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**Curriculum**

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| --- | --- |
| **Program** | Bachelor program – **Quality Management and Techno-Economic Feasibility Assessment**  |
| **Degree awarded** | **Bachelor of Science in Instrument Engineering, Automation and Control Systems**  |
| **Faculty**  | **Faculty of Technical Engineering** |
| **Program coordinator/coordinators** | Gia Dadunashvili, Associate Professor  |
| **Length of the program (semester, ECTS)** | **Length of the program is 240 credits,** one credit – 25 astronomic hours approximately, 5982 hours in all * General university courses - 375 hours
* General faculty courses – 1998 hours
* Program compulsory courses - 3609 hours
 |
| **Language of the Program**  | **Georgian** |
| **Program development and renewal date of issue** | August 2011 |
| **Program prerequisites** |
| Certificate of general education or the equivalent document. For citizens of Georgia – certificate of confirmation of passing the unified national exams (three compulsory exams – Georgian language, Foreign language and General skills, and one elective from the following subjects: Mathematics, Physics, Chemistry, Biology, History, Geography), which grants them student status, or the equivalent document for foreign citizens, in the case of the appropriate inter-state agreement.  |
| **Aim of the Program** |
| The program is aimed at training of Bachelor in field of Instrument Engineering, Automation and Control Systems, who, based on metrological examination technological processes of enterprises, is expected to be able: to participate in the organization of products and service quality control; to select optimally measuring instruments; to carry out measurements and take part in processing of their results; to participate in the preparation of an expert report; to carry out monitoring; to participate in the organization of highly-effective teamwork.  |
| **Learning outcomes (General and branch competences)**  |
| **Knowledge and understanding** | Bachelor’s degree holder is expected:**to have knowledge about:*** the International System of Units and the State Unified System of Measurements;
* the State Standardization System;
* measurement methods and instruments;
* the relationship between the measurement accuracy and the quality indicators of products;
* the types of measurement errors and sources of their origin;
* the requirements imposed on the development of normative technical documentation;
* products quality indicators;
* certification of products and services;
* control of technological processes and the general principles of management processes;
* the principles of selecting the measuring instruments;
* operating schemes of multipurpose instruments;
* basic principles of measurement data processing;
* general principles of conducting the expert examination;
* schemes of using and verifying the measurement instruments;
* general rules of preparing products (including foods) for the analysis;
* main methods sampling, weighing and reagents preparing modes;
* basic principles of constructing and calculating the dimensions chains;
* basic schemes for conducting technical expert examination of enterprises;
* basic principles and requirements of establishing the quality control systems of enterprises.

**to be aware of:**  * theoretical foundations of metrology;
* the essence of the unified system of measurement units;
* the essence of the State standardization system;
* the essence of the need for periodical verification of measurement instruments;
* the need for optimal selection of measurement methods for obtaining high-quality products;
* real opportunities of improving the quality parameters of products, based on the results of measurement;
* the role and capacities of the service of legal metrology in management of manufacturing processes;
* basic principles of quality control.
 |
| **Applying knowledge** | Bachelor’s degree holder is expected:**to be able:*** to take part in selecting the measuring instruments, conducting measurements and processing their results, as well as in preparing an expert report;
* to take part in developing the normative and technical documentation and conducting metrological expert examination of documents;
* to correctly formulate the primary patent application on object of intellectual property and submission to patent office;
* to participate in determining, measuring and controlling the quality indicators of products, as well as in conducting expertise examination of products and its monitoring;
* to take part in developing the quality indicators control system on the production site;
* to participate in management of the production systems and staff, taking into account technical, economic and social factors.
 |
| **Making judgement** | Bachelor’s degree holder is expected:**to be able:*** to take part in justified selection of measurement method and instruments in the enterprise;
* to process and analyze the measurement results, and to participate in preparing conclusions;
* to collect data based on the main standardization and certification documents, and analyze their coherence in the enterprise;
* to take part in preparing conclusions of metrological examination of normative and technical documentation;
* to collect materials required for patenting object of intellectual property and to participate in preparing the preliminary expert reports;
* to participate in the analysis of the reports and monitoring results documentation and preparing conclusions;
* to participate in preparing conclusions on the issues of the organization of products quality control, based on metrological examination the manufacturing processes in the enterprise.
 |
| **Communication skills** | Bachelor’s degree holder is expected:**to be able:*** to use the modern computer-processor systems, paper-less documents and information technology, as well as to calculate modern standard engineering problems and to use properly technological resources;
* to use the databases and the Internet sites, as well as to transfer accurately and consistently the ideas and information, and to search and transfer elementary information in foreign language on the issues relating to the profession.

**to have skills of:*** team work;
* working independently;
* criticism and self-criticism;
* working in the international context.
 |
| **Learning skills** | Bachelor’s degree holder is expected:**to be able:*** to acquire new knowledge about the profession-related issues at the directions of manager or by searching for required information in the literature;
* to plan and organize teaching strategy;
* to adapt to the new sistuations, as well as to analyze and interpret;
* to determine the need and possibility to continue education at the next educational level, based on the acquired knowledge.
 |
| **Values** | Bachelor’s degree holder is expected: * to understand and recognize universal human values;
* to be able to seek ways to address the risk situations arising in the intellectual-technical systems, by using humane methods;
* to understand, use and promote the strengthening of those ethical and legal standards, which regulate relations between people and their attitude towards the open society and environemhnt.
 |
| **Teaching methods** |
| Discussion/debates, collaborative work, teamwork, problem-based learning, heuristic approach, case studies, brainstorming, role and case plays, demonstrative method, induction and deduction methods, method of analysis and synthesis, verbal or oral method, writing method, laboratory method, practical methods, explanatory method, action-oriented teaching.  |
| **Structure of the Program** |
| **see attached document 2** |
| **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 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.  |
| **Employment opportunities** |
| The object of professional activities of Bachelor’s degree holder is represented by the State-owned controlling regulatory bodies, private and State-owned enterprises and service field institutions, medical organizations, research laboratories, service measurement and repair objects, consumer rights protection institutions.  |
| **Supportive resources**  |
| **see attached document 3** |
|  |

**Attachment 1**

**Akaki Tsereteli State University**

**Faculty of Technical Engineering**

**Bachelor Program**

**Quality Management and Techno-Economic Feasibility Assessment**

**Study Schedule 2017-2021**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| № | Course title  | Hours per week | Number of credits | Number of hours | Lect./practic./group/lab | Semesters | Precondition |
| Total | Contact hours | Independent | I | II | III | IV | V | VI | VII | VIII |
| Class hours  | Mid-term and final exams |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | **University compulsory courses (15 credits)** |
| 1.1. | Foreign Language 1 (Russian) |  | 5 | 125 | 60 | 2 | 63 | 0.60.0.0 |  | 5 |  |  |  |  |  |  |  |
|  | Foreign Language 1 (English) |  | 5 |  |  |  |  |  |  | 5 |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Foreign Language 1 (French) |  | 5 |  |  |  |  |  |  | 5 |  |  |  |  |  |  |  |
|  | Foreign Language 1 (German) |  | 5 |  |  |  |  |  |  | 5 |  |  |  |  |  |  |  |
| 1.2 | Foreign Language 2 (Russian) |  | 5 | 125 | 60 | 2 | 63 | 0.60.0.0 |  |  | 5 |  |  |  |  |  | 1.1. |
|  | Foreign Language 2 (English) |  | 5 |  |  |  |  |  |  |  | 5 |  |  |  |  |  |  |
|  | Foreign Language 2 (French) |  | 5 |  |  |  |  |  |  |  | 5 |  |  |  |  |  |  |
|  | Foreign Language 2 (German) |  | 5 |  |  |  |  |  |  |  | 5 |  |  |  |  |  |  |
| 1.3 | Foreign Language 3 (Russian) |  | 5 | 125 | 60 | 2 | 63 | 0.60.0.0 |  |  |  | 5 |  |  |  |  | 1.2. |
|  | Foreign Language 3 (English) |  | 5 |  |  |  |  |  |  |  |  | 5 |  |  |  |  |  |
|  | Foreign Language 3 (French) |  | 5 |  |  |  |  |  |  |  |  | 5 |  |  |  |  |  |
|  | Foreign Language 3 (German) |  | 5 |  |  |  |  |  |  |  |  | 5 |  |  |  |  |  |
| **Total** |  | **15** | **375** | **180** | **6** | **189** | **-** | **15** |  |
| 2 | **Faculty compulsory courses (65 credits)** |
| 2 | Mathematics |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2.1. | Linear Algebra and Analytic Geometry |  | 5 | 125 | **45** | **2** | **78** | **15.30.0.** | **5** |   |   |  |  |  |  |  |  |
| 2.2. | Mathematical Analysis - 1 |  | 5 | 125 | **45** | **2** | **78** | **15.30.0** | **5** |   |   |  |  |  |  |  |  |
| 2.3. | Mathematical Analysis - 2 |  | 5 | 125 | **45** | **2** | **78** | **15.30.0** |  | **5** |   |  |  |  |  |  | 2.2. |
| 2.4. | Probability Theory and Statistics |  | 5 | 125 | **45** | **2** | **78** | **15.30.0** |  | **5** |   |  |  |  |  |  |  |
| 3 | Fundamentals of Mechanics |  | 5 | 125 | **45** | **2** | **78** | **15.30.0** | **5** |  |   |  |  |  |  |  |  |
| 4 |  Physics - 1 |  | 4 | 100 | **45** | **2** | **78** | **15.15.15** |  |  |   |  |  |  |  |  |  |
| 5 | Physics -2 |  | 4 | 100 | **45** | **2** | **78** | **15.15.15** |  | **5** | 4 |  |  |  |  |  | 4 |
| 6 | Chemistry |  | 5 | 125 | **45** | **2** | **78** | **15.15.15** | **5** |  |   |  |  |  |  |  |  |
| 7 | Engineering Graphics |  | 5 | 125 | **45** | **2** | **78** | **15.0.30.** | **5** |  |  |  |  |  |  |  |  |
| 8 | Computing |  |  |  |  |  |  |  |  | **5** |  |  |  |  |  |  |  |
| 8.1. | Computer Skills - 1 |  | 5 | **125** | **45** | **2** | **78** | **15.0.30.** | **5** | **5** |   |  |  |  |  |  |  |
| 8.2. | Computer Skills - 2 |  | 3 | **75** | **30** | **2** | **43** | **0.0.30.** |  |  |  |  |  |  |  |  | 8.1. |
| 8.3. | Engineering Computer Graphics |  | 5 | **125** | **45** | **2** | **78** | **0.0.45.** |  | **5** |   |  |  |  |  |  | 7; 8.1 |
| 8.4. | MathCAD |  | 3 | **75** | **45** | **2** | **28** | **15.0.30.** |  |  |  |  |  |  |  |  | 3; 8.1 |
| 9 | **Economic and managerial disciplines**  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 9.1. | Micro & Macro Economics |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  | 3 |  |  |  |  |  |  |
| 9.2. | Fundamentals of Business Legislation |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  | 3 |  |  |  |  |
| **Total** |  | **65** | **1625** | **630** | **30** | **1015** | **630** | **65** |  |
|  | **Faculty elective courses 18 credits (6 credits per semester)**  |
| 1\* | Marketing Foundations |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  | 6 | 6 | 6 |  |  |
| 2\* | Project Management  |   | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 3\* | Mathematical Methods and Models in Management  |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  | 8.4 |
| 4\* | Special-Purpose Materials and Alloys  |  | **3** | **75** | **30** | **2** | **43** | **15.15.0.** |  |  |  |  |  |  |
| 5\*\* | Entrepreneurship and Problem Solving  |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 6\*\* | History of Georgia  |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 7\*\* | Philosophy |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 8\*\* | Emergency Situations and Civil Defence |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 9\*\* | Political Science |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 10\*\* | Logistics Foundations |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 11\*\* | Ethics |  | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  |  |  |
| 12\*\* | Foreign Language (Branch-wise English) |   | **6** | **150** | **45** | **2** | **103** | **0.45.0** |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Total** |  | **18** | **450** | **180** | **12** | **258** | **60** | 18 |
| 4 | **Specialty compulsory courses** |
| 10.1 | Applied Mechanics -1 |  | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  | **5** |  |  |  |  |  |  **3** |
| 10.2 | Applied Mechanics -2 |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  | **5** |  |  |  |  | **10.1** |
| 11 | Electrical Technology |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  |  | **5** |  |  |  | **5** |
| 12 | Foundations of Electronics  |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  |  |  | **5** |  |  |  **5** |
| 13 | Fluid and Air Mechanics |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  |  |  | **5** |  |  | **4** |
| 14 | Material Science  |   | **5** | **125** | **45** | **2** | **78** | **15.0.30** |  |  |  | **5** |  |  |  |  | **5; 6** |
| 15.1 | Replaceability and technical measurements -1 |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  | **5** |  |  |  |  |  |  |
| 15.2 | Replaceability and technical measurements -2 |   | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  | **4** |  |  |  |  | **15.1** |
|  16.1 | Instrument engineering technology -1  |   | **3** | **75** | **30** | **2** | **43** | **15.15.0** |  |  |  |  | **3** |  |  |  | **15.2** |
| 16.2 | Instrument engineering technology -2 |   | **6** | **150** | **60** | **2** | **88** | **30.15.15** |  |  |  |  |  | **6** |  |  | **16.1** |
| 17.1 | Analytical measurements -1 |   | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  | **4** |  |  |  |  |  | **5, 6** |
| 17.2 | Analytical measurements -2 |   | **4** | **100** | **45** | **2** | **53** | **15.15.15** |  |  |  | **4** |  |  |  |  | **17.1** |
| 17.3 | Analytical measurements -3 |   | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  | **4** |  |  |  | **17.2** |
| 18 | Construction materials engineering |   | **4** | **100** | **45** | **2** | **53** | **30.0.15** |  |  | **4** |  |  |  |  |  |  **5; 6** |
| 19 | Theoretical metrology  |   | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  |  | **5** |  |  |  | **5** |
| 20 | Standardization fundamentals  |   | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  | **4** |  |  |  |  |
| 21 | Methods of materials processing  |   | **4** | **100** | **45** | **2** | **53** | **30.15.0** |  |  |  | **4** |  |  |  |  | **18** |
|  | **Practice**  |   |  |  |  |  |  |  |  |  |  |  |   |  |   |   |  |
| 22 | Practical Training |   | **3** |  | **100** |  |  |  |  |  |  | **3** |  |  |  |  | **18** |
| 23 | Work Experience Internship  |   | **3** |  | **50** |  |  |  |  |  |  |  |  | **3** |  |  | **19** |
| 24 | Ecology and life safety  |  | **5** | **125** | **45** | **2** | **78** | **15.0.30** |  |  |  |  |  | **5** |  |  | **5. 6** |
| 25 | Qualimetry  |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  | 4 |  | **19** |
| 26 | Quality management  |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  |  | **4** | **25** |
| 27 | Expert examination of materials and industrial products  |  | **5** | **125** | **45** | **2** | **78** | **30.15.0** |  |  |  |  |  |  |  | **5** | **16.2 25** |
| 28.1 | Expert examination of products -1 |  | **6** | **150** | **60** | **2** | **88** | **30.30.0** |  |  |  |  |  |  | 6 |  | **17.3** |
| 28.2 | Expert examination of products -2 |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  |  | 4 | **28.1** |
| 29 | Certification  |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  |  | **4** | **20** |
| 30 | Intellectual proper rights and patenting  |  | **5** | **125** | **45** | **2** | **78** | **30.15.0** |  |  |  |  |  |  |  | **5** |  |
| 31 | Metrological examination of normative-technical documentation  |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  |  | **4** | **15.2 20** |
| 32 | Applied metrology |  | **4** | **100** | **45** | **2** | **53** | **30.15.0** |  |  |  |  |  |  | 4 |  | **15.2 19** |
| 33 | Practice with managerial program  |  | **5** | **125** | **100** | **2** | **23** | **0.100.0.** |  |  |  |  |  |  | **5** |  | **23** |
| 34 | Accounting  |  | **4** | **100** | **45** | **2** | **53** | **15.30.0** |  |  |  |  |  |  |  | 4 | **9.2** |
| 35 | Production industrial machinery  |  | **5** | **125** | **45** | **2** | **78** | **15.15.15** |  |  |  |  |  |  | **5** |  | **16.2** |
| **Total** |  | **142** | **3450** | **1420** | **60** | **1970** | **1570** | **142** |  |