



Integral University, Lucknow

Effective from Session: 2020-21							
Course Code	AS 506	Title of the Course	Soil Water Plant Relationship	L	T	P	C
Year	II	Semester	III	2	0	1	0
Course Objectives	<ul style="list-style-type: none"> To attain the knowledge about the problematic soils of India, soil survey and mapping of soil 						

Course Outcomes	
CO1	To gain basic knowledge about the problematic soils of India
CO2	To provide knowledge about the different remedial measures
CO3	To classify soil according to its physical and chemical properties
CO4	To study about the crop management practices in problematic areas
CO5	To deal with survey and mapping of problematic soils of India

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Soil plant-atmosphere continuum-pathways of water movement, variations in water potentials and fluxes.	5	CO1, CO4, CO5
2	Unit-II	Solute transport in soils, Root growth in relation to soil physical environment. Modelling water uptake by plants at macro and micro levels	6	CO2
3	Unit-III	Evapotranspiration and growth relations, Models for water use, plant growth and yield in terms of water availability.	8	CO3

Practicals:				
Evapotranspiration losses under different situations. Salt and water profile changes during infiltration. Measurement of canopy temperature, leaf diffusion resistance, xylem water potential. Determination of components of water balance in a cropped field.			26	CO1, CO2, CO3, CO4, CO5

Reference Books:				
<ul style="list-style-type: none"> M.B. Kirkham. 2014. Principles of Soil and Plant Water Relations, 2nd Edition, Academic Press. Rathinasamy A. 2014. Fundamentals of Soil Science, Scientific Publishers-Jodhpur. Jeffrey, D.W. (Ed.). 1987. Soil-Plant Relationships: An Ecological Approach. Springer Netherlands. 				

e-Learning Source:				

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	1	1	3	3	3		3	1	3	3	3	1			
CO2	3	3	3	1		3	3	3		3	3	2	3	3	1			
CO3	3	2	1	1		2	3	3	1	1	2	3	2	2	2			
CO4	3	2	2	2		3	3	3		2	3	3	3	3	2			
CO5	3	1	1	1	1	2	3	3		2	3	3	3	2	3			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2020-21							
Course Code	AA 505	Title of the Course	Agronomy of Major Field Crops (Kharif)	L	T	P	C
Year	II	Semester	III	3	0	0	0
Course Objectives	<ul style="list-style-type: none"> To attain the knowledge of concept of major field crops, pulse crop, oilseed crop and cash crop 						

Course Outcomes	
CO1	To learn study about the origin, history, distribution, adaptation, classification, morphology, physiology of major field crops
CO2	To learn about the adaptation, classification, morphology, physiology of major field crops
CO3	To understand the phenology, varietal improvement and production technology of major field crops
CO4	To know the quality components and industrial use of the main and by products
CO5	To understand the post-harvest handling of main and by products for marketing

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Origin, history, distribution, adaptation, classification, morphology, phenology, varietal improvement and production technology of Rice Maize, Sorghum, Pearl-millet	9	CO1, CO3
2	Unit-II	Origin, history, distribution, adaptation, classification, morphology, phenology, varietal improvement and production technology of Smaller-millet, Pigeon pea, Mung bean, Urd bean, Cowpea, Moth bean, Groundnut, Sunflower, Sesame, Niger, Caster, Soybean, Cotton, Jute, Mesta & Sugarcane.	16	CO1, CO3
3	Unit-III	Quality components and industrial uses of the main and by-products and their post-harvest handling for marketing	9	CO2, CO4, CO5

Reference Books:	
	• Das NR. 2007. Introduction to Crops of India. Scientific Publ.
	• Kumar Ranjeet & Singh NP. 2003. Maize Production in India: Golden Grain in Transition. IARI, New Delhi
	• Khare D & Bhale MS. 2000. Seed Technology. Scientific Publ.
	• Hunsigi G & Krishna KR. 1998. Science of Field Crop Production. Oxford & IBH.
	• Pal M, Deka J & Rai RK. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill.

e-Learning Source:	
	https://www.iaritoppers.com/2019/06/Field-Crop-Kharif-ICAR-E-course-Free-PDF-Book-Download-e-krisi-shiksha.html
	https://ashabookhouse.com/product/agronomy-of-field-crops/

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																		
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1	2	2	3	3	3	3	3	3	3	2	2	2	3	3	1		
CO2	3	2	1	2	2	2	3	2	2	3	2	3	3	3	1			
CO3	2	2	3	3	3	3	2	3	3	3	2	2	2	2	2			
CO4	3	3	2	2	2	2	1	3	2	2	3	3	3	3	2			
CO5	3	2	3	2	2	1	1	3	2	2	3	3	3	2	3			

1- Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	AG 506	Title of the Course	Toxicology of Insecticides	L	T	P	C
Year	II	Semester	III	2	0	1	0
Course Objectives	<ul style="list-style-type: none"> To understand the scope and classification of insecticide, principles of toxicology, action of insecticide, insecticide residue and environmental implications 						

Course Outcomes	
CO1	To understand the scope of insecticide toxicology, history of chemical control; pesticide use and pesticide industry in India
CO2	Classification of insecticides and acaricides based on mode of entry, mode of action and chemical nature
CO3	Basic concept of principles of toxicology; evaluation of insecticide toxicity; joint action of insecticides- synergism, potentiation and antagonism
CO4	Insecticide resistance management and pest resurgence
CO5	Insecticide residues, their significance and environmental implications

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Definition and scope of insecticide toxicology; history of chemical control; pesticide use and pesticide industry in India.	5	CO1
2	Unit-II	Classification of insecticides and acaricides based on mode of entry, mode of action and chemical nature. Structure and mode of action of organochlorines, organophosphates, carbamates, pyrethroids, tertiary amines, neonicotinoids, oxadiazines, phenyl pyrololes, insect growth regulators, microbials, botanicals, new promising compounds, etc.	7	CO2
3	Unit-III	Principles of toxicology; evaluation of insecticide toxicity; joint action of insecticides-synergism, potentiation and antagonism; factors affecting toxicity of insecticides; insecticide compatibility, selectivity and phytotoxicity.	7	CO3
4	Unit-IV	Insecticide metabolism; pest resistance to insecticides; mechanisms and types of resistance; insecticide resistance management and pest resurgence.	6	CO4
5	Unit-V	Insecticide residues, their significance and environmental implications. Insecticide Act, registration and quality control of insecticides; safe use of insecticides; diagnosis and treatment of insecticide poisoning.	6	CO5

Practicals:

Insecticide formulations and mixtures; quality control of pesticide formulations; laboratory and field evaluation of bioefficacy of insecticides; bioassay techniques; probit analysis; evaluation of insecticide toxicity and joint action. Toxicity to beneficial insects. Pesticide appliances. Working out doses and concentrations of pesticides; visit to toxicology laboratories. Good laboratory practices.	18	CO1, CO2, CO3, CO4, CO5
---	----	-------------------------

Reference Books:

- Chattopadhyay SB. 1985. Principles and Procedures of Plant Protection. Oxford & IBH, New Delhi.
- Gupta HCL. 1999. Insecticides: Toxicology and Uses. Agrotech Publ., Udaipur.
- Ishaaya I & Degheele (Eds.). 1998. Insecticides with Novel Modes of Action. Narosa Publ. House, New Delhi.
- Perry AS, Yamamoto I, Ishaaya I & Perry R. 1998. Insecticides in Agriculture and Environment. Narosa Publ. House, New Delhi.
- Prakash A & Rao J. 1997. Botanical Pesticides in Agriculture. Lewis Publ., New York.

e-Learning Source:

https://ag.arizona.edu/classes/ento415/LECTURES/ENTO415_Toxicology.pdf

<https://link.springer.com/book/10.1007/978-1-4613-4410-0>

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	1	3	2	3	3	3	2	2	3	3	3	3			
CO2	3	3	2	2	2	2	3	2	2	1	2	3	3	3	3			
CO3	2	3	2	2	3	2	2	2	2	1	2	3	2	2	2			
CO4	3	3	2	3	2	2	2	1	2	2	3	2	3	3	2			
CO5	2	2	3	2	2	2	2	3	3	2	2	1	3	2	3			

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	AG507	Title of the Course	Hormonal Regulation of Plant Growth and Development	L	T	P	C
Year	II	Semester	III	2	0	1	0
Course Objectives	<ul style="list-style-type: none"> To expose students to an understanding of the hormonal and environmental regulation of plant growth and development 						

Course Outcomes	
CO1	To gain knowledge about hormones, endogenous growth substances and synthetic chemicals and other growth substances
CO2	Students will learn about the basic concepts of auxins, gibberellins, cytokinins, abscisic acid and ethylene brassinosteroids
CO3	The students will have in-depth knowledge of hormone mutants and transgenic plants
CO4	The students will have the knowledge of signal perception, transduction, and effect at functional gene level of different hormones
CO5	The students will have the concept and knowledge of synthetic growth regulators

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Definition and classification of plant growth regulators- Hormones, endogenous growth substances and synthetic chemicals, Endogenous growth regulating substances other than hormones. triconanol, Phenols – polyamines, jasmonates, concept of death hormone.	6	CO1
2	Unit-II	Site of synthesis, biosynthetic pathways and metabolism and the influence on plant growth development of individual group of hormones- Auxins, Gibberellins, cytokinins, Abscisic acid and Ethylene Brassinosteroids.	7	CO2
3	Unit-III	Hormone mutants and transgenic plants in understanding role of hormones.	3	CO3
4	Unit-IV	Signal perception, transduction, and effect at functional gene level of different hormones- Auxins- cell elongation, Gibberellins - germination of dormant seeds, cytokinins- cell division. Retardation of senescence of plant parts, Abscisic acid-Stomatal closure and induction of drought resistance, Ethylene- fruit ripening.	8	CO4
5	Unit-V	Interaction of hormones in regulation of plant growth and development processes. Rooting of cuttings-Flowering. Apical dominance, molecular aspects of control of reproductive growth and development.	6	CO4
6	Unit-VI	Synthetic growth regulators- Classification, their effect on plant growth and development. Practical utility in agriculture and horticulture.	6	CO5

Practicals:

Quantification of Hormones- Principles of bioassays, physico-chemical techniques and immunoassay, Extraction of hormones from plant tissue. Auxins- bioassays- auxins effect on rooting of cuttings, abscission, apical dominance, Gibberellins- bioassays-GA effect on germination of dormant seeds, cytokinin- bioassays- estimation using immunoassay technique cytokinin effect on apical dormance and senescence, ABA bioassays estimation using immunoassay technique. ABA effect on stomatal movement, Ethylene bioassays, estimation using physico-chemical techniques- effect on breaking dormancy in sunflower and groundnut.	28	CO1, CO2, CO3, CO4, CO5
---	----	-------------------------

Reference Books:

- Hopkins WG & Huner NPA. 2004. Introduction to Plant Physiology. John Wiley & Sons.
- Salisbury FB & Ross C. 1992. Plant Physiology. 4th Ed. Wadsworth Publ.
- Taiz L & Zeiger E. 2006. Plant Physiology. 4th Ed. Sinauer Associates.

e-Learning Source:

<https://link.springer.com/content/pdf/bfm:978-94-015-3950-0/1.pdf>

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	3	2	3	1	2	3	1	2	2	1	3	2	3			
CO2	1	3	2	2	2	2	3	2	2	2	2	1	3	2	3			
CO3	1	3	2	3	3	2	3	2	2	1	2	2	3	2	3			
CO4	1	2	2	1	2	1	1	3	2	2	1	2	3	3	3			
CO5	2	3	3	2	2	2	1	3	3	2	2	2	3	2	3			

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2019-20							
Course Code	AG 508	Title of the Course	Diseases of Field Crops	L	T	P	C
Year	II	Semester	III	2	0	1	
Course Objectives	<ul style="list-style-type: none"> The student will gain the overall knowledge about the diseases and management practices of different field crops 						

Course Outcomes	
CO1	To understand about the diseases, their epidemiology and management practices of different cereal crops
CO2	To gain knowledge about the diseases, their epidemiology and management practices of different pulse crops
CO3	To attain knowledge about the diseases, their epidemiology and management practices of different oilseed crops
CO4	To understand about the diseases, their epidemiology and management practices of cash crops

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	History, economic importance, symptoms; disease cycle, epidemiology and diseases management of Cereal crops- wheat, barley, rice, pearl millet, sorghum and maize.	6	CO1
2	Unit-II	History, economic importance, symptoms; disease cycle, epidemiology and diseases management of Pulse crops- gram, urd bean, mung bean, lentil, pigeon pea, soybean.	6	CO2
3	Unit-III	History, economic importance, symptoms; disease cycle, epidemiology and diseases management of Oilseed crops- rapeseed and mustard, sesame, linseed, sunflower, groundnut, castor.	7	CO3
4	Unit-IV	History, economic importance, symptoms; disease cycle, epidemiology and diseases management of Cash crops- cotton, sugarcane.	3	CO4

Practicals:		
Detailed study of symptoms and host parasite relationship of important diseases of above-mentioned crops. Collection and dry preservation of diseased specimens of important crops.	20	CO1, CO2, CO3, CO4, CO5

Reference Books:	
<ul style="list-style-type: none"> Joshi LM, Singh DV & Srivastava KD. 1984. Problems and Progress of Wheat Pathology in South Asia. Malhotra Publ. House, New Delhi. Rangaswami G. 1999. Diseases of Crop Plants in India. 4th Ed. Prentice Hall of India, New Delhi. Ricanel C, Egan BT, Gillaspie Jr AG & Hughes CG. 1989. Diseases of Sugarcane, Major Diseases. Academic Press, New York. Singh RS. 1998. Plant Diseases. 7th Ed. Oxford & IBH, New Delhi. Singh US, Mukhopadhyay AN, Kumar J & Chaube HS. 1992. Plant Diseases of International Importance. Vol. I. Diseases of Cereals and Pulses. Prentice Hall, Englewood Cliffs, New Jersey. 	

e-Learning Source:	
https://www.rvskvv.net/images/Diseases_Field-Crops_a_20.04.2020.pdf	
https://www.appleacademicpress.com/fungal-diseases-of-rice-and-their-management-/9781774912478	
https://www.appleacademicpress.com/bacterial-diseases-of-rice-and-their-management-/9781774911914	

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	3	2	3	3	1	2	2	3	3	3	1			
CO2	2	3	2	3	3	2	3	3	2	2	2	3	3	3	1			
CO3	2	3	3	3	3	2	2	2	2	2	2	3	2	2	1			
CO4	2	3	3	3	2	2	3	2	2	2	3	3	3	3	2			

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2021-22							
Course Code	AS 511	Title of the Course	Management of Problematic Soils and Waters	L	T	P	C
Year	II	Semester	III	2	0	1	0
Course Objectives	<ul style="list-style-type: none"> To study about the classification and characterization of salt affected soils of India, survey and mapping of problematic soils of India 						

Course Outcomes	
CO1	To gain basic knowledge about the problematic soils and its factors
CO2	To provide knowledge of classification and characterization of salt affected soils of India
CO3	To imparts knowledge on reclamation and management of soil physical and chemical constraints
CO4	To study about the crop management practices in problematic soils and waters for irrigation
CO5	To deal with survey and mapping of problematic soils of India

Unit No.	Title of the Unit	Content of Unit	Contact Hrs.	Mapped CO
1	Unit-I	Area and distribution of problem soils – acidic, saline, sodic and physically degraded soils; origin and basic concept of problematic soils, and factors responsible.	4	CO1
2	Unit-II	Morphological features of saline, sodic and saline-sodic soils; characterization of salt-affected soils - soluble salts, ESP, pH; physical, chemical and microbiological properties	6	CO2
3	Unit-III	Management of salt-affected soils; salt tolerance of crops - mechanism and ratings; monitoring of soil salinity in the field; management principles for sandy, clayey, red lateritic and dry land soils.	7	CO3
4	Unit-IV	Acid soils - nature of soil acidity, sources of soil acidity; effect on plant growth, lime requirement of acid soils; management of acid soils; biological sickness of soils and its management	6	CO4
5	Unit-V	Quality of irrigation water; management of brackish water for irrigation; salt balance under irrigation; characterization of brackish waters, area and extent; relationship in water use and quality.	7	CO4
6	Unit-VI	Agronomic practices in relation to problematic soils; cropping pattern for utilizing poor quality ground waters.	6	CO5

Practicals:

Characterization of acid, acid sulfate, salt-affected and calcareous soils, Determination of cations (Na ⁺ , K ⁺ , Ca ²⁺ and Mg ²⁺) in ground water and soil samples, Determination of anions (Cl ⁻ , SO ₄ ²⁻ , CO ₃ ²⁻ and HCO ₃ ⁻) in ground waters and soil samples, Lime and gypsum requirements of acid and sodic soils.	18	CO1, CO2, CO3, CO4, CO5
--	----	-------------------------

Reference Books:

- Chemistry of the Soil-Bear FE. 1964, Oxford & IBH.
- Salt-affected Soils- Jurinak JJ. 1978, Department of Soil Science & Biometeorology. Utah State Univ.
- Diagnosis and improvement of Saline and Alkali Soils- USDA Handbook No. 60. 1954, Oxford & IBH.
- Fundamentals of Soil Science- Indian Society of Soil Science (ISSS) 2012, 2nd edition.

e-Learning Source:

- https://www.academia.edu/44609807/Title_Management_of_Problematic_Soils_and_Water
- https://coabnau.in/uploads/1631006625_UG_Ag.Chem.3.3_ProblematicSoils_THEORYNOTES.pdf
- <https://agritech.tnau.ac.in/pdf/3.pdf>

Course Articulation Matrix: (Mapping of COs with POs and PSOs)																		
PO-PSO CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
	CO1	3	1	2	1	1	3	3	3		3	1	3	3	3	1		
CO2	3	3	3	1		3	3	3		3	3	2	3	3	1			
CO3	3	2	1	1		2	3	3	1	1	2	3	2	2	2			
CO4	3	2	2	2		3	3	3		2	3	3	3	3	2			
CO5	3	1	1	1	1	2	3	3		2	3	3	3	2	3			

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation



Integral University, Lucknow

Effective from Session: 2018-2019							
Course Code	PGS501	Title of the Course	Library and Information Services	L	T	P	C
Year	II	Semester	III	0	0	2	0
Course Objectives	<ul style="list-style-type: none"> To study about the role of library in education, research and technology To obtain idea of Intricacies of abstracting and indexing services and to enlighten the students about the computerized library services. To give the knowledge of e resources and search engines 						

Course Outcomes	
CO1	The students will gain the knowledge about the library importance in different sites.
CO2	They gain knowledge of Intricacies of abstracting and indexing services.
CO3	They know about the computerized library services.
CO4	To provide knowledge of e resources.
CO5	To give basic information about search engines.

Practicals:		
	Contact Hrs.	Mapped CO
Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e-resources access methods.	28	CO1, CO2, CO3, CO4, CO5

Reference Books:
<ul style="list-style-type: none"> Singh G. Information Sources, Services and Systems, 2013 Edition. Prentice Hall India Learning Private Limited Library Science, 2018 Edition. Ramesh Publishing House Subhankar Biswas, Durga Sankar Rath. Cataloguing in the New Era: Gazing through the Bodleian Catalogues to RDA, 2017 Edition. Ess Ess Publications

e-Learning Source:
https://www.youtube.com/watch?v=jQlGmtY3sUw (Role of libraries in education, research and technology transfer)

PO-PSO CO	Course Articulation Matrix: (Mapping of COs with POs and PSOs)																	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	1	1	3	3	3	2	3	1	3	1	1	1			
CO2	3	3	1	3	3	3	1	3	2	3	3	2	1	1	1			
CO3	3	2	1	3	3	2	1	3	2	1	2	3	1	1	1			
CO4	3	2	1	3	3	3	1	3	2	2	3	3	1	1	1			
CO5	3	1	1	3	3	3	1	3	2	2	3	3	1	1	1			

1-Low Correlation; 2- Moderate Correlation; 3- Substantial Correlation