

<b>INSTITUTE</b>	<b>FACULTY OF AGRICULTURE</b>
<b>PROGRAM</b>	<b>BACHELOR OF SCIENCE (Hons.) AGRICULTURE</b>
<b>SEMESTER</b>	<b>1</b>
<b>COURSE TITLE</b>	<b>FUNDAMENTALS OF SOIL SCIENCE</b>
<b>COURSE CODE</b>	<b>16AS0102</b>
<b>COURSE CREDITS</b>	<b>3</b>

**Objective:**

- 1 To teach the fundamentals properties of soil and how these all affect the crop production.
- 2 To identify the different soils and their management.

**Course Outcomes:** After completion of this course, student will be able to:

- 1 Students will be able to articulate and retain knowledge relevant to different types of soil.
- 2 Students will be enriched with the knowledge of physical, chemical and biological conditions of soil.
- 3 Students will be able to acquaint with the instruments used in the soil science laboratory as well as analyze the soil samples and preparing a report.
- 4 Students will develop the ability to determine the soil density, moisture content, texture, porosity, EC, cation exchange capacity and organic matter content of soil.

**Pre-requisite of course:** Basic knowledge about the different soils of India.

**Teaching and Examination Scheme**

<b>Theory Hours</b>	<b>Tutorial Hours</b>	<b>Practical Hours</b>	<b>ESE</b>	<b>IA</b>	<b>CSE</b>	<b>Viva</b>	<b>Term Work</b>
2	0	2	50	30	20	25	25

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation.</b> Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation.	4
2	<b>Soil profile, components of soil; soil physical properties; soil texture, methods of particle size analyses, structure, density and porosity, soil colour, consistence and plasticity; elementary knowledge of soil taxonomy classification and soils of India.</b> Soil profile, components of soil; soil physical properties; soil texture, methods of particle size analyses, structure, density and porosity, soil colour, consistence and plasticity; elementary knowledge of soil taxonomy classification and soils of India.	10

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
3	<b>Soil water retention, movement and availability; soil air, composition; source, amount and flow of heat in soil; soil temperature and plant growth.</b> Soil water retention, movement and availability; soil air, composition; source, amount and flow of heat in soil; soil temperature and plant growth.	2
4	<b>Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability.</b> Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability.	2
5	<b>Soil colloids- inorganic and organic; silicate clays: constitution and properties; source of charge ion exchange, cation exchange capacity, base saturation.</b> Soil colloids- inorganic and organic; silicate clays: constitution and properties; source of charge ion exchange, cation exchange capacity, base saturation.	2
6	<b>Soil organic matter: composition, properties and its influence on soil properties; humic substances – nature and properties.</b> Soil organic matter: composition, properties and its influence on soil properties; humic substances – nature and properties.	2
7	<b>Soil organisms ; macro and micro organisms, their beneficial and harmful effects.</b> Soil organisms ; macro and micro organisms, their beneficial and harmful effects.	2
<b>Total Hours</b>		<b>24</b>

#### **Suggested List of Experiments:**

<b>Contents : Unit</b>	<b>Topics</b>	<b>Contact Hours</b>
1	<b>Study of soil sampling tools, collection of representative soil samples, its processing and storage</b> Study of soil sampling tools, collection of representative soil samples, its processing and storage	2
2	<b>Study of soil profile in field</b> Study of soil profile in field	2
3	<b>Study of soil forming rocks and minerals</b> Study of soil forming rocks and minerals	2
4	<b>Determination of practical density and bulk density of soil and computation of porosity</b> Determination of practical density and bulk density of soil and computation of porosity	2
5	<b>Determination of soil moisture content and maximum water holding capacity and computation of moisture constants</b> Determination of soil moisture content and maximum water holding capacity and computation of moisture constants	2

### Suggested List of Experiments:

Contents : Unit	Topics	Contact Hours
6	<b>Determination of soil texture by feel and international pipette method</b> Determination of soil texture by feel and international pipette method	2
7	<b>Study of capillary rise phenomenon of water in soil column and water movement in soil</b> Study of capillary rise phenomenon of water in soil column and water movement in soil	2
8	<b>Study of soil map</b> Study of soil map	2
9	<b>Determination of soil colour</b> Determination of soil colour	2
10	<b>Determination of heat transfer in soil</b> Determination of heat transfer in soil	2
11	<b>Determination of soil pH and electrical conductivity</b> Determination of soil pH and electrical conductivity	2
12	<b>Determination of cation exchange capacity of soil</b> Determination of cation exchange capacity of soil	2
13	<b>Estimation of organic matter content of soil</b> Estimation of organic matter content of soil	2
<b>Total Hours</b>		<b>26</b>

### Textbook :

- 1 NA, NA, NA, NA

### References:

- 1 Introductory soil science, Introductory soil science, Das P. K., Kalyani Publishers, New Delhi., 2015
- 2 Fundamentals of soil science, Fundamentals of soil science, Patil V. D. and Mali C. V., Phoenix publishers , Parbhani, 1999
- 3 Fundamentals of soil , Fundamentals of soil , Sahai V. N., Kalyani Publishers, New Delhi, 1990
- 4 The nature and properties of soil, The nature and properties of soil, Brady N. C. and Well R. R., Pearson education, 2008
- 5 Fundamentals of Soil Science , Fundamentals of Soil Science , Indian Society of Soil Science (ISSS), Indian Society of Soil Science, New Delhi, 2012

### Suggested Theory Distribution:

The suggested theory distribution as per Bloom's taxonomy is as follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation

<b>Remember / Knowledge</b>	<b>Understand</b>	<b>Apply</b>	<b>Analyze</b>	<b>Evaluate</b>	<b>Higher order Thinking</b>
25.00	25.00	20.00	10.00	10.00	10.00

**Instructional Method:**

- 1 The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board may also use any of tools such as demonstration, role play, quiz, brain storming, MOOCs etc.
- 2 The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- 3 Practical examination will be conducted at the end of semester for evaluation of performance of students in laboratory.
- 4 Students will use supplementary resources such as online videos, NPTEL videos, e-courses, Virtual Laboratory.