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 **Ministry of Education**

**Identified Competency Focus Areas and Core Courses for Ethiopian Higher Education Institutions’ Exit Examination**

Program: - Bachelor of Science in Chemistry

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1. **Introduction**

Chemical sciences play key role in improving the living standard of the society in the world. Particularly, the knowledge of chemistry is indispensable in understanding many areas of related disciplines such as biology, medicine, materials science, etc. Moreover, in line with progress of science and technology, the demand of well-trained chemists in different sectors such as manufacturing, regulatory and research centers is vital.

The following are some of the objectives of the undergraduate B.Sc. program in chemistry.

* Produce well trained and skilled chemists capable of taking up positions in the growing demand of the various sectors of the economy such as various industries, research institutions, learning institutions, as well as various environmental conservation endeavors of the country;
* Develop capabilities for the provision of consultancy and technical services as well as short term specialized training to both public and private sectors
* To produce chemists who create job opportunities by applying the acquired knowledge and skills.

To assure whether the objectives of the program are met or not, an exit exam is required in all government Universities. Exit exam is the last comprehensive exam students have to sit for before graduating in B.Sc. in chemistry. It is a test taken as part of the requirements for graduation from government Universities. It aims at determining the progress the student has made over the years. It also aims at checking, albeit indirectly, the program’s effectiveness in delivering what it promised to deliver from the beginning.

The thematic areas are analytical chemistry, Inorganic chemistry, Organic chemistry, Physical chemistry and Applied Chemistry. The courses that are given in parts are taken together as one.

The thematic areas and the courses included in the exit exam are to be applied only to Applied Chemistry program. Separate exit exam is required for Industrial chemistry that does not have harmonized curriculum and Chemistry education.

1. **Expected Profiles of Graduates**
* To provide students with abroad and balanced foundation of chemical knowledge and practical skills.
* To develop the ability to apply chemical knowledge and skills to the solution of theoretical r and practical problems in chemistry.
* To instilling students an appreciation of the importance of chemistry in an industrial, environmental and social context
1. **Competencies and Learning Outcome**

Graduates of Applied Chemistry are expected to develop the following knowledge, skills and attitudes

**3.1. Competencies**

* An ability to operate scientific instruments.
* An ability to fulfill a multiplicity of roles as research scientist, quality control and as lab/unit/ manager.
* Conduct assigned and professional activities with integrity and professional ethics
* Develop environmentally conscious attitude
* Have competences to fit them for entry-level graduate employment in the general workplace, including the chemical industry;
* Capacity for analysis and synthesis
* Ability to work autonomously
* Capacity for applying knowledge in practice

**3.2. Learning Outcome**

* An ability to identify, formulate, and solve broadly defined technical and scientific problems by applying knowledge of mathematics and science and/or technical topics to Industrial Chemistry.
* Ability to formulate or design a system, process, procedure or program in chemical industries to meet desired needs.
* Synthesize, characterize and study chemical compounds
* An ability to develop and conduct experiments analyze and interpret data and use scientific judgment to draw conclusions.
* An ability to understand ethical and professional responsibilities and the impacts of technical and scientific solutions in global, economic, environmental, and societal contexts.
* Ability to demonstrate an understanding of major concepts in all five major disciplines of chemistry: analytical, Applied, inorganic, organic and physical.
1. **Categorizing Courses into Themes**

The Applied Chemistry courses are categorized into five thematic areas. They are:

1. Analytical Chemistry
2. Inorganic Chemistry
3. Organic Chemistry
4. Physical Chemistry
5. Applied Chemistry
6. **Courses to be included in the Exit Exam**
	1. **Analytical Chemistry**

|  |  |
| --- | --- |
| **Course** | **Cr.hrs.** |
| * + 1. Analytical Chemistry
 | 3 |
| * + 1. Instrumental Analysis (I, II)
 | 3 + 3 |
| * + 1. Practical Instrumental Analysis (I, II)
 | 1 + 1 |
| * + 1. Real Sample Analysis
 | 2 |

* 1. **Inorganic Chemistry**

|  |  |
| --- | --- |
| **Course** | **Total Cr.hr** |
| * + 1. Inorganic Chemistry (I, II, III)
 | 3 + 3 + 4 |
| * + 1. Practical Inorganic Chemistry(I, II)
 | 1 + 2 |

* 1. **Organic Chemistry**

|  |  |
| --- | --- |
| **Course** | **Total Cr.hr** |
| * + 1. Organic Chemistry (I, II)
 | 3 + 3 |
| * + 1. Practical Organic Chemistry (I, II, III)
 | 1 + 1 + 2 |

* 1. **Physical Chemistry**

|  |  |
| --- | --- |
| **Course** | **Cr. Hrs.** |
| * + 1. Chemical Thermodynamics
 | 3 |
| * + 1. Kinetic and Electrochemistry
 | 3 |
| * + 1. Quantum Chemistry
 | 4 |

* 1. **Applied Chemistry**

|  |  |
| --- | --- |
| **Course** | **Cr.hrs.** |
| * + 1. Industrial Chemistry (I, II)
 | 3 + 3 |
| * + 1. Chemistry of Consumer Products
 | 3 |
| * + 1. Environmental Chemistry and Toxicology
 | 3 |

1. **Conclusion**

In this document, five course categories and fourteencourses are selected for the exit exam in applied chemistry are presented. Exam questions based on the selected courses are believed to test the knowledge, the skills and attitudes that are expected as learning outcome for B.Sc. in Applied chemistry.