plan research; create individual study plan; | 135 |
| collect material and read relevant sources; create thesis project; | |

| | |
|---|---|
| conduct experiment, continue collecting material; data analyses; organize collected material, define research results, elaborate structure of the thesis; | |
| continue writing of the thesis and check the results; | |
| prepare and publish scientific/study work/article | |
| finish work on the thesis and public defence | |

Based on the curriculum every doctoral student with the supervisor and administrative staff of the doctoral school elaborates individual study and research plan in the way that chosen topic and the career goal of the student are reflected.

## Description of Programme Components

### Academic writing for doctoral students - 6 ECTS

After studying this subject graduate will be able to create and organize academic work, he or she will know the standards and structure of academic writing. Doctoral student will be able to search for the relevant information independently, summarize results of the research, argue confidently, quote, make citation and bibliography according to the Chicago standards, adhere to accuracy and copyright.

### Preparation of thesis research- 6 ECTS

The objective of the subject is to prepare doctoral student to carry out research. Student will learn how to plan and organize research, main principles, alternative models and procedural approaches of the research.

### Quantitative methods of the research - 8 ECTS

This subject aims to provide doctoral student with the methods of quantitative and qualitative research used in different scientific fields. The subject covers topics such as different kinds of research designs, identification and interpretation of the information sources, approaches of data collection and analyses, statistical analyses and graphical and visual representation of quantitative research results, research ethics.

### Scientific project management - 6 ECTS

This subject provides the doctoral students with the knowledge and skills, that are necessary for the preparation of any type scientific application and its implementation. The course is about providing modern science with the human and material resources, how to transfer scientific ideas into the project, elaborate financing strategies and other issues for the project management.

### Teaching in higher educational system - 4 ECTS

The subject provides doctoral students with the knowledge and skills needed for teaching in the higher education field. The course covers topics on how the educational system is

organized, particularly - Bologna Process and its importance, specifics of the educational system in Georgia, requirements for higher educational organizations and programs.

**Doctoral seminars (3) – 5 ECTS per, 15 ECTS in total**

Doctoral seminars are main components of the curriculum. According to the individual study plan, the doctoral student prepares and presents seminars three times during the course. The topic of the seminar might be related to the thesis or to the actual issues in the field. The seminar is prepared under supervision of the supervisor of student's doctoral thesis; supervisor with the student plans the seminar, selects the topic and the scientific material (e.g. articles, books, online sources etc.) for the seminar, provides consultations. The completed seminar topic is presented as a report and presentation.

**Research component**

This part consists of 135 ECTS and covers components, which the doctoral students should complete before the thesis defence. The components are completed as prerequisites for the thesis and is assessed by the supervisor and dissertation commission. According to the individual study plan, at the end of each semester, the doctoral student prepares and presents the report on the research component to the scientific committee. The evaluation criterion is pass/fail.

**Scientific work publication**

Before thesis defence, at least one scientific article related to the research topic should be published in the international journal with the impact-factor and/or in the journal which is recommended by the scientific committee. The doctoral student should be the author or co-author of the article.

**Thesis**

The doctoral thesis requires original research which can create additional knowledge in the selected field. It is formal academic work, which represents the fundamental study of the research topic conducted by the doctoral student. The student should build a hypothesis, determine how his or her research project distinguishes from the previous projects and what practical values does he or she assign to the research results.

## Human and Material Resources

The programme involves full and associated professors and PhD degree scientists, invited and academic personnel of the Agricultural University of Georgia.

Educational programmes are financially and materially supported. For implementation of the programmes university allocates relevant financial resources. Programmes are also supported with material recourses.

University's material-technical infrastructure, equipped with modern learning and research inventory, is used during the scientific-research and studying process in the engineering field.

## Map of study objectives and results

| **Learning and research components of the programme** | Knowledge and understanding | Applying knowledge to practice | Ability to make conclusion | Communication skills | Ability to learn | Values |
|---|---|---|---|---|---|---|
| Academic writing for doctoral students | X | X | X | X | X | X |
| Preparation of thesis research | X | X | X | X | X | X |
| Quantitative research methods | X | X | X | X | X | |
| Teaching in higher educational system | X | X | X | X | X | |
| Scientific project management | X | X | X | X | X | |
| Doctoral Seminars | X | X | X | X | X | |
| Thesis | X | X | X | X | X | X |