



# Identified Competency Focus Areas and Selected Courses for National Exit Examination

Program: Bachelor of Science Degree in Environmental Science

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## **1. Introduction**

Human beings are strongly dependent on their environment for their daily needs and survival. The environment has also been the base for human civilization and economic development. However, over-exploitation of environmental resources, rapid industrialization and urbanization, and the implementation of development projects without due attention to the environment have been highly deteriorating the environment. This has been impacting economic development, social coherence, human health, politics, and even the environment itself. The concern for the environment has become at the forefront of international concerns since late the 1960s. Since then, the issue of the environment has been placed within the framework of sustainable development. Ethiopia ratified several international conventions, protocols and multilateral and bilateral treaties to protect the environment and promote sustainable development. Besides, the issue of environmental protection and sustainable development are entrenched in the current constitution of the country under article 43, 44, and 92. Moreover, Ethiopia has an environmental policy, institutions and proclamations such as Environmental and Social Impact Assessment proclamation (No. 299/2002), Environmental polluters pay proclamation (No. 300/2002) and others.

Producing environmental scientists that can analyze a wide variety of environmental problems and provide potential solutions are quite pertinent. Ethiopia and the whole world has been working on environmental education, awareness and research especially after the first intergovernmental conference on environmental education in 1977, Tbilisi. In this respect, several higher education institutions in Ethiopia have been running the BSc program in Environment Science. Recently, the curriculum for the BSc in Environmental Science program has been nationally harmonized to deliver standard content with respect to Environmental Science. To ensure whether the graduation profile of Environmental Science curriculum has been achieved in producing skilled and competent manpower, the ministry of education and the concerned higher education institutions have planned to give an exit exam to graduate class students as of 2015 E.C. Identification of competency focus areas and the courses that will be considered in the exit exam are among the basic steps to set a standardized exit exam. Hence, this document contains the identified competency areas and the selected courses that will be considered for the exit examination.

## **1.1 Objectives of the Exit Examination**

The national environmental science exit examination shall have the following objectives:

- Producing skilled and competent manpower for the national and international market
- Assessing students' educational achievement in major areas of environmental science
- Ensuring whether the graduation profile of environmental science curriculum have achieved at least common standards of knowledge, skills, and attitude
- Improving public and industrial trust and confidence in environmental management activities of professionals
- Facilitating the efforts of students to revise the core learning outcomes of the courses covered by the exit examination
- Ensuring all graduates from HEIs satisfy the requirements of the labor market and employability through the national wide implementation of competency-based exit examination
- Creating competitive spirit among concerned institutions in Ethiopia with the strives to encouraging them to give due attention to the national standards

## **1.2 Significance of the Document**

It is important to set competency areas of the subject matter under a program in order to measure how much the graduates acquired the required skills, knowledge and attitudes. In this regard, the document in general can be used as a base or a guide to set standardized national exit examination in environmental science program. This is particularly seen in its parts that: (1) set competencies that helps to assess the basic skills, knowledge and attitude of graduating students; (2) systematically select the courses which will be included the national exit examination.

## **2. Expected Graduate Profiles**

Graduates of environmental sciences would find a market in governmental, non-governmental, and private organizations dealing with the issues related to environment. Some of the working organizations are: federal urban planning institute; ministry of mining; ministry of water, irrigation, and energy; environmental authority (Federal and Regional); national radiation authority, quality and standard authority; Ethiopian roads authority; Ethiopian wildlife conservation authority; Ministry of Agriculture; Ethiopian meteorological agency; ministry of innovation and technology; urban development unit of regional states.

They can also work as researchers, graduate assistants, laboratory technicians, or as development experts on environmentally friendly projects and institutions. They may also be privately engaged as service providers or entrepreneur, such as consultant in Environmental Impact Assessment (EIA), environmental beautification as income generating mechanism for GO's, NGO's and private organizations. Other graduates will find it rewarding to pursue further studies in environmental science, environment and development, and environmental engineering or other related fields.

### **3. Competencies and Learning Outcomes**

#### **3.1 Competencies**

##### **Knowledge**

- Understand the environment as a system and the interactions between the components and human interferences
- Recognize the various forms of environmental degradation, their causes, impacts and rehabilitation/restoration measures through integrated watershed management approach
- Understand the climate systems, climate change, and its adaptation and mitigation measures
- Identify existing national and international legal frameworks, policies, and institutions
- Identify sustainable environmental management tools, methods, and measures that safeguard the environment and human health.
- Describe the advantages and disadvantages of various renewables energy resources in relation to environmental sustainability

##### **Skill**

- Investigating and characterizing pollutants and determining their fate in different components of the environment to control and/or manage pollution
- Analyze environmental risks and design disaster risk management measures
- Identify and analyze various forms of pollution within the environment using different sampling techniques
- Investigate the impacts of environmental pollution on the biophysical environment and human health
- Characterize solid, liquid and hazardous wastes and investigate their impacts to design and implement appropriate waste management measures
- Assess biodiversity and ecosystem services for effective ecosystem management
- Conduct environmental and social impact assessments, auditing, and develop environmental management system (EMS)
- Develop sustainable solutions to various environmental problems by considering global-to-local contexts

- Lead environmental education and awareness creation programs at various levels through coordination and team approach
- Develop skills of applying and communicating circular economy in terms of using waste materials as a resource for plant nutrients and energy recovery, and recycling.
- Apply sustainable environmental management tools, methods, and measures to safeguard the environment and human health.

### **Attitude**

- Execute responsibilities according to the required level of professional ethics
- Engage in professional associations, and environmental clubs
- Develop the lifelong learning habit to enhance social inclusion, active citizenship, and personal development.
- Appreciate the best environmental management measures to cop up with environmental changes in different sectors for sustainable development.

### **3.2 Learning Outcomes**

The graduates of environmental science program will achieve the following learning outcomes:

- Comprehend the fundamentals of environment and environmental sciences (essential facts, concepts, principles and theories)
- Possession of intellectual flexibility necessary to view environmental issues from multiple perspectives
- Understand and apply the scientific process to assess and conduct research that play significant role in solving existing and emerging environmental problems
- Soil, air and water sampling, testing, analysis, and interpretation of to determine their quality and design management measures
- Use information technology (IT) tools to analyze, interpret and present environmental data and information to guide policy and decision makers
- Understanding of current issues and debates in environment at national and international levels
- Dissemination of environmental knowledge to development and community workers as well as the general public;

- Delivery expert advice to clients regarding the management of the environment and reduction of a company's overall carbon footprint.
- Improvement and protection the health of both humans and the environment.
- Assessment of humans impact on the ecosystems and their services
- Supervision of compliance of organization's with environmental regulations to reduce the overall footprints and waste output.
- Solve problems creatively, and reflexively by assembling their knowledge and skills
- Application of basic innovation and entrepreneurs principles that are tailored to environmental management
- Evolvement of individual vision of harmonious and sustainable interactions among humans and the biophysical environment.



#### **4. Selected Courses for the Exit Examination**

Based on the identified competency focus areas, all the courses of environmental science program with exclusion of freshman courses are categorized here under five/5/ themes or focus areas, which are:

1. Basics of Environmental Science
2. Environmental Resources Management
3. Climate and Energy
4. Environmental Pollution and Sustainable Waste Management
5. Environmental Management Tools and Techniques

The courses selected under each theme are described in the **Table1** and the lists of all courses considered in theme categorization are also indicated in the appendix.

**Table 1 Thematic areas and selected courses**

S/N	Themes	Selected courses	Course Code	Cr.hr	ECTS
1.	<b>Basics of Environmental Science</b>	Principles of Environmental Sciences	EnSc211	3	5
		Environmental Education and Communication	EnSc262	2	3
	<i>Total</i>	<i>2</i>		<i>5</i>	<i>8</i>
2.	<b>Environmental Resources Management</b>	Integrated Watershed Management	EnSc322	3	5
		Biodiversity Conservation and Management	EnSc451	3	5
	<i>Total</i>	<i>2</i>		<i>6</i>	<i>10</i>
3.	<b>Climate and Energy</b>	Climate Change Adaptation and Mitigation	EnSc371	2	3
		Energy and Environment	EnSc242	3	5
		Environmental Disaster and Risk Management	EnSc411	3	5
	<i>Total</i>	<i>3</i>		<i>8</i>	<i>13</i>
4.	<b>Environmental Pollution and Sustainable Waste Management</b>	Environmental Toxicology	EnSc362	3	5
		Environmental Sampling and Analysis	EnSc481	1	2
		Environmental Pollution Control and Management	EnSc472	2	3
		Solid and Hazardous Waste Management	EnSc361	2	3
		Water and Wastewater Treatment	EnSc352	3	5
	<i>Total</i>	<i>5</i>		<i>11</i>	<i>18</i>
5.	<b>Environmental Management Tools and Techniques</b>	Environmental and Social Impact Assessment	EnSc421	3	5
		Environmental Management Systems and Auditing	EnSc432	2	3
	<i>Total</i>	<i>2</i>		<i>5</i>	<i>8</i>
<i>Grand total</i>		<i>14</i>		<i>35</i>	<i>57</i>

## **5. Conclusion**

This document of identification of competency focus areas and selection of the courses for environmental science program is mainly the result of an endeavor to integrate the nationally harmonized curriculum with existing careers in the national market evaluated through the experiences acquired by the writers during previous need assessments, curriculum reviews, practical attachments, job fair recruitments, research findings on current environmental issues, and collected feedbacks from students on various issues related to the program. The document is also prepared based on the specific directions and general guideline delivered by the Ministry of Education (MoE).

Accordingly, the competencies identified under the three learning domains (knowledge, skill and attitude) have been related with the 14 courses selected from all 47 program courses included within the curriculum by categorizing them in to 5 themes.

With all its limitations and other considerations, the document can help to continue the next steps of preparation for exit examination to be given for graduates of environmental science in the year 2015 E.C.

## Appendices

### 1. Lists of Categorized Themes and Courses

S/N	List of Themes	List of Courses
1.	Basics of Environmental Science	Principles of Environmental Science General Ecology Environmental Education and Communication Environmental Geology Fundamental Soil Sciences Climatology and Meteorology Introduction to Forestry Environmental Physics Environmental Chemistry Environmental Hydrology
2.	Environmental Resources Management	Biodiversity Conservation and Management Environmental Degradation and Rehabilitation Integrated Watershed Management Limnology and Wetland Management Land Evaluation and Land Use Planning
3.	Climate and Energy	Energy and Environment Climate Change, Adaptation and Mitigation Environmental Disaster and Risk Management
4.	Environmental Pollution and Sustainable Waste management	Solid and Hazardous Waste Management Water and Wastewater Treatment Industrial and Urban Environmental Management Environmental Sampling and Analysis Environmental Microbiology Environment and Health Environmental Toxicology Environmental Biotechnology and Biosafety Environmental Pollution Control and Management
5.	Environmental Management Tools and Techniques	Environmental and Social Impact Assessment Environmental Policy and Laws Environmental Management System and Auditing

## 2. Competency and Core Course Identification Validation Workshop for National Exit Examination

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