

## SOIL SCIENCE AND AGRICULTURAL ENGINEERING

Course Code : SSC 101

Course Title : Fundamentals of Soil Science and Geology

Credit Hours : 3(2+1) Full Marks: 75 Theory: 50 Practical: 25

### OBJECTIVES

Upon the completion of this course, the students will be able to understand soils in relation to crop production, identify soil reaction for the amendment of different types of soil condition, and ecological perspectives in relation with geology.

### I. SYLLABUS

Introduction: Definitions of related terminologies, historical development of soil science and geology; concepts of soil as a medium for plant growth and soil as a natural body; Soils in relation to agricultural production, soil physical properties; soil chemical properties; Soil colloids: ion exchange phenomena; Geology in relation to soils; Physiographic units of Nepal; Perspectives on the relationships between soil science and geology; soil ecology: The ecosystem, soil animals, nutrient cycling, soil organisms and environmental quality.

### II. COURSE OUTLINE

#### A. Lecture

S. N.	Topic	No. of Lectures
1.	Introduction of Soil: Definition, concept and uses of soil,	1
2.	Historical development of soil science, Braches of soil science	1
3.	Soil as a medium for plant growth and soil as a natural body	2
4.	Three phase system of Soil: Solid, Liquid and Gaseous Phase	2
5.	Soil physical properties: Mechanical composition and textural classification, Soil Aggregation and Structure, Soil Color, Bulk density, particle density and porosity, Soil consistency, Soil aeration,	6
6.	Soil chemical properties: Soil pH, Soil reaction- acidic soils, saline soils, sodic, saline-sodic soils and their management. Buffering Capacity of soil and Liming	5
7.	Soil colloids: Properties of Soil Colloids and its types, Layer silicates	4
8.	Ion Exchange Phenomena, Cation and Anion Exchange Capacity of soil and its importance in Agriculture	2
9.	Geology in relation to soils: Evolution of earth, Composition of earth, Soil forming rocks and minerals and weathering of rocks and minerals.	4
10.	Physiographic units of Nepal: Terai, Siwalik, Middle Mountain and Higher Mountain	1
11.	Soil ecology: Ecosystem, producers, consumers; Microorganism and their importance in decomposition.	2
<b>Total</b>		<b>30</b>

**B. Practical**

<b>S. N.</b>	<b>Topic</b>	<b>No. of Practicals</b>
1.	Identification and function of soil science laboratory equipment.	1
2.	Collection and Preparation of soil sample	1
3.	Soil textural determination by Field methods	1
4.	Soil consistency determination	1
5.	Particle size analysis by hydrometer method	2
6.	Soil structure determination	1
7.	Determination of soil color	1
8.	Determination of bulk density of soil	1
9.	Determination of Particle density of soil	1
10.	Determination of soil PH	1
11.	Determination of lime requirement in acid soil	1
12.	Identification of soil forming minerals	1
13.	Identification of soil forming rocks	1
14.	Study of soil as a natural body	1
<b>Total</b>		<b>15</b>

**REFERENCES**

Nyle C. Brady and Ray R. Weil. 2012. The Nature and Properties of Soils. 14th Ed. Prentice Hall of India Ltd.

Soil, Human Society and the Environment. Geological Society, London, Special Publications, 2006.

Henry D. Foth. 1990. Fundamentals of Soil Science. 8th Ed., John Wiley & Sons, Inc.

Robert E. White. 2006. Principles and Practice of Soil Science: The Soil as a Natural Resource. Blackwell Publishing, USA.

V. Obruchev. 2005. Fundamentals of Geology. Foreign Languages Publishing House.

Carla W. Montgomery and Kenneth F. Griffin. 1996. Fundamentals of Geology. McGraw-Hill Higher Education.