



**Wollo University**  
**College of Natural Sciences**  
**Department of Biology**

**A Course Guide for Soil Fertility and Plant Nutrition**

**I. General Information**

<b>A Course Guide for Soil Fertility and Plant Nutrition</b>	<b>COURSE TITLE: Soil Fertility and Plant Nutrition</b>
<b>Module Name:</b>	<b>COURSE CODE : BIOB 548</b>
<b>MODULE CODE :</b>	<b>COURSE ECTS : 5ECTS</b>
<b>MUDULE CATEGORY:</b>	<b>Instructor's Contact Information:</b>
<b>YEAR : 1<sup>st</sup></b>	<b>Dr. Nasiruddin Ansari</b>
<b>SEMESTER : II</b>	<b>E-mail: <a href="mailto:hinasru@gmail.com">hinasru@gmail.com</a></b>
<b>TARGET GROUP : M.Sc. I YEAR BOTANY STUDENTS</b>	<b>Phone: +251922937185</b> <b>Office Hours: Monday and Tuesday 9.00 to 11.00 AM</b>
<b>M.Sc. I year, II semester Botany students</b>	<b>Location: Classroom: TBS</b>

**1. Course Description**

After completing the course, the students should be able to:

The course deals with the chemical, physical and biological properties of soils; soil formation and development; the classification of soils, soil erosion and its control, Plant nutrition and their deficiency symptoms, Soil acidity and alkalinity and adaptation of plants to adverse soil conditions.

**2. Course Objectives**

Upon completing the course, the student will be able to:

- Discuss soil chemical and physical properties and processes important to agriculture and nonagricultural soil uses.
- Explain the process of Soil formation
- Discuss Soil genesis, soil profile development.
- Identify physical and chemical properties of soil.
- Explain Biological properties of soils
- Identify different types of Soil
- Discuss soil erosion and its control
- Explain Soil acidity and alkalinity
- Chemistry of plant nutrients
- Uptake and translocation of nutrients
- Plant nutrition and their deficiency symptoms

- 3. Teaching Methods/Strategies:** Lecture, laboratory demonstration and practical, field work, individual or group project

#### 4. Course Content

Week	Contents
1	1. Concepts of Soil 1.1. Introduction 1.2. What is Soil? 1.3 Why We Study Soil? 1.4. Soil Profile description
2	2. Soil Formation 2.1. Weathering process 2.2. Pedogenesis 2.3. Factors of soil formation 2.4. Soil Profile Development 2.5. Soil horizon differentiation
3	3. Physical Properties of Soils 3.1. Soil texture 3.2. Soil Structure 3.3. Soil Air 3.4. Factors Affecting the Composition of Soil Air
4.	4. Chemistry of Soil 4.1. The Soil Colloid 4.2 Types of Soil Colloids 4.3. Cation exchange 4.4. Basic Cation Saturation Percentage 4.5 Buffering Capacity of Soils
5.	5. Organic Matter of Mineral Soil 5.1. Introduction 5.2. Sources and Composition of SOM 5.3. Composition of SOM 5.4. Distribution of organic matter in the soil 5.5. Decomposition of Organic Matter 5.6. Labile Soil Organic Matter 5.7. Role (Significance) of organic matter 5.8. Microbial Population of the Soil
6.	6. Soil Erosion and Its Control 6.1. Kinds of soil erosion 6.2. Agents of erosion 6.3. Effects of Soil Erosion 6.4. Forms of Erosion 6.5 Factors Affecting Water Erosion 6.6. Soil and Water Conservation 6.7. Relationships of Water to Soil 6.8. Land use and Land management

7.	7. Soil classification and Survey 7.1. Purpose of soil classification 7.2. History of soil classification 7.3. System of Soil classification 8. Plant Nutrition 8.1. Nutrients in the soil system 8.2. Essential nutrients; 8.3. Beneficial Nutrients 8.4. Uptake and translocation of nutrients by root from the soil solution 8.5. Factors affecting the uptake of nutrients 8.6. Nutrients-Their Functions, Mobility in Plants & Deficiency/Toxicity Symptoms
8.	9. Soil Acidity 9.1 Definition of Soil Acidity 9.2. Causes of Soil Acidity 9.3. Control of Soil Acidity 9.4. Alkaline soils 9.5. Chemistry of Alkaline soils 9.6. Management of alkali soils 9.7. Effect of soil pH on nutrient availability and plant growth 9.8. Examples of problems of soil and plant nutrition from Ethiopia 9.8.1. Soil Acidity in Ethiopia 9.8.2. Effect of Soil Alkalinity and Acidity  <b>Final Exam=50%</b>

**5. Mode of Assessment Methods:**

Mid Exam .....	30%
Assignment & Presentation.....	20%
Final written exam.....	50%
Total .....	100%.

**6. Course Policies**

The instructor expects that students will have read the appropriate chapters in the reference books BEFORE the class. Students are responsible for all material covered in lecture, whether it comes directly from the text or not. Students arrive on time to class. We will conduct this class in an atmosphere of mutual respect. The instructor encourages your active participation in class discussions. If you feel that you need individual help or would like to come by to talk (about this course or anything else). Do not miss assignments, exams and laboratory sessions unless you are forced due to health problems. Do all assignments, group works, and presentations on time.

- Attending all class is **a must**
- Disabling a cellular phone is **a must**

**7. Reference Materials**

1. Pan Brady, N. C. and Weil, R.R. (1996). *The Nature and Properties of Soils, 11<sup>th</sup> Edition*. Prentice-Hall, Inc. New Jersey.
2. Landon, J.R. (ed.) (1990). *Booker Tropical Soil Manual: A Handbook for Soil Survey and Agricultural Land Evaluation in the Tropics and Subtropics*. Booker Tate Limited, Harlow
3. Singer, M.J and Munns, D.N. (1999). *Soils: An Introduction*. (4<sup>th</sup> ed.) Prentice-Hall, Inc. New Jersey.
4. Staples, R.C. and Toenniessen, G.H. (1984). *Salinity Tolerance in Plants: strategy for crop improvement*. John Wiley and Sons, New York.
5. Taiz, L. and Zeiger, E. (1991, 1998, 2002, 2006). *Plant Physiology*. Sinauer Associates, Inc., Publishers. Massachusetts.(Text).

**Course Instructor**

Dr. Nasiruddin Ansari

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<b>Name</b>	<b>Date</b>	<b>Signature</b>
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**Department head**

Dr. Moges Kibret

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