

**Ministry of Education**

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

Program: - Bachelor of Science in **Applied Biology**

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# 1. Introduction

Recently there is an attempt of transferring teaching from traditional science to modern science with the advancement of science and technology to solve our country’s problems in different sectors like health, agriculture, and environment, and to produce future-oriented and internationally competent biologists. The program was also intended to support bio-entrepreneurship for start-up business. Based on this premise, the Department of Applied Biology has developed BSc curriculum for Applied Biology to train students with modern biological principles. The curriculum was designed to make the training relevant to the current country's aspirations and by training students the practical uses of biological knowledge and to inculcate in the students an entrepreneurial and problem-solving ability. It emphasizes technologies and applications relevant to biology-based industries and institutions such as biomedical, pharmaceutical, biotechnological, and the environment.

For the education to bring the desired change in the country, it has to produce qualified, competent, and socially responsible professionals in the different fields of science and technology through promoting research oriented science and technology. The field Applied Biology thus similarly needs to produce competent professionals through promoting research oriented science.

To ensure that all first-degree graduates of applied Biology met the graduate profile of the curriculum, it is crucial to offer them an exit exam based on the curriculum. An exit exam is an exam which a student is required to pass in order to complete a course of study. It is also considered as an exam that assesses students’ overall understanding of their educational experience.

Besides raising student achievement and improving the quality of education, an exit exam can be used as a quality monitoring tool in the form of certification of competence for employment. Thus, it can be used as source of information for policy decisions at national level. Hence, preparation of an exit exam for the first-degree graduatesof applied Biology for the year 2022/23 is crucial.

In preparing the exit exam, the major core points to be considered include graduate profile, identification of core competency areas and learning out comes. Graduate profile is the minimum expected outcome of students after completing their education. It is the desired knowledge, skill and attitude that students are expected to perform. Competency describes the desired knowledge, skills and behaviors of a student graduating from a program. It defines the applied skills and knowledge that enable people to successfully perform in professional, educational and other life contexts. Identifying competency areas involve selecting profiles that clearly measure students’ competency from the curriculum. It is a means of correlating which competency will be measured through different courses. It also involves course identification.

Thus for applied Biology first degree graduates (ASTU), a total of 15 courses (Table 1)categorized under 8 themes(Table 2) were identified as part of the exit exam.

# 2. Graduate profile

At the end of the completion of the program, the graduate will be able to:

* Useand handle basic biological lab equipment,chemicalsandreagents effectively.
* Transfer basic knowledge concerningcellularbiology.
* Transferknowledgeoftheanatomy,morphology,physiologyand adaptationof plants and animals fordifferent environmental conditions.
* Value theeconomic andecological importanceofplants and animals.
* Applybotanicaltechniquesongardening,cultivation,collectionandpreservationof plant specimens.
* Establish business enterprise on apicultureand sericultureproducts.
* Planandimplementsustainablemanagementstrategiesintheconservationand utilization of aquatic resources.
* Designandapplyaquaculturetechniquesinthecommercialproductionofaquatic organisms.
* Applymicrobialtechniquesinisolation, identification, cultivationand characterization ofmicroorganisms usedin Agriculture, Medicine,Industries, Environment and relatedsectors.
* Applymitigation measures on environmental changes and design preventiveand management measuresagainst infectious diseases.
* Assist in immunodiagnostic research activities.
* Developprojectproposals,conductBiologicalresearchesandwritescientificreport in Agricultural, Medicinal,Industrial andrelated sectors.
* Applyandusemolecularandbiotechnologicaltechniquesinvarioussectorsto solve societal problems.
* Applybiological field techniques and experimental design.
* Assistinexperimentalandpracticalapplicationsoftheprinciplesinplantand animal hybridization.
* Usetissueculture andbiotechnologytechniquesinexperimentalandpractical applications.
* Pursuepostgraduatetrainingsinnationalaswellasinternationalhigherlearning institutions.
* Provideprofessional service and leadership in biological disciplines, positively influencethe societyandserveasagent ofchangein matters related to biological sciences suchas conservation and management ofnatural resources, disease control, and food security.

# 3. Core Competencies and learning out comes

1. Ability to perform applied researches in various biological disciplines

2. Ability to apply various biological techniques, and methods, at cellular and molecular level

3. Ability to analyze and interpret biological data, write and communicate scientific findings

4. Ability to study postgraduate study at national and international levels

5. Ability to engage different industrial sectors, research center, and other related area of their job opportunity and thus able to positively influence the society and serve as agent of change in matters related to application of any biological sciences

6. Ability to demonstrate knowledge, leadership quality, business incubation, project managing capability, and entrepreneurship skill etc. to one’s own work and/or biological profession

7. Ability to produce biological and/or biotechnological competent with the aims of technology transfer for better production improvement as an individual, and member in diverse nation and in multi-disciplinary area

8. Ability to design projects based on social demand, training them and/or practical display how to engage for working habit for their income generations

# 4. Selection of courses to be included in the exit exam

A total of 15 major courses were included in the exit exam as listed below

Table 1: Courses to be included in the exit exam

|  |  |  |
| --- | --- | --- |
| **S.Num** | **Course name** | **Cr Hr.** |
| 1 | Cell Biology | 3 |
| 2 | Animal Biology | 3 |
| 3 | General Entomology | 3 |
| 4 | Human Anatomy and Physiology  | 3 |
| 5 | Fisheries and Aquatic Ecology  | 3 |
| 6 | Plant Biology | 3 |
| 7 | General Microbiology | 3 |
| 8 | Principles of Genetics  | 3 |
| 9 | Introduction to Biotechnology  | 3 |
| 10 | Ecology and Field Study  | 3 |
| 11 | Principles of Parasitology  | 3 |
| 12 | Research Methods and Scientific Writing  | 2 |
| 13 | Seminar I and II | 2 |
| 14 | Undergraduate research I and 2 | 2 |
| 15 | Introduction to Biotechnology | 3 |

The courses listed above were themed as below

Table 2: Courses themed for the exit exam

|  |  |  |
| --- | --- | --- |
| **Themes** | **Course name** | **% of the exit exam to be prepared**  |
| Cellular Biology  | Cell Biology | 7 |
| Zoology | Animal Biology | 5 |
| General Entomology | 6 |
| Human Anatomy and Physiology  | 5 |
| Fisheries and Aquatic Ecology  | 5 |
| Botany | Plant Biology | 10 |
| Microbiology | General Microbiology | 8 |
| Genetics and Molecular Biology | Principles of Genetics  | 8 |
| Introduction to Biotechnology  | 8 |
| Ecological and Environmental Biology | Ecology and Field Study  | 4 |
| Biomedical Science | Principles of Parasitology  | 7 |
| Research methods in biology, Entrepreneurship and seminars | Research Methods and Scientific Writing  | 7 |
| Seminars I and II | 6 |
| Undergraduate research I and 2 | 9 |
| Introduction to Biotechnology | 5 |

# 5. Conclusion

The curriculum of Applied Biology in ASTU is different from that of harmonized curriculum used in other universities. Thus it requires setting the exit exam as per its curriculum. Based on this curriculum, a total of 15 major courses were selected which were categorized under 8 themes namely, cell biology, zoology, botany, microbiology, genetics and molecular biology, ecology and environmental biology, Biomedical science, Research methods in biology, introduction to Biotechnology and seminars. However, there are many major elective courses that need to be included, although the selection is based on the individual student.