

Course Information Sheet

Programme: UG	Degree: B. Tech (AGRI)	
Course Code:	Course Title: Principles of Soil Science and Agronomy	
Year: I Sem: II A.Y. : 2023-24	Regulation: IS24 University: JNTU Kakinada.	
L T/P/D C: 3/0/0/3	Credits: 3	Contact Hrs: 5
Mid Marks: 30	External Marks: 70	Total Marks: 100
Teaching Hrs: 60	Exam Duration: 3 hrs.	

Course Pre-Requisites: Agricultural Engineering

Course Code	Course Name	Description	Year-Sem
	Principles of Soil Science and Agronomy	Basic knowledge in Soil Science and Agriculture	I AGRI Semester -II

Course outcomes:

No.	Description	Skill /Bloom's Taxonomy Level
CO1	Understand soil genesis, formation processes, and classification.	Remember Understand TL1/TL2
CO 2	Analyze soil organic matter, reaction, and reclamation techniques.	Apply/TL3
CO 3:	Evaluate soil fertility, productivity, and the role of fertilizers and microorganisms.	Create /TL4
CO4	Apply agronomic practices for crop production, irrigation, and weed management.	Design/TL 6
CO5	Implement sustainable and organic farming practices for soil health improvement	Derived it from lower-level Blooms /TL5

Course Articulation Matrix:

Mapping of Course Outcomes (CO) with Program Outcomes (PO) and Program Specific Outcomes (PSO's):

Course Outcomes (CO)	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2	PSO1	PSO 2
CO1	2	3	2	1	-	-	-	-	-	-	-	-	2	1
CO2	2	3	1	2	-	-	1	-	-	-	-	1	2	1
CO3	2	2	1	2	1	1	3	-	-	1	-	1	2	-
CO4	2	3	3	3	1	1	2	-	-	-	2	1	2	2
CO5	2	3	3	2	1	1	2	-	-	-	2	1	1	2
Overall	2	2.8	2	2	0.6	0.6	1.6	-	-	0.2	0.8	0.8	1.8	1.2

Level: 1- Low correlation (Low), 2- Medium correlation (Medium), 3-High correlation (High)

JUSTIFICATIONS OF CO –PO MAPPING

AGE102.1		
AGE102.2-P01	2	Apply the knowledge of Mathematics, Science, and Engineering to solve soil-related challenges.
AGE102.2-P02	3	Identify and analyze soil formation processes using scientific principles.
AGE102.2-P03	2	Design and classify soil types based on their properties.
AGE102.2-P04	1	Use research-based knowledge to analyze soil structure and fertility.
AGE102.2-P05	-	
AGE102.2-P06	-	
AGE102.2-P07	-	
AGE102.2-P08	-	
AGE102.2-P09	-	

AGE402.2-P10	-	
AGE402.2-P11	-	
AGE402.2-P12	-	

AGE102.2		
AGE102.2-P01	2	Apply principles of soil chemistry and organic matter decomposition.
AGE102.2-P02	3	Formulate research-based solutions for soil reaction and nutrient availability.
AGE102.2-P03	1	Develop soil reclamation strategies ensuring sustainability.
AGE102.2-P04	2	Conduct experiments on soil fertility and organic matter decomposition.
AGE102.2-P05	-	
AGE102.2-P06	-	
AGE102.2-P07	1	Evaluate the environmental impact of soil management practices.
AGE102.2-P08	-	
AGE102.2-P09	--	
AGE102.2-P10	-	
AGE102.2-P11	-	
AGE102.2-P12	1	Engage in lifelong learning to improve soil health strategies.

AGE102.3		
AGE102.2-P01	2	Apply scientific knowledge to assess soil fertility and crop productivity.
AGE102.2-P02	2	Analyze the role of fertilizers and beneficial microorganisms in agriculture.
AGE102.2-P03	1	Develop solutions to improve soil nutrient availability.
AGE102.2-P04	2	Conduct research-based studies on the impact of fertilizers.
AGE102.2-P05	1	Utilize modern tools for soil nutrient analysis.
AGE102.2-P06	1	Assess social and environmental responsibilities of soil fertility management.
AGE102.2-P07	3	Understand and implement sustainable agricultural practices.
AGE102.2-P08	-	
AGE102.2-P09	-	
AGE102.2-P10	1	Communicate research findings effectively on soil fertility improvements.
AGE102.2-P11		
AGE102.2-P12	1	Continuously update knowledge on advancements in soil science.

AGE102.4		
AGE102.2-P01	2	Apply agronomic principles to improve crop production.
AGE102.2-P02	3	Research and analyze different agronomic practices.
AGE102.2-P03	3	Design crop management strategies considering environmental factors.
AGE102.2-P04	3	Use experimental analysis to enhance irrigation and weed management.
AGE102.2-P05	1	Apply modern tools to optimize crop productivity.
AGE102.2-P06	1	Evaluate the safety and legal considerations in agronomic practices.
AGE102.2-P07	2	Implement sustainable approaches to crop production.
AGE102.2-P08	-	
AGE102.2-P09	-	
AGE102.2-P10	-	
AGE102.2-P11	2	Apply management principles for effective crop planning.
AGE102.2-P12	1	Engage in lifelong learning to improve agronomic knowledge

AGE102.5		
AGE102.2-P01	2	Implement principles of organic farming for soil health improvement.
AGE102.2-P02	3	Analyze the impact of organic practices on agricultural sustainability.
AGE102.2-P03	3	Design and implement organic farming techniques.
AGE102.2-P04	2	Conduct research on organic nutrient sources.
AGE102.2-P05	1	Use IT tools to assess organic farming practices.
AGE102.2-P06	1	Evaluate social and health implications of organic farming.
AGE102.2-P07	2	Promote sustainable agricultural solutions.
AGE102.2-P08	-	
AGE102.2-P09	-	
AGE102.2-P10	-	
AGE102.2-P11	2	Continuously update knowledge in organic farming trends.

Justification for CO-PSO Mapping

Topics beyond Syllabus

S.No.	Description	Proposed Actions
1	Climate Change and Agriculture	Assignment
2	Organic Certification and Market Trends	Seminar

TOPICS BEYOND SYLLABUS/ASSIGNMENT/INDUSTRY VISIT/PROJECTS/NPTEL ETC

Topic beyond Syllabus: Mapping with PO and PSO:

Justification for Avg CO-PO Mapping		
Mapping	Level	Justification
AGE102.2-P01	1	Apply the knowledge of Mathematics, science, Engineering Fundamentals and an Engineering Specialization to the Solution of complex Engineering problems.
AGE102.2-P02	2	Identify formulate, review Research literature and Analyze Complex Engineering Problems reaching Substantiated conclusions using first principles of Mathematics , Natural Sciences , and Engineering Sciences
AGE102.2-P03	1	Design Solutions for Complex Engineering and Problems and design System Components are processes that meet the specified needs with appropriate Consideration for the public health and Safety and the cultural, Societal and Environmental Considerations
AGE102.2-P04	1	Use research-based Knowledge and research Methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide conclusions
AGE102.2-P05	1	Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to Complex Engineering Activities with an understanding of the limitations
AGE102.2-P06	1	Apply reasoning informed by the contextual knowledge to assess social, health, safety legal cultural issues and the consequent responsibilities relevant to the professional Engineering practice
AGE102.2-P07	1	Understand the impact of the professional Engineering Solutions in Social and Environmental Contexts, and demonstrate the knowledge of, and need for sustainable development.
AGE102.2-P08	--	
AGE102.2-P09	--	
AGE102.2-P10	--	
AGE102.2-P11	--	Page 5 of 11
AGE102.2-P12	-	

Topic beyond syllabus	Program Outcomes (PO)												Program Specific Outcomes (PSO's)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
1.	3	3	2	3	3	-	-	-	-	-	-	2	3	2

Justification for Topic beyond the Syllabus (TBS) -PO Mapping.

Mapping	Level	Justification
TBS-PO1	3	Apply the knowledge of Mathematics, Science, Engineering Fundamentals, and an Engineering Specialization to the solution of complex engineering problems in soil science and agronomy.
TBS-PO2	3	Identify, formulate, review research literature, and analyze complex engineering problems related to soil fertility, agronomic practices, and nutrient management.
TBS-PO3	2	Design solutions for soil and agronomic issues that meet the specified needs with appropriate consideration for public health, safety, cultural, societal, and environmental considerations.
TBS -PO4	3	Use research-based knowledge and research methods, including the design of experiments, analysis and interpretation of data, and synthesis of information, to provide conclusions in soil science and agronomy.
TBS -PO5	3	Understand the impact of professional engineering solutions in social and environmental contexts and demonstrate the knowledge of and need for sustainable development in soil and agronomy sciences.

Justification for Topic Beyond the Syllabus (TBS) -PSO Mapping.

Mapping	Level	Justification
TBS-PSO1	3	Ability to apply innovative and creative thinking to develop solutions for real-world soil science and agronomy challenges, including soil fertility management, crop productivity, and sustainable agriculture (Core Skills).
TBS-PSO2	2	Ability to learn and integrate new scientific advancements in soil science and agronomy, fostering entrepreneurship and employment opportunities in sustainable farming and soil conservation (Professional Development).

WEB SOURCE REFERENCES :

1	Indian Council of Agricultural Research (ICAR)
2	Food and Agriculture Organization (FAO)

Syllabus / Lesson Plan:

S.No	SYALLABUS	Periods	Methodology	Text book/references /web references and additional text book reference
UNIT – I				
1	Introduction to Soil Science	1	Chalk & Talk	T2, A1
2	Soil Formation and Classification	1	Chalk & Talk	T1, T2, A1
3	Soil Physical Properties	1	Chalk & Talk	T2, A1
4	Soil Chemistry and Nutrients	1	Chalk & Talk	T1, T2
5	Soil Microorganisms and Fertility	1	Chalk & Talk	T2, A1
6	Soil pH and Nutrient Availability	1	Chalk & Talk	T2, A1, A2
7	Soil Erosion and Conservation	1	Chalk & Talk	T2, A1
8	Soil Taxonomy and Classification	1	Chalk & Talk	T2, A1, A2
9	Demonstration on Soil Properties	1	Chalk & Talk, Demo	
	Total	09		
Unit II				
10	Soil Organic Matter and Composition	1	Chalk & Talk	T1, A1, A2
11	Soil Reactions and pH	1	Chalk & Talk	T1, A1, A2
12	Nutrient Availability in Soil	1	Chalk & Talk	T1, A1, A2
13	Acid and Alkaline Soils	1	Chalk & Talk	T1, A1, A2
14	Saline and Sodic Soils	1	Chalk & Talk	T1, A1, A2
15	Soil Amendments and Management	1	Chalk & Talk	T1, A1, A2
16	Fertility and Productivity Concepts	1	Chalk & Talk	T1, A1, A2
17	Deficiency Symptoms and Diagnosis	1	Chalk & Talk	T2, A1
18	Inorganic Fertilizers and Reactions	1	Chalk & Talk	T1, A1, A2
19	Liquid Fertilizers and Biofertilizers	1	Chalk & Talk	T2, A1, A2
20	National and International Research Institutes	1	Chalk & Talk	T1, A1, A2
21	Classification of Crops	1	Chalk & Talk	T2, A1, A2
22	Crop Growth Stages and Management	1	Chalk & Talk	T2, A1, A2
	Total	14		
Unit III				
23	Essential Resources for Crop Production - Biotic & Abiotic Factors	1	Chalk & Talk	T2, A1, A2
24	Agro-climatic Zones of India & Andhra Pradesh	1	Chalk & Talk	T2, A1, A2

25	Crop Seasons - Kharif, Rabi, and Summer	1	Chalk & Talk	T2, A1, A2
26	Tillage & Tilt - Importance and Practices	1	Chalk & Talk	T2, A1, A2
27	Sowing - Methods, Time, and Depth	1	Chalk & Talk	T2, A1, A2
28	Methods and Time of Application of Manures & Fertilizers	1	Chalk & Talk	T2, A1, A2
29	Weeds - Influence on Crop Production & Management Principles	1	Chalk & Talk	T2, A1, A2
30	Basics on Soil-Plant-Water Relationship	1	Chalk & Talk	T2, A1, A2
31	Effective Root Zone Depth & Critical Stages of Irrigation	1	Chalk & Talk	T2, A1, A2
	Total	09		
Unit IV				
32	Moisture Extraction Pattern & Crop Coefficients	1	Chalk & Talk	T2, A1, A2
33	Water Requirement of Crops & Critical Stages for Irrigation	1	Chalk & Talk	T2, A1, A2
34	Crop Rotation - Principles & Benefits	1	Chalk & Talk	T2, A1, A2
35	Cropping Systems - Types and Importance	1	Chalk & Talk	T2, A1, A2
36	Relay Cropping & Mixed Cropping Systems	1	Chalk & Talk	T2, A1, A2
37	Dryland Agriculture - Challenges & Solutions	1	Chalk & Talk	T2, A1, A2
38	Measures to Reduce Evapotranspiration Losses	1	Chalk & Talk	T2, A1, A2
39	Crop Husbandry Practices for Major Crops - Rice	1	Chalk & Talk	T2, A1, A2
40	Crop Husbandry Practices for Major Crops - Maize	1	Chalk & Talk	T2, A1, A2
41	Crop Husbandry Practices for Major Crops - Cotton	1	Chalk & Talk	T2, A1, A2
42	Crop Husbandry Practices for Major Crops - Groundnut	1	Chalk & Talk	T2, A1, A2
43	Introduction to Organic Farming - Principles & Scope	1	Chalk & Talk	T2, A1, A2
44	Relevance of Organic Farming to Modern Agriculture	1	Chalk & Talk	T2, A1, A2
	TOTAL	13		
UNIT - V				
45	Sustainable Agriculture - Definition & Concepts	1	Chalk & Talk	T2, A1, A2
46	Organic Nutrient Sources & Fortification	1	Chalk & Talk	T2, A1, A2
47	Organic Manures - Types & Application Methods	1	Chalk & Talk	T2, A1, A2
48	Composting - Methods & Benefits	1	Chalk & Talk	T2, A1, A2
49	Green Manures - Role in Soil Fertility	1	Chalk & Talk	T2, A1, A2
50	Biofertilizers - Types & Methods of Application	1	Chalk & Talk	T2, A1, A2

51	Benefits & Limitations of Biofertilizers	1	Chalk & Talk	T2, A1, A2
52	Nutrient Management in Organic Farming	1	Chalk & Talk	T2, A1, A2
53	Organic Certification - Importance & Process	1	Chalk & Talk	T2, A1, A2
54	Inspection & Certification Procedures	1	Chalk & Talk	T2, A1, A2
55	Labeling & Accreditation for Organic Products	1	Chalk & Talk	T2, A1, A2
56	Role of Government Policies in Organic Farming	1	Chalk & Talk	T2, A1, A2
57	Market Potential & Challenges in Organic Farming	1	Chalk & Talk	T2, A1, A2
58	Future Prospects of Sustainable Agriculture	1	Chalk & Talk	T2, A1, A2
59	Summary & Review of Organic Farming Concepts	1	Chalk & Talk	T2, A1, A2
	TOTAL	15		
	GRAND TOTAL	60		

Topic Beyond Syllabus:

S.No.	Topic Beyond Syllabus Planning	PERIODS	Methodology	Text book/references/web references and additional text book reference
1	Advanced Soil Health Management	2	Seminar	T1, T2,A1
2	Precision Farming Techniques	2	Industrial visit	

Note: Bloom's Taxonomy Levels

BTL1-Remember	BTL2 – Understand	BTL3 –Apply
BTL4-Analyze	BT56 –Evaluate	BTL6–Create

Text books (T) / Reference books (R)/Additional text books (A):

T/R/A	Book Title/Author/Publication
T1	Yella Manda Reddy T & Shankar Reddy. <i>Principles of Agronomy</i> . Publications.
T2	Brady Nyle C & Ray R Well (2002). <i>Nature and Properties of Soils</i> . Pearson Education Inc., New Delhi.
R1	Indian Society of Soil Science (1988). <i>Fundamentals of Soil Science</i> . IARI, New Delhi.
R2	Brady Nyle C. & Ray R. Well (2002). <i>Nature and Properties of Soil</i> . Pearson Education Inc., New Delhi.
R3	Indian Society of Soil Science (1998). <i>Fundamentals of Soil Science</i> . IARI, New Delhi.
A1	T. Yellamanda Reddy & G. H. Sankara Reddy (2015). <i>Principles of Agronomy</i> . Kalyani Publishers, Ludhiana.

Web References:

W1	National Institute of Agricultural Extension Management (MANAGE)
W2	Indian Society of Soil Science (ISSS)
W3	Indian Council of Agricultural Research (ICAR)

ASSESSMENT METHODOLOGIES-DIRECT

<input checked="" type="checkbox"/> ASSIGNMENTS	<input checked="" type="checkbox"/> STUD. SEMINARS	<input checked="" type="checkbox"/> TESTS/MODEL EXAMS	<input checked="" type="checkbox"/> UNIV. EXAMINATION
<input type="checkbox"/> STUD. LAB PRACTICES	<input type="checkbox"/> STUD. VIVA	<input type="checkbox"/> MINI/MAJOR PROJECTS	<input type="checkbox"/> CERTIFICATIONS
<input type="checkbox"/> ADD-ON COURSES	<input type="checkbox"/> OTHERS		

ASSESSMENT METHODOLOGIES-INDIRECT

<input checked="" type="checkbox"/> ASSESSMENT OF COURSE OUTCOMES (BY FEEDBACK, ONCE)	<input checked="" type="checkbox"/> STUDENT FEEDBACK ON FACULTY (TWICE)
<input type="checkbox"/> ASSESSMENT OF MINI/MAJOR PROJECTS BY EXT. EXPERTS	<input type="checkbox"/> OTHERS



Prepared by



Approved by