საქართველოს ტექნიკური უნივერსიტეტი
GEORGIAN TECHNICAL UNIVERSITY

Approved
by Academic Council of GTU
on 05/09/2012
by Decree № 740

# Bachelor's Degree Program

## Program Title

Engineering Physics

## Faculty

Informatics and Control Systems

## Program Supervisor

Full Professor Ketevan Kotetishvili

## Awarded Qualification

### Interim Qualification

will be awarded in case of passing a short cycle of educational program
(Intermediary Qualification in Engineering Physics)

### Bachelor of Engineering Physics

will be awarded in case of passing a short cycle of educational program and free components or/and by combination of additional speciality components (Minimum 240 credits)

## Language

English

## Program Objective

The purpose of the educational program in engineering physics is the training in specializations of this specialty, such as a physical computer science, medical physics and radiation safety of humans and environment, physical-technical expertise and technical diagnostics. The program aims to obtain knowledge of physical foundations of information technology, applications of physical methods in medicine, fundamentals of modern methods to prevent undesirable effects of irradiation, fundamental issues of technology in microelectronics and optoelectronics, fundamentals of modern diagnostic equipment and electronic devices, fundamentals of methods of physical and technical expertise.

## Program prerequisites

Applicant is admitted in compliance with the Georgian Legislation

## Learning Outcome/Competencies

**Knowledge and understanding** – Using research, technology, design, and expert diagnostic methods specific of engineering physics to solve various tasks, such as use of electronic technology and methods of modeling, introduction to fundamentals of microelectronics, use of physical methods in medicine, study of methods of measurement of radiation, classification of nanoscale materials.

- ✓ Wide theoretical knowledge of the sphere of Engineering Physics and perception the complex problems of relevant directions;
- ✓ Critical estimation of current achievements and novelties in the sphere of Engineering Physics ;
- ✓ Perception of mutual links between basic spheres of Engineering Physics;
- ✓ Knowledge of the terminology of Engineering Physics.
- ✓ Knowledge of achievements in computer technologies at application of integral schemes and electronic apparatuses.
- ✓ Estimation of the quality of electronic apparatuses and knowledge of control methods;
- ✓ Knowledge and understanding of methods and facilities of safety work of physical processes and electronic devices, normative-technical and organizational problems of life safety;
- ✓ Knowledge of basic principles of Engineering Physics, norms of manufacturing, service and exploitation of electronic devices according to international standard norms.

**Applying knowledge** – Using research, technology, design, and expert diagnostic methods specific of engineering physics to solve various tasks, such as use of electronic technology and methods of modeling, introduction to fundamentals of microelectronics, use of physical methods in medicine, study of methods of measurement of radiation, classification of nanoscale materials.

- ✓ Critical and argument perception of theoretic statements and principles of Engineering Physics;
- ✓ Revealing and processing new technical and technological information in the sphere of Engineering Physics.
- ✓ Skills of definition the relevant time scopes in order to reach the stated goals;
- ✓ Skills of investigation of technological processes and devices in the sphere of Engineering Physics and drawing the relevant conclusions;
- ✓ Application the methods of electronic technologies and modeling for solution the technical problems in the sphere of Engineering Physics;
- ✓ Application the automatic design system to the process of construction and elaboration of devices in the sphere of Engineering Physics;
- ✓ Application the investigation, technological, constructive, diagnostical and expert methods characterizing the sphere of Engineering Physics for solution the different problems and conducting the investigation or practical kind projects according to preliminary given instructions

**Making judgments** – Analysis of new data or situations to solve problems arising in different directions of engineering physics (physical informatics, medical physics and radiation safety of humans and environment, microelectronics and optoelectronics, physical and technical expertise, technical expertise) and the ability to make relevant conclusions.

- ✓ Skills of revealing and processing new technical and technological information for solution the problems, arising in the sphere of Engineering Physics.

- ✓ Drawing the relevant documented conclusions based on new and estranged data for solution the problems of Engineering Physics;
- ✓ Composition and definition of the conclusion in the sphere of Engineering Physics concerning the physical phenomena and technical conditions and working skills of electronic devices..

**Communication skills** – The ability to present in Georgian and foreign languages the special information to professionals working in the field of engineering physics and non-specialists as well. Clear argumentation of own views to the professionals in engineering physics and representatives of other specialties.

- ✓ Skills of application of information-communication technological resources in order to reach the working goals;
- ✓ Argument discussion about as theoretical, as experimental fundamentals in the sphere of Engineering Physics;
- ✓ Skills of presentations and compilling the written information.
- ✓ Skills of verbal and written statement of information for specialists and non-specialists in native and foreign languages;
- ✓ Public presentation, defend and clear documentation of own considerations as for the specialists in the sphere of Engineering Physics, as for ones of other branches.
- ✓ Skills of laconic and plainly writing about professional problems.

**Learning skills** – Identify areas of self-learning in order to enrich the professional knowledge and experience in engineering physics (physical computer science, medical physics and radiation safety of humans and environment, micro-and optoelectronics, physical and technical examination, technical diagnostics). Search, analysis and interpretation of information on current developments.

- ✓ Continuous and multilateral estimation of own studying process in order to enrich the knowledge and experience, self-estimation of necessity of refreshing of the knowledge and statement of necessity of continuity of studying at the second level (master degree);

- ✓ In order to enrich the knowledge and experience in the sphere of Engineering Physics the skills of revealing and perception the modern materials and reception of continuous education..

**Values** – Observance of professional values in the field of engineering physics (exactness, accuracy, objectivity, transparency, organization, etc.). Assessment, analysis and decision-making on existing technology, research, environmental, economic, and various technical problems.

- ✓ Defend of accepted ethical and worth norms;
- ✓ Defend of accepted moral norms;
- ✓ Skills of participation in the process of formation of worth, conscience norms and espiration of their establishment.
- ✓ Defend of professional worth (exactness, punctuality, objectivity, transparency, organization etc.) in the sphere of Engineering Physics.

## Forms and Methods of achieving the learning outcomes

☐ Lecture ☐ Seminar ( working in the group) ☐ Practice ☐ Laboratory Work

☐ Field Work ☐ Course Work/Project ☐ Independent Work

Forms and Methods of achieving the learning outcomes are included to the Educational Program and can be find via the following link: http://www.gtu.ge/quality/pdf/sc.pdf

## 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 of make up;
- **(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;

For assessment methods, criteria and scales please refer to the following link: http://www.gtu.ge/quality/axali/shefasebisforma.pdf.

## Spheres of Employment

Graduates of engineering physics specialty can work in higher education bodies, their research centers, Ministries of Health and Human Services, Interior and Security, Defense, Energy, Environment and Natural Resources, health clinics, private institutions and organizations working in the fields of expertise, electronics, information technology and telecommunications.

## Possibilities for further continues education

Master's educational programs

## Required human and material resources

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

## The number of attached syllabi: 59

## The short-cycle subject load of program

| № | Code of discipline | Discipline | Prerequisites of admission | ECTS Credits | | | |
|---|---|---|---|---|---|---|---|
| | | | | 1st year | | 2nd year | |
| | | | | სემესტრი Semester | | | |
| | | | | I | II | III | IV |
| 1 | **MAT01E8** | Mathematics 1 | Non | 5 | | | |
| 2 | **PHE01E8** | Physics 1 | Non | 4 | | | |
| 3 | **IIT01E8** | Introduction to Information Technologies | Non | 5 | | | |
| 4 | **FP004E8** | Programming Fundamentals | Non | 7 | | | |
| 5 | **GFLN1E7-P** | Georgian Language 1 | Non | 5 | | | |
| 6 | **FUCAOE8** | Fundamentals of Computer Architecture and Organization | Non | 4 | | | |
| 7 | **MAT02E8** | Mathematics 2 | Mathematics 1 | | 5 | | |
| 8 | **PHE02E8** | Physics 2 | Physics 1 | | 4 | | |
| 9 | **PAS02E8** | Personal application Systems | Non | | 4 | | |
| 10 | **DSP00E8** | Algorithmization Fundamentals and Programming Elements | Non | | 7 | | |
| 11 | **OPSFUE8** | Operating Systems Fundamentals | Non | | 5 | | |
| 12 | **GFLN2E7-P** | Georgian Language 2 | Georgian Language 1 | | 5 | | |
| 13 | **MAT01E8** | Mathematics 3 | Mathematics 2 | | | 5 | |
| 14 | **PHE03E8** | Physics 3.1 | Physics 2 | | | 5 | |
| 15 | **THE07E8** | Theoretical physics 1 | Physics 2 | | | 5 | |
| 16 | **FEE00E8** | Fundamentals of Radioelectronics | Physics 2 | | | 5 | |
| 17 | **PME06E8** | Physical Methods of Materials and Structures Research | Physics 2 | | | 5 | |
| 18 | **EEE09E8** | Elements of Electronics | Non | | | 5 | |
| 19 | **CTE16E8** | Creative Thinking Techniques | Non | | | | 5 |
| 20 | **PHE04E8** | Physics 4 | Physics 3 | | | | 5 |
| 21 | **SSE08E8** | Solid state physics | Physics 3 | | | | 5 |
| 22 | **MAE05E8** | Materials Testing | Physics 3 | | | | 5 |
| 23 | **MPE11E8** | Mathematical Modeling of Technological Processes and Devices | Physics 2 | | | | 5 |
| 24 | **TPE16E8** | Theoretical physics 2 | Theoretical physics 1 | | | | 5 |
| | | | **In semester** | **30** | **30** | **30** | **30** |
| | | | **In year** | **60** | | **60** | |
| | | | **total** | **120** | | | |

## Free components (modules/courses)

| **Module I (not more than 60 credits):** Medical physics and radiation safety of humans and environment<br>Leader of module Full Professor Nugzar Dolidze | | | | |
|---|---|---|---|---|
| Prerequisites of admission to module: **Physics 2** | | | | |
| № | Code of discipline | Discipline | Prerequisites of admission | ECTS Credits |
| 1.1 | **MME12E8** | Medical material science | Non | 5 |
| 1.2 | **EME12E8** | Essential medical physics | Physics 2 | 5 |
| 1.3 | **PIE12E8** | Physical Investigation Methods in Medicine | Physics 2 | 5 |
| 1.4 | **IRE12E8** | Ionizing radiation in medicine 1 | Physics 2 | 5 |
| 1.5 | **RPE12E8** | Radiation physics | Physics 2 | 5 |
| 1.6 | **MME17E8** | Mathematical methods of processing of results of experiments dates | Physics 2 | 5 |
| 1.7 | **SEE17E8** | Solid state electronics | Physics 2 | 5 |
| 1.8 | **IRE12E8** | radiation in medicine 2 | Physics 2 | 5 |
| 1.9 | **RPE12E8** | Reception of Image in Medicine by non-Ionized Radiation | Physics 2 | 5 |
| 1.10 | **RSE12E8** | Radiating safety of the person and environment | Physics 2 | 5 |
| 1.11 | **OEE12E8** | Optics and electronics in medicine | Physics 2 | 5 |
| 1.12 | **RIE12E8** | Radiation dosimeter | Physics 2 | 5 |
| | | | **Credits in total** | **60** |

## Free components (modules/courses)

| **Module II (not more than 60 credits):** Microelectronics and optoelectronics<br>Leader of module Associated Professor Gela Goderdzishvili | | | | |
|---|---|---|---|---|
| Prerequisites of admission to module: **Physics 2** | | | | |
| № | Code of discipline | Discipline | Prerequisites of admission | ECTS Credits |
| 2.1 | **PSE17E8** | Physics of Semiconductors and Insulators | Physics 2 | 5 |
| 2.2 | **PBE13E8** | Physical Basis of microelectronics | Physics 2 | 5 |
| 2.3 | **HSE13E8** | Household Electronic Equipment Service | Physics 2 | 5 |
| 2.4 | **MDE13E8** | Microelectronic devices design | Physics 2 | 5 |
| 2.5 | **SME13E8** | Semiconductor devices | Physics 2 | 5 |
| 2.6 | **MPE13E8** | Microprocessor techniques | Physics 2 | 5 |
| 2.7 | **PBE13E8** | Physical basis of optoelectronics | Physics 2 | 5 |
| 2.8 | **EEE13E8** | Household Electronic Equipment | Physics 2 | 5 |

| **Module II (not more than 60 credits):** Microelectronics and optoelectronics<br>Leader of module Associated Professor Gela Goderdzishvili | | | | |
|---|---|---|---|---|
| Prerequisites of admission to module: **Physics 2** | | | | |
| № | Code of discipline | Discipline | Prerequisites of admission | ECTS Credits |
| 2.9 | **TSE17E8** | Technology of the semiconductor devices and Integrated Circuits (IC) | Physics 2 | 5 |
| 2.10 | **HEE13E8** | Helioenergetics | Physics 2 | 5 |
| 2.11 | **TFE13E8** | Technology of fabrication of electronic products | Physics 2 | 5 |
| 2.12 | **INE17E8** | Introduction to Nanotechnology | Physics 2 | 5 |
| | | | **Credits in total** | **60** |

## Free components (modules/courses)

| **Module III (not more than 60 credits):** Physical-technical expertise<br>Leader of module Full Professor Tamaz Eterashvili | | | | |
|---|---|---|---|---|
| Prerequisites of admission to module: Physics 2 | | | | |
| № | Code of discipline | Discipline | Prerequisites of admission | ECTS Credits |
| 3.1 | PSE17E8 | Physics of Semiconductors and Insulators | Physics 2 | 5 |
| 3.2 | POE14E8 | Physics of metals | Physics 2 | 5 |
| 3.3 | FIE14E8 | Physical methods of fixation and investigation of the trace detection | Physics 2 | 5 |
| 3.4 | CTE10E8 | Crystallography | Physics 2 | 5 |
| 3.5 | PME14E8 | Physical-mathematical simulation of the identification of the investigated objects. | Physics 2 | 7 |
| 3.6 | EPE14E8 | Explosive Physics | Physics 2 | 5 |
| 3.7 | RSE17E8 | Radiating safety of the person and environment | Physics 2 | 5 |
| 3.8 | DME14E8 | Diffraction methods structure investigation | Physics 2 | 5 |
| 3.9 | EEE14E8 | Electronic devices and their test methods | Physics 2 | 8 |
| 3.10 | BEE14E8 | Expertise of Blasting processes | Physics 2 | 5 |
| 3.11 | ICE14E8 | Information communications | Physics 2 | 5 |
| | | | **Credits in total** | **60** |

## Map of study results

### Engineering Physics Courses I-II

| | Course code | Course | Knowledge and understanding | Applying Knowledge | Making judgments | Communication skills | Learning skills | Values |
|---|---|---|---|---|---|---|---|---|
| 1 | **MAT01E8** | Mathematics 1 | X | X | | | X | |
| 2 | **PHE01E8** | Physics 1 | X | | X | X | | |
| 3 | **IIT01E8** | Introduction to Information Technologies | | X | | X | X | |
| 4 | **FP004E8** | Programming Fundamentals | | X | X | | X | |
| 5 | **GFLN1E7-P** | Georgian Language 1 | | X | | X | X | |
| 6 | **FUCAOE8** | Fundamentals of Computer Architecture and Organization | X | X | | | X | |
| 7 | **MAT02E8** | Mathematics 2 | X | X | | | X | |
| 8 | **PHE02E8** | Physics 2 | | X | X | | X | |
| 9 | **PAS02E8** | Personal application Systems | | X | | X | X | |
| 10 | **DSP00E8** | Algorithmization Fundamentals and Programming Elements | | X | X | | X | |
| 11 | **OPSFUE8** | Operating Systems Fundamentals | X | X | X | | | |
| 12 | **GFLN2E7-P** | Georgian Language 2 | | X | | X | X | |
| 13 | **MAT01E8** | Mathematics 3 | X | X | | | X | |
| 14 | **PHE03E8** | Physics 3.1 | X | | X | | X | |
| 15 | **THE07E8** | Theoretical physics 1 | X | | X | | X | |
| 16 | **FEE00E8** | Fundamentals of Radioelectronics | | X | X | | | |
| 17 | **PME06E8** | Physical Methods of Materials and Structures Research | | X | X | X | | |
| 18 | **EEE09E8** | Elements of Electronics | X | | X | | X | |
| 19 | **CTE16E8** | Creative Thinking Techniques | | X | X | | | X |
| 20 | **PHE04E8** | Physics 4 | X | | X | | X | |
| 21 | **SSE08E8** | Solid state physics | X | | X | X | | |
| 22 | **MAE05E8** | Materials Testing | X | | X | | X | |
| 23 | **MPE11E8** | Mathematical Modeling of Technological Processes and Devices | | X | X | X | | |
| 24 | **TPE16E8** | Theoretical physics 2 | X | | X | | X | |

## Medical physics and radiation safety of humans and environment

| | Course code | Course | Knowledge and understanding | Applying Knowledge | Making judgments | Communication skills | Learning skills | Values |
|---|---|---|---|---|---|---|---|---|
| 1.1 | **MME12E8** | Medical material science | X | X | X | | | |
| 1.2 | **EME12E8** | Essential medical physics | | X | X | X | | |
| 1.3 | **PIE12E8** | Physical Investigation Methods in Medicine | | X | X | | X | |
| 1.4 | **IRE12E8** | Ionizing radiation in medicine 1 | X | X | | | X | |
| 1.5 | **RPE12E8** | Radiation physics | X | X | | | X | |
| 1.6 | **MME17E8** | Mathematical methods of processing of results of experiments dates | | X | X | X | | |
| 1.7 | **SEE17E8** | Solid state electronics | X | X | | | X | |
| 1.8 | **IRE12E8** | radiation in medicine 2 | X | X | X | | | |
| 1.9 | **RPE12E8** | Reception of Image in Medicine by non-Ionized Radiation | X | | X | | X | |
| 1.10 | **RSE12E8** | Radiating safety of the person and environment | | X | X | | | X |
| 1.11 | **OEE12E8** | Optics and electronics in medicine | | x | | x | x | |
| 1.12 | **RIE12E8** | Radiation dosimeter | | x | x | | x | |

## Microelectronics and optoelectronics

| | Course code | Course | Knowledge and understanding | Applying Knowledge | Making judgments | Communication skills | Learning skills | Values |
|---|---|---|---|---|---|---|---|---|
| 2.1 | **PSE17E8** | Physics of Semiconductors and Insulators | | X | X | | X | |
| 2.2 | **PBE13E8** | Physical Basis of microelectronics | X | X | | | | X |
| 2.3 | **HSE13E8** | Household Electronic Equipment Service | X | X | | X | | |
| 2.4 | **MDE13E8** | Microelectronic devices design | X | X | | | X | |
| 2.5 | **SME13E8** | Semiconductor devices | X | X | | X | | |
| 2.6 | **MPE13E8** | Microprocessor techniques | X | X | | | | |
| 2.7 | **PBE13E8** | Physical basis of optoelectronics | X | X | X | | | |
| 2.8 | **EEE13E8** | Household Electronic Equipment | X | X | | | X | |
| 2.9 | **TSE17E8** | Technology of the semiconductor devices and Integrated Circuits (IC) | X | X | | X | | |
| 2.10 | **HEE13E8** | Helioenergetics | X | X | | X | | |
| 2.11 | **TFE13E8** | Technology of fabrication of electronic products | X | X | | X | | |
| 2.12 | **INE17E8** | Introduction to Nanotechnology | X | X | X | | | |

Physical-technical expertise

| | Course code | Course | Knowledge and understanding | Applying Knowledge | Making judgments | Communication skills | Learning skills | Values |
|---|---|---|---|---|---|---|---|---|
| 3.1 | **PSE17E8** | Physics of Semiconductors and Insulators | | X | X | | X | |
| 3.2 | **POE14E8** | Physics of metals | | X | X | X | | |
| 3.3 | **FIE14E8** | Physical methods of fixation and investigation of the trace detection | | X | X | X | | |
| 3.4 | **CTE10E8** | Crystallography | X | | | X | X | |
| 3.5 | **PME14E8** | Physical-mathematical simulation of the identification of the investigated objects. | | X | X | | X | |
| 3.6 | **EPE14E8** | Explosive Physics | X | | X | | X | |
| 3.7 | **RSE17E8** | Radiating safety of the person and environment | | X | X | | | X |
| 3.8 | **DME14E8** | Diffraction methods structure investigation | X | | | X | X | |
| 3.9 | **EEE14E8** | Electronic devices and their test methods | X | | X | | X | X |
| 3.10 | **BEE14E8** | Expertise of Blasting processes | | X | X | | X | |
| 3.11 | **ICE14E8** | Information communications | X | X | | X | | |

## Program curriculum

### Engineering Physics Courses I-II

| № | Code of discipline | Discipline / Hours | ECTS Credits / Hours | Lectures | Workshop (group work) | Exercises | Laboratory works | Practices | Yearly essay / Project | Independent activity |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | **MAT01E8** | Mathematics 1 | 5/135 | 30 | | 30 | | | | 75 |
| 2 | **PHE01E8** | Physics 1 | 4/108 | 15 | | | 30 | | | 63 |
| 3 | **IIT01E8** | Introduction to Information Technologies | 5/135 | 15 | | | 30 | | | 102 |
| 4 | **FP004E8** | Fundamentals of Programming | 7/189 | 30 | | 30 | 30 | | | 99 |
| 5 | **GFLN1E7-P** | Georgian Language 1 | 5/135 | | | 60 | | | | 75 |
| 6 | **FUCAOE8** | Fundamentals of Computer Architecture and Organization | 4/108 | 30 | | 15 | | | | 63 |
| 7 | **MAT02E8** | Mathematics 2 | 5/135 | 30 | | 30 | | | | 75 |
| 8 | **PHE02E8** | Physics 2 | 4/108 | 15 | | | 30 | | | 63 |
| 9 | **PAS02E8** | Personal application Systems | 4/108 | 15 | | | 30 | | | 63 |
| 10 | **DSP00E8** | Algorithmization Fundamentals and Programming Elements | 7/189 | 30 | | 30 | 30 | | | 99 |
| 11 | **OPSFUE8** | Operating Systems Fundamentals | 5/135 | 15 | | | 30 | | | 102 |
| 12 | **GFLN2E7-P** | Georgian Language 2 | 5/135 | | | 60 | | | | 75 |
| 13 | **MAT01E8** | Mathematics 3 | 5/135 | 30 | | 30 | | | | 75 |
| 14 | **PHE03E8** | Physics 3.1 | 5/135 | 30 | | | 30 | | | 75 |
| 15 | **THE07E8** | Theoretical physics 1 | 5/135 | 30 | | 30 | | | | 75 |
| 16 | **FEE00E8** | Fundamentals of Radioelectronics | 5/135 | 30 | | | 30 | | | 75 |
| 17 | **PME06E8** | Physical Methods of Materials and Structures Research | 5/135 | 30 | | | 30 | | | 75 |
| 18 | **EEE09E8** | Elements of Electronics | 5/135 | 60 | | | | | | 75 |
| 19 | **CTE16E8** | Creative Thinking Techniques | 5/135 | 30 | 30 | | | | | 75 |
| 20 | **PHE04E8** | Physics 4 | 5/135 | 30 | | | 30 | | | 75 |
| 21 | **SSE08E8** | Solid state physics | 5/135 | 60 | | | | | | 75 |
| 22 | **MAE05E8** | Materials Testing | 5/135 | 30 | | | 30 | | | 75 |
| 23 | **MPE11E8** | Mathematical Modeling of Technological Processes and Devices | 5/135 | 30 | | 30 | | | | 75 |
| 24 | **TPE16E8** | Theoretical physics 2 | 5/135 | 30 | | 30 | | | | 75 |

## Medical physics and radiation safety of humans and environment

| № | Code of discipline | Hours / Discipline | ECTS Credits / Hours | Lectures | Workshop (group work) | Exercises | Laboratory works | Practices | Yearly essay / Project | Independent activity |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.1 | **MME12E8** | Medical material science | 5/135 | 60 | | | | | | 75 |
| 1.2 | **EME12E8** | Essential medical physics | 5/135 | 60 | | | | | | 75 |
| 1.3 | **PIE12E8** | Physical Investigation Methods in Medicine | 5/135 | 30 | 30 | | | | | 75 |
| 1.4 | **IRE12E8** | Ionizing radiation in medicine 1 | 5/135 | 30 | | 30 | | | | 75 |
| 1.5 | **RPE12E8** | Radiation physics | 5/135 | 60 | | | | | | 75 |
| 1.6 | **MME17E8** | Mathematical methods of processing of results of experiments dates | 5/135 | 30 | | 30 | | | | 75 |
| 1.7 | **SEE17E8** | Solid state electronics | 5/135 | 30 | | | 30 | | | 75 |
| 1.8 | **IRE12E8** | radiation in medicine 2 | 5/135 | 30 | | 30 | | | | 75 |
| 1.9 | **RPE12E8** | Reception of Image in Medicine by non-Ionized Radiation | 5/135 | 30 | | 30 | | | | 75 |
| 1.10 | **RSE12E8** | Radiating safety of the person and environment | 5/135 | 30 | | | 30 | | | 75 |
| 1.11 | **OEE12E8** | Optics and electronics in medicine | 5/135 | 30 | | 30 | | | | 75 |
| 1.12 | **RIE12E8** | Radiation dosimeter | 5/135 | 30 | | 30 | | | | 75 |

## Microelectronics and optoelectronics

| № | Code of discipline | Hours / Discipline | ECTS Credits / Hours | Lectures | Workshop (group work) | Exercises | Laboratory works | Practices | Yearly essay / Project | Independent activity |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.1 | **PSE17E8** | Physics of Semiconductors and Insulators | 5/135 | 30 | | | 30 | | | 75 |
| 2.2 | **PBE13E8** | Physical Basis of microelectronics | 5/135 | 30 | | | 30 | | | 75 |
| 2.3 | **HSE13E8** | Household Electronic Equipment Service | 5/135 | 30 | | | 30 | | | 75 |
| 2.4 | **MDE13E8** | Microelectronic devices design | 5/135 | 30 | | 30 | | | | 75 |
| 2.5 | **SME13E8** | Semiconductor devices | 5/135 | 30 | | | 30 | | | 75 |
| 2.6 | **MPE13E8** | Microprocessor techniques | 5/135 | 30 | | 30 | | | | 75 |
| 2.7 | **PBE13E8** | Physical basis of optoelectronics | 5/135 | 30 | | | 30 | | | 75 |
| 2.8 | **EEE13E8** | Household Electronic Equipment | 5/135 | 30 | | 30 | | | | 75 |
| 2.9 | **TSE17E8** | Technology of the semiconductor devices and Integrated Circuits (IC) | 5/135 | 30 | 30 | | | | | 75 |
| 2.10 | **HEE13E8** | Helioenergetics | 5/135 | 30 | | 15 | | | 15 | 75 |
| 2.11 | **TFE13E8** | Technology of fabrication of electronic products | 5/135 | 30 | 30 | | | | | 75 |
| 2.12 | **INE17E8** | Introduction to Nanotechnology | 5/135 | 45 | | 15 | | | | 75 |

**Physical-technical expertise**

| № | Code of discipline | Hours / Discipline | ECTS Credits / Hours | Lectures | Workshop (group work) | Exercises | Laboratory works | Practices | Yearly essay / Project | Independent activity |
|---|---|---|---|---|---|---|---|---|---|---|
| 3.1 | **PSE17E8** | Physics of Semiconductors and Insulators | 5/135 | 30 | | | 30 | | | 75 |
| 3.2 | **POE14E8** | Physics of metals | 5/135 | 30 | | 30 | | | | 75 |
| 3.3 | **FIE14E8** | Physical methods of fixation and investigation of the trace detection | 5/135 | 30 | | 15 | 15 | | | 75 |
| 3.4 | **CTE10E8** | Crystallography | 5/135 | 30 | | 30 | | | | 75 |
| 3.5 | **PME14E8** | Physical-mathematical simulation of the identification of the investigated objects. | 5/195 | 45 | | 45 | | | | 105 |
| 3.6 | **EPE14E8** | Explosive Physics | 5/135 | 30 | | | 30 | | | 75 |
| 3.7 | **RSE17E8** | Radiating safety of the person and environment | 5/135 | 30 | | | 30 | | | 75 |
| 3.8 | **DME14E8** | Diffraction methods structure investigation | 5/135 | 30 | | 30 | | | | 75 |
| 3.9 | **EEE14E8** | Electronic devices and their test methods | 8/225 | 60 | | 45 | | | | 120 |
| 3.10 | **BEE14E8** | Expertise of Blasting processes | 5/135 | 30 | | | 30 | | | 75 |
| 3.11 | **ICE14E8** | Information communications | 7/135 | 30 | | 30 | | | | 75 |

Educational Program Supervisor — Ketevan Kotetishvili

The Head of the Quality Assurance Service of the Faculty of — Zurab Baiashvili

The Dean of the Faculty — Zurab Tsveraidze

**Accepted at**
The Council of the Faculty of — Zurab Tsveraidze

**03/09/2012 №6**

The Head of the Faculty Council — Zurab Tsveraidze

**Agreed with**
Quality Assurance Service of GTU — Giorgi Dzidziguri