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**Curriculum**

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| **Program** | | **Chemistry** | |
| **Degree awarded** | | **Bachelor of Science (BSc) in Chemistry** | |
| **Faculty** | | **Faculty of Exact and Natural Sciences** | |
| **Program coordinator/coordinators** | | **Nino Kakhidze** - PhD, Associated Professor | |
| **Length of the program (semester, ECTS)** | | **4 year / 8 semesters / 240 credits**  Basic (Major) Programme – 180 cr.  Minor Program/Free credits – 60 cr. | |
| **Language of the Program** | | | **Georgian** |
| **Program development and renewal date of issue** | | | The Accreditation Decision #32, 23.09.2011  Faculty of Exact and Natural Sciences Board protocol №7; 25.04.2011  Academic Board protocol №1 (11/12) 31.08.2011;  Faculty Board Protocol #8, 24.05.2012  Academic Board protocol #17, 25.05.2012  Faculty Board Protocol #3, 16.05.2014  Faculty Board Protocol #12, 15.06.2016  Academic Board protocol #2, (15/16) 22.09.2016  Faculty Board Protocol #1, 11.09.2017  Academic Board protocol #1 (17/18) 15.09.2017 |
| **Program prerequisites** | | | |
| **-** Certificate of General Education issued by the State;  **-**  Certificate of confirmation of passing the unified national exams; | | | |
| **Aim of the Program** | | | |
| The program aims to   * Provide students with theoretical knowledge of professional level and develop their practical skills in basic disciplines of Chemistry: general and inorganic chemistry; organic, physical, analytical, high-molecular and elementorganic chemistry of compounds; applied and chemical ecology, coloid chemistry, natural compounds chemistry, and other important disciplines of chemistry also provide knowledge of the basics in natural and other (Calculus, Computer, Physics, Chemoistry and Geography) sciences; * exercise the skills for independent research and analysis of scientific technical content; * provide students with knowledge of modern methodology in physics and chemistry, and develop skills for applying those methods. | | | |
| **Learning outcomes (the map of competences): see appendix 2** | | | |
| **Knowledge and understanding** | A student   * Understands and demonstrates important facts, concepts, principles and theories related to chemistry. * Evaluates, interprets and synthesizes information and data in chemistry; * Is able to present scientific material and argumentations to the competent audience; * Observes safety measures while working on chemical material. | | |
| **Applying knowledge** | A student   * Applies knowledge in different adjacent spheres to resolve qualitative and quantitative problems. * Ia able to conduct standard laboratory procedures which implies the use of special device for synthetic and analytic procedures with respect to organic and inorganic systems; * Monitors and records chemical behavior, events and changes. | | |
| **Making judgement** | After the completion of the program, the graduate   * Is able to interpret information received over laboratory observations and measuring; * Is able to identify, raise and settle the problem; * has skills for abstract thinking, analysis and synthesis. | | |
| **Communication skills** | A student   * is capable of discussion and inference to accurately pass conclusions to the addressee; * is able to apply information and communication technologies to research, elaborate and present information. | | |
| **Learning skills** | A student   * is able to develop knowledge with the help of modern information sources; * works independently | | |
| **Values** | A student   * has ability of critical thinking and self-criticism; * is able to stand for professional values in different situations; * Is able to apply wide range of knowledge and practice independently; * Takes responsibility for the task; * Evaluates professional activities of his/her own and others * is responsible for the safety of the environment; * knows ethical norms. | | |
| **Teaching methods** | | | |
| This program applies various methods which in frequent cases are combined and interrelated; here is the list of methods: Verbal/oral, practical; laboratory and demonstrative method; written work, induction, deduction, analysis, synthesis, group work, discussion, and independent work. The methods applied for each course have been described in the relevant syllabi. | | | |
| **Structure of the Program** | | | |
| **4 years / 8 semesters / 15 weeks per semester**  The program covers 180 credits of major and 60 credits of minor courses equaling a total of 240 credits. Major course combines: compulsory university courses: Foreign Language 1, 2, 3 (15 credits); faculty compulsory course (25 credits), compulsory courses of specialization (115 credits) and compulsory elective specialization courses (20 credits); free course (5 credits).  **See Appendix 1.** | | | |
| **Assessment System** | | | |
| Final assessment of a student is obtained from the add-up of mid-term and final exams throughout the semester. The educational course has a grading scale of 100 points. The student has the right to take the final exam, if his/her minimum competency equals 18 points.Minimum margin of assessment received by the student on the final exam is 15 points. Below than this, is assessed with FX (fail).  Evaluation System includes:  A. Five Forms 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) sufficient – 51-60 points  B. Two Forms of Negative Assessment:  (FX) (Administrative Fail in Course for Grade/could not pass) – A student gets 41-50 points from maximum evaluation which means that s/he is required to work more for passing the exam, and that s/he is entitled to take a make-up exam only once through personal study  (F) (Academic Fail) – A student gets 0 – 40 points from maximum evaluation; it means that the work done by him/her is not sufficient and she/he has to retake the course.  According to educational component of educational program, in case of adoption of FX, a makeup exam will be appointed no less than 5 calendar days after the conclusion of the final exam results.  The number of points received in the make-up final exam, is not added to the final assessment received by the student.  According to the assessment 0-50 points received from the make-up final exam, in the final evaluation of the educational component, the student will receive a grade of F-0.  (Midterm and final exams take place in exam center of ATSU)  Specific assessment criteria are outlined in the syllabus of the relevant academic course. | | | |
| **Employment opportunities** | | | |
| Educational research institutions with relevant profile; chemistry profile enterprises and companies; chemical and pharmaceutical companies; pesticide production and consumption spheres; food and light industry enterprises and laboratories; chemical laboratories of customs and environmental protection services; military system – chemical laboratories and organizational structures; thermal energy and metalurgical industries; petrochemical companies and etc. | | | |
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**Curriculum 2017-2021**

**Programme: Chemistry**

**Qualification: Bachelor of Science in Chemistry**

**BSc in Chemistry**

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| № | Course | Contact hrs. per week | Credit Number | The number of hours | | | | Lectures/practical/group work/laboratory | Semester | | | | | | | | | Precondition |
| Total | Contact | | Independent | I | | II | III | IV | V | VI | VII | VIII |
| Auditory | Midterm and final exam |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| 1 | **University Compulsory (15 ECTS)** | | | | | | | | | | | | | | | | | |
| I.1 | Foreign Language-1 | 4 | 5 | 125 | 60 | 3 | 62 | 0/4/0/0 | 5 | |  |  |  |  |  |  |  |  |
| I.2 | Foreign Language -2 | 4 | 5 | 125 | 60 | 3 | 62 | 0/4/0/0 |  | | 5 |  |  |  |  |  |  | 1.1 |
| I.3 | Foreign Language -3 | 4 | 5 | 125 | 60 | 3 | 62 | 0/4/0/0 |  | |  | 5 |  |  |  |  |  | 1.2 |
| **Total:** | |  | **15** | **375** | **180** | **9** | **186** |  |  | | | | | | | | |  |
| 2 | **Faculty Compulsory Courses (10 ECTS )** | | | | | | | | | | | | | | | | | |
| 2.1 | Calculus | 4 | 5 | 125 | 60 | 3 | 62 | 2/2/0/0 | 5 | |  |  |  |  |  |  |  |  |
| 2.2 | Computer Skills | 4 | 5 | 125 | 60 | 3 | 62 | 2/0/2/0 | 5 | |  |  |  |  |  |  |  |  |
| **Total:** | |  | **10** | **250** | **90** | **6** | **154** |  |  | |  |  |  |  |  |  |  |  |
| 3 | **Faculty Elective Courses (15 ECTS)** | | | | | | | | | | | | | | | | | |
| 3.1 | Introduction to Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 2/0/1/0 | 5 |  | |  |  |  |  |  |  |  |
| 3.2 | Introduction to Biology | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 | 5 |  | |  |  |  |  |  |  |  |
| 3.3 | Introduction to Geography | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 | 5 |  | |  |  |  |  |  |  |  |
| **Total:** | |  | **15** | **375** | **135** | **9** | **231** |  |  |  | |  |  |  |  |  |  |  |
| 4 | **Specialization Compulsory Courses (115 ECTS)** | | | | | | | | | | | | | | | | | |
| 4.1 | Physics | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | | 5 |  |  |  |  |  |  | - |
| 4.2 | Information Technology in Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 0/3/0/0 |  | | 5 |  |  |  |  |  |  | 2.2 |
| 4.3 | General Chemistry | 6 | 10 | 250 | 90 | 3 | 157 | 2/2/2/0 |  | | 10 |  |  |  |  |  |  | 3.1 |
| 4.4 | Inorganic Chemistry | 6 | 10 | 250 | 90 | 3 | 157 | 2/2/2/0 |  | |  | 10 |  |  |  |  |  | 4.3 |
| 4.5 | Substance Composition | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  | 5 |  |  |  |  |  | 4.3 |
| 4.6 | Physical Chemistry - 1 | 6 | 10 | 250 | 90 | 3 | 157 | 2/1/3/0 |  | |  |  | 10 |  |  |  |  | 4.5 |
| 4.7 | Analytical Chemistry | 6 | 10 | 250 | 90 | 3 | 157 | 2/2/2/0 |  | |  |  | 10 |  |  |  |  | 4.4 |
| 4.8 | Physical Chemistry - 2 | 5 | 8 | 200 | 75 | 3 | 122 | 2/1/2/0 |  | |  |  |  | 8 |  |  |  | 4.6 |
| 4.9 | Organic Chemistry – 1 | 5 | 7 | 175 | 75 | 3 | 97 | 2/1/2/0 |  | |  |  |  | 7 |  |  |  | 4.4 |
| 4.10 | Organic Chemistry - 2 | 6 | 10 | 250 | 90 | 3 | 157 | 2/1/3/0 |  | |  |  |  |  | 10 |  |  | 4.3 |
| 4.11 | Macromolecular Chemistry - 1 | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  | 5 |  |  | 4.9 |
| 4.12 | Macromolecular Chemistry - 2 | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  |  | 5 |  | 4.11 |
| 4.13 | Metalorganic Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/2/0/0 |  | |  |  |  |  |  | 5 |  | 4.10 |
| 4.14 | Colloid Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  |  | 5 |  | 4.10 |
| 4.15 | Physical and Chemical methodology of Study | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  | 5 | 4.3 |
| 4.16 | General Chemical Technology | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  |  |  | 5 | 4.4 |
| 4.17 | Chemistry of Natural Compounds | 3 | 5 | 125 | 45 | 3 | 77 | 1/2/0/0 |  | |  |  |  |  |  |  | 5 | 4.10 |
| **Total:** | |  | **115** | **2875** | **1050** | **51** | **1774** |  |  | | | | | | | | | |
|  | **Specialization Elective Modules (20 ECTS)** | | | | | | | | | | | | | | | | | |
| **5** | **Elective Module - 1** | | | | | | | | | | | | | | | | | |
| 5.1.1. | Quantum Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  | 5 |  |  |  | 4.6 |
| 5.1.2 | Chrystal Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  | 4.4 |
| 5.1.3 | Foreign Language -4 | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  |  |
|  | **Elective Module - 2** |  | | | | | | |  | | | | | | | | | |
| 5.2.1 | Environmental Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/2/0/0 |  | |  |  |  |  | 5 |  |  | 4.10 |
| 5.2.2 | Oil and Natural Gas Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  |  |  | 4.10 |
| 5.2.3 | Foreign Language -5 | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  |  |
|  | **Elective Module - 3** |  | | | | | | |  | | | | | | | | | |
| 5.3.1 | Applied Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/2/0 |  | |  |  |  |  |  | 5 |  | 4.10 |
| 5.3.2 | Labor Protection | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  | 4.4 |
| 5.3.3 | Foreign Language -6 | 3 | 5 | 125 | 45 | 3 | 77 | 2/1/0/0 |  | |  |  |  |  |  |  |  |
|  | **Elective Module - 4** |  | | | | | | |  | | | | | | | | |  |
| 5.4.1 | Bioorganic Chemistry | 3 | 5 | 125 | 45 | 3 | 77 | 1/1/1/0 |  | |  |  |  |  |  |  | 5 | 4.12 |
| 5.4.2 | Organic Synthesis | 3 | 5 | 125 | 45 | 3 | 77 | 1/0/2/0 |  | |  |  |  |  |  |  | 4.8 |
| **Total:** | |  | **20** | **500** | **180** | **12** | **308** |  |  | |  |  |  |  |  |  |  |  |
| **6** | **Free Elective Course (5 ECTS)** | | | | | | | | | | | | | | | | | |
| 6.1 | Free Elective Course | 3 | 5 | 125 | 45 | 3 | 77 | 2/0/0/1 |  | | 5 |  |  |  |  |  |  | - |
| **7** | **Field Practical Training (5 ECTS)** | | | | | | | | | | | | | | | | | |
|  | **Minor Modules** |  | **60** | **1500** |  |  |  |  |  | |  | **10** | **10** | **10** | **10** | **10** | **10** |  |
| **Total** | |  | **240** | **6000** |  |  |  |  | **30** | | **30** | **30** | **30** | **30** | **30** | **30** | **30** |

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| **Program Components** | | | | | | | | | | |
|  | | ECTS | I | II | III | IV | V | VI | VII | VIII |
| **University compulsory courses (Foreign language)** | | 15 | 5 | 5 | 5 |  |  |  |  |  |
| Faculty courses | **Compulsory** | 10 | 10 |  |  |  |  |  |  |  |
| **Elective** | 15 | 15 |  |  |  |  |  |  |  |
| Specialization courses | **Compulsory** | 115 |  | 20 | 15 | 20 | 15 | 15 | 15 | 15 |
| **Elective** | 20 |  |  |  |  | 5 | 5 | 5 | 5 |
| Free Credits | | 5 |  | 5 |  |  |  |  |  |  |
| Minor credits | | 60 |  |  | 10 | 10 | 10 | 10 | 10 | 10 |
| **Total** | | 240 | 30 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |