Program Syllabus Booklet

Master of Science in Agronomy

(M.Sc. Agronomy-504)

Session: 2020-21

University College of Agriculture,

Guru Kashi University,

Talwandi Sabo

GURU KASHI UNIVERSITY
PUNJAB - INDIA

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Program Name: M.Sc. Agronomy

Program Code: 504

The Program Outcomes (POs) for the program M.Sc. Agronomy are as follow:

PO	Agronomy post-graduates will be able to:
PO1	To acquire knowledge about efficient production systems for major field crops, to enhance the quality & productivity of crop production, to introduce new technologies in crop production: fertigation & new varieties, to understand the morphology & physiology of crops.
PO2	To learn principles and techniques for agronomy of *rabi* oil seed, *kharif* oil seed, fibre crops, sugar crops, forage crops, medicinal and aromatic crops along with their estimation for quantitative and qualitative parameters for growth, yield and quality.
PO3	To learn production technology of kharif and rabi fodder crops, principles and methods of hay and silage making, value addition of poor quality fodder, seed production techniques of fodder crops.
PO4	The skills of cropping systems under different land use pattern, farming systems, allelopathic effects, selection of plants for dry land, forage crop production, different indices like LER, CEY etc.
PO5	To learn the different methods of irrigating different field crops and managing water as precious element of crop production and increasing water use efficiency. To develop the skill for measurement of soil moisture by different direct and indirect methods.
PO6	To learn the weed control by different methods in field crops, herbicide structure factors affecting herbicide selectivity in different situations, calculation of cost benefit ratio, weed control efficiency.
PO7	To get familiar with the physical source, soil and water management in cropping system, concept of sustainability in cropping system, different types of cropping system, crop diversification for sustainable productivity, concept of organic farming, organic standards and classifications in relevant to India and global agriculture, organic manures and their applicability for sustainable agriculture.
PO8	To learn about the crop growth analysis, quantitative agro-biological principles, crop yield equation, physiology of grain yield in cereals, concept of ideal plant type, yield and environmental stress, resources conservation technology and crop residue management- recycling and precision agriculture.
PO9	It provides concepts of soil fertility and productivity, essential plant nutrients & their importance, transformation; it also imparts preparation and use of Farm Yard Manures, commercial manure and fertilizers, fertilizer mixtures, ways to increase fertilizer use efficiency. Get familiar with basic concept of problematic soils, diagnosis and reclamation of saline- alkaline soils and acidic soils, management of sandy, clayey, compact and water logged soils, diagnosis and management of poor quality irrigation water.
PO10	Statistical principles apply in all the areas of experimental work and they have a very important role in agriculture, decision making, agriculture development and estimates agriculture and national income.

The Program Specific Outcomes (PSO) for the program M.Sc. Agronomy are as follow:

PSO	Statement
PSO1	To learn the research methodology and techniques for field crops using principles ofagronomy.
PSO2	Detailed knowledge of cultivation practices, soil, fertilizers, economic associated with farming enterprises.
PSO3	Get familiar with the physical source, soil and water management in cropping system, concept of sustainability in cropping system, different types of cropping system, crop diversification for sustainable productivity

Study Scheme:

Flexible Study Scheme										
Sr.	Course Code	Course Name	Type of Course T/P	(Hours Per Week)			No. of Credits	Internal Marks	External Marks	Total Marks
				L	T	P				
1	504001	Agronomy of Major Cereal and Pulse crops	T	3	0	0	3	50	50	100
2	504003	Agronomy of Oilseed, Fiber, Sugar and Important Medicinal and Aromatic Crops	T	2	0	0	2	50	50	100
3	504005	Agronomy of Fodder and Forage/ Pasture Crops	T	1	0	0	1	50	50	100
4	504007	Dry Land Farming and Water Shed Management	T	2	0	0	2	50	50	100
5	504009	Irrigation Water Management	T	2	0	0	2	50	50	100
6	504011	Weed Management	T	2	0	0	2	50	50	100
7	504013	Cropping system and Sustainable Agriculture	T	3	0	0	3	50	50	100
8	504014	Modern Concepts in Crop Productions	T	2	0	0	2	50	50	100
9	504015	Soil Fertility and Fertilizer Use	T	2	0	0	2	50	50	100
10	504017	Crop production in Problem Soils and Water	T	2	0	0	2	50	50	100
11	504019	Plant Physiology	T	2	0	0	2	50	50	100
12	504021	Agricultural Statistics	T	3	0	0	3	50	50	100
13	504023	Seminar-I	P	NA	NA	NA	1	100	NA	100
14	504023A	Seminar-II	P	NA	NA	NA	1	100	NA	100
15	504002	Lab- Agronomy of Major Cereal and Pulse crops	P	0	0	2	1	60	40	100

16	504004	Lab- Agronomy of Oilseed, Fibre, Sugar and important Medicinal and Aromatic Crops	P	0	0	2	1	60	40	100
17	504006	Lab -Agronomy of Fodder and Forage/ Pasture Crops	P	0	0	2	1	60	40	100
17	504008	Lab -Dry Land Farming and Water Shed Management	P	0	0	2	1	60	40	100
18	504010	Lab -Irrigation Water Management	P	0	0	2	1	60	40	100
19	504012	Lab - Weed Management	P	0	0	2	1	60	40	100
20	504018	Lab- Crop productions in Problem Soils and Water	P	0	0	2	1	60	40	100
21	504020	Lab- Plant Physiology	P	0	0	2	1	60	40	100
22	504022	Lab- Agricultural Statistics	P	0	0	2	1	60	40	100
23	504024	Lab - Fundamentals of Computer Applications	P		-	2	1(NC)			
24	504025	Lab -Library and Information Services	P		-	2	1(NC)			
25	504026	Lab-Technical Writing and Communication Skills	P		-	2	1(NC)			
26	504027	Masters Research	P		-	48	24(NC)			
Elective Subject										
27	504015	Soil Fertility and Fertilizer Use	T	2	0	0	2	50	50	100
28	504016	Lab- Soil Fertility and Fertilizer Use	P	0	0	2	1	60	40	100
29	509106	Integrated Disease Management	T	2	0	0	2	50	50	100

30	509116	Integrated Disease Management Lab	P	0	0	2	1	60	40	100
31	508007	Insect-Pest Management	T	2	0	0	2	50	50	100
32	508019	Insect-Pest Management Lab	P	0	0	2	1	60	40	100
Total No. of Credits							38+ 27 (NC)			

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Annexure 3

Course Name: Agronomy of Major Cereal and Pulse crops

Course Code:

504001

Semester: 1st

L T P

Credits: 03 **3 0 0**

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Knowledge about efficient production systems for major field crops: wheat, gram, rapeseed & mustard, oat, barley.
CO2	Fulfill the demands of commercial firms, farmers, industrials and consumers
CO3	Attain knowledge about enhance the quality & productivity of crop production
CO4	New technologies in crop production: fertigation & new varieties.
CO5	Have knowledge of cropping and farming systems

Course Contents

Sustainable agriculture- Introduction, definition, goal and current concepts, factors affecting ecological balance and ameliorative measures, land degradation and conservation of natural resources.

Origin, history, area, production, classification, morphology, phenology, physiology, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition, quality components,handling and processing of the produce for maximum production of kharif and rabi cereals and pulses (rice, maize, sorghum, millets, wheat, barley), important grain legumes Pigeonpea, mungbean, urdbean, chickpea and lentil).

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	1	2	1	2	2	1	2	3	1	2
CO2	1	2	3	2	2	2	3	1	2	2	1	2	1
CO3	3	3	3	2	2	1	3	2	3	2	2	3	3
CO4	3	3	3	2	2	1	1	3	2	2	3	2	3
CO5	3	3	3	2	3	2	2	2	3	3	2	1	2
Average	2.6	2.6	3	1.8	2.2	1.4	2.2	2	2.2	2.2	2.2	1.8	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh.

Course Name: Lab- Agronomy of Major Cereal and Pulse crops

Course Code:

504002

Semester: 1st

L T P
0 0 1

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Know about the phonological studies at different crop growth stages
CO2	Have knowledge about formulation of cropping scheme for various farm sizes
CO3	know about working of growth indices of prominent intercroppingsystems
CO4	Attain knowledge about skill development regarding : planning and layout of the field experiments
CO5	Have knowledge about skill development regarding the termination of cost cultivation and working outharvest index of various crops
CO6	Understand about various seed production techniques of crops

Course Content

Identification of crops, seeds, fertilizers, pesticides and tillage implements, study of agro- climatic zones of India, Identification of weeds in crops, Methods of herbicide and fertilizer application.

Phenological studies at different growth stages of crop. Estimation of crop yield on the basis of yield attributes; Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; Working out growth indices of prominent intercropping systems of different crops; Estimation of protein content in pulses; Planning and layout of field experiments; Intercultural operations in different crops; Determination of cost of cultivation of different crops; Working out harvest index of various crops; Study of seed production techniques in various crops; Visit of field experiments.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	2	2	2	2	1	2	3	1	2
CO2	1	2	3	3	2	2	3	1	2	2	3	2	1
CO3	3	3	2	2	2	1	3	2	2	2	2	3	3
CO4	3	3	3	2	2	1	1	3	2	2	3	2	3
CO5	3	3	2	2	3	2	2	2	3	3	2	1	2
Average	2.6	2.6	2.6	2	2.2	1.6	1	1.6	2	1.8	2.6	1.8	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh.

Course Name: Agronomy of Oilseed, Fiber, Sugar and Important Medicinal and Aromatic Crops

Course Code:

504003

Semester: 1st

L T P
2 0 0

Credits: 02

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Learn introduction and evaluation of new improved lines of spice crops and medicinal crops.
CO2	Know about the improved agronomic practice
CO3	Have knowledge about improved cultivars and productivity.
CO4	Attain knowledge about Management of pest and diseases.
CO5	Learn about improved post harvest techniques for major medicinal and aromatic crops.

Origin and history, area and production, classification, morphology, phenology, physiology, improved varieties, adaptability, climate, soil, water and cultural requirements, nutrition quality component, handling and processing of the produce for maximum production of *kharif* and *rabi* oilseed crops (Groundnut, sesame, castor, sunflower, soybean, rapeseed and mustard, linseed), fiber crops (Cotton, jute, sunhemp) and sugar crops (Sugar- beet and sugarcane). Description, distribution, climate, soil requirements, cultural practices,processing and important constituents/ quality of medicinal, aromatic, plantation and under-utilized crops, viz., Isabgol, Mentha, Lemongrass, Citronella, Lathyrus, Sesbania, Clusterbean, French bean, Celery, Fenugreek, Grain Amaranth, Coffee, Tea andTobacco Turmeric.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	2	2	2	2	1	2	3	1	2
CO2	1	1	3	2	2	2	2	1	2	2	2	2	1
CO3	3	2	2	2	2	2	3	2	3	2	2	2	3
CO4	3	2	3	3	2	1	1	1	2	2	3	2	3
CO5	3	3	2	2	3	2	2	2	3	3	2	1	2
Average	2.6	2	2.6	2	2.2	1.8	2	1.6	2.2	2.2	2.4	1.6	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh.
3. Handbook of Medicinal and Aromatic Plants by Aditya Pratap & D Ram Singh.

Course Name: Lab- Agronomy of Oilseed, Fiber, Sugar and important Medicinal and Aromatic Crops
Course Code: 504004

Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Learn about the promotion of cultivation and conservation of medicinal plants.
CO2	Attain knowledge about cultivation techniques including quality plant materials, irrigation, fertilizer, plant protection and processing, which are cost effective in different agro-climatic regions of the state.
CO3	Employ latest techniques to improve the production system
CO4	Gain knowledge about the Improved agronomic practice cultivars and productivity
CO5	Know Improved post harvest techniques for major medicinal and aromatic crops and Management of pest and diseases..

Course Contents

Planning and layout of field experiments. Cultivation of sugarcane crop and estimation of its quality parameters. Intercultural operations in different crops; Cotton seed treatment; Working outgrowth indices of prominent intercropping systems; Judging of physiological maturity in different crops and working out harvest index; Working out cost of cultivation of different crops; Estimation of crop yield on the basis of yield attributes; Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; Determination of oil content in oilseeds and computation of oil yield; Estimation of quality of fiber of different fiber crops; Study of seed production techniques in various crops; Visit of field experiments. Identification of crops based on morphological and seedcharacteristics; Raising of herbarium of medicinal, aromatic and under-utilized plants;

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	1	2	2	2	2	1	2	3	2	2
CO2	3	1	2	3	2	2	2	1	2	2	2	2	1
CO3	3	2	2	2	3	3	3	3	3	3	2	2	3
CO4	3	2	3	3	2	1	3	3	2	3	3	2	3
CO5	3	3	3	2	3	2	2	2	3	3	2	2	2
Average	2.8	2	2.6	2.2	2.6	2	2.6	2.2	2.2	2.6	2.4	2	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh.
3. Handbook of Medicinal and Aromatic Plants by Aditya Pratap & D Ram Singh.

Course Name: Agronomy of Fodder and Forage/ Pasture Crops

Course Code:

504005

Semester: 1st

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Have knowledge about the production technology of kharif fodder crops
CO2	Knowledge about the production technology of rabi fodder crops
CO3	Attain knowledge about the principles and methods of hay and silage making
CO4	Knowabout the value addition of poor quality fodder
CO5	Have knowledge about the seed production techniques of fodder crops

Course Contents

Adaptation, distribution, varietal improvement, agro-techniques and quality aspects including antiquality factors of important fodder crops like maize, bajra, guar, cowpea, oats, barley, berseem, senji, lucerne etc. and forage crops like, napier grass, panicum, lasiuras, cenchrusetc. Year-round fodder production and management, preservation and utilization of forage and pasture crops. Principles and methods of hay and silage making; chemical and biochemical changes, nutrient losses and factors affecting quality of hay and silage. Use of physical and chemical enrichments and biological methods for improving nutrition. Value addition of poor quality fodder. Economics of forage cultivation uses and seed production techniques. Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveller, seed drill.

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	2	2	2	2	1	2	3	2	2
CO2	1	1	2	3	2	2	2	1	2	1	2	2	1
CO3	1	1	1	2	3	3	3	3	1	3	2	1	1
CO4	3	2	1	2	3	3	2	1	2	3	1	2	3
CO5	3	3	3	2	3	2	2	2	3	1	2	2	2
Average	2.2	1.8	2	2	2.6	2.4	2.2	1.8	1.8	2	2	1.8	1.8

The correlation levels are: “1” – Low Correlation, “2” – Medium Correlation, “3” – High Correlation and “-” indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh

Course Name: Lab- Agronomy of Fodder and Forage/ Pasture Crops

Course Code: 504006

Semester:

1st

L T P

Credits: 01 **1 0 0**

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Understand about the phonological studies at different crop growth stages
CO2	Knowledge about the formulation of cropping scheme for various farm sizes
CO3	Learn about working of growth indices of prominent intercroppingsystems and seed production techniques of crops
CO4	Know the skill development regarding the planning and layout of the field experiments.
CO5	Get knowledge about development the termination of cost cultivation and working out harvest index of various crops

Course Contents

Farm operations in raising fodder crops; Canopy measurement, yield and quality estimation, viz. crude protein, NDF, ADF, lignin, silica, cellulose etc. of various fodder and forage crops; Anti-quality components like HCN in sorghum and such factors in other crops; Hay and silage making and economics of their preparation.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	1	2	2	2	2	3	2	3	2	2
CO2	3	3	2	3	2	1	2	3	2	3	2	2	1
CO3	2	3	1	2	2	3	3	3	1	3	2	3	3
CO4	3	2	3	3	2	3	3	1	2	3	3	2	3
CO5	3	3	3	2	3	2	2	2	3	1	2	2	2
Average	2.6	2.6	2.4	2.2	2.2	2.2	2.4	2.2	2.2	2.4	2.4	2.2	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Textbook of Field Crops Production by Rajendra Prasad.
2. Modern Techniques of Raising Field Crops by Chhida Singh, Prem Singh and Rajbir Singh.
3. Handbook of Medicinal and Aromatic Plants by Aditya Pratap & D Ram Singh.

Course Name: Dry Land Farming and Water Shed Management
Course Code: 504007
Semester: 1st

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Acquire knowledge about the concept of dry farming
CO2	Get knowledge about the constraints limiting crop production in dry land areas
CO3	Learn about the types of the drought and stress physiology and registrants to drought
CO4	Attain knowledge about the soil moisture conservation and crop productiontechnology in dry land
CO5	Know about the concept of watershed resource management,problems, approach, and components

Course Contents

Definition, concept and characteristics of dry land farming. Dry land versus rainfed farming. Significance and dimensions of dry land farming in Indian agriculture. Soil and climatic parameters with special emphasis on rainfall characteristics. Constraints limiting crop production in dry land areas. Types of drought. Characterization of environment for water availability. Crop planning for erratic and aberrant weather conditions. Stress physiology and resistance to drought, adaptation of crop plants to drought and drought management strategies. Preparation of appropriate crop plans for dry land areas, mid contingent plan for aberrant weather conditions. Tillage, tilth, frequency and depth of cultivation, compaction in soil tillage, concept of conservation tillage, tillage in relation to weed control and moisture conservation, techniques and practices of soil moisture conservation (use of mulches, kinds, effectiveness and economics). Anti-transpirants, soil and crop management techniques, seeding and efficient fertilizer use. Fertilzer placement top dressing foliage application. Special weather forecasts for frost, insects, pests and diseases, drought, high winds, heat waves etc. Protection against frost, forest fire, drought and floods. Wind breaks and shelter belts. Principles of cloud seeding.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	1	2	3	1	2	2	2	2	3	2	3	2	2

CO2	3	3	2	1	2	1	2	3	2	3	2	2	1
CO3	2	1	1	2	2	1	1	3	1	1	2	1	3
CO4	3	2	3	3	2	3	1	1	2	1	3	2	1
CO5	3	3	3	2	1	2	2	2	3	1	2	2	2
Average	2.4	2.2	2.4	1.8	1.8	1.8	1.6	2.2	2.2	1.6	2.4	1.8	1.8

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Dhopte. A.M. 2002. Agro technology for Dry land Farming. Scientific Publ.
2. Dhruv Narayana, V.V. 2002. Soil and Water Conservation Research in India. ICAR.
3. Gupta, U.S. (Ed.). 1995. Production and Improvements of Crops for Drylands. Oxford & IBH.
4. Katyal, J.C. and Farrington, J. 1995. Research for Rainfed Farming. CRIDA.
5. Rao, S.C. and Ryan, J. 2007. Challenges and Strategies of Dryland Agriculture. Scientific Publishers.
6. Singh, P. and Maliwal, P.L. 2005. Technologies for Food Security and Sustainable Agriculture. Agrotech Publishing Company.
7. Singh, R.P. 1988. Improved Agronomic Practices for Dryland Crops. CRIDA.
8. Singh, R.P. 2005. Sustainable Development of Dryland Agriculture in India. Scientific Publ.
9. Singh, S.D. 1998. Arid Land Irrigation and Ecological Management. Scientific Publishers.
10. Venkateshwarlu, J. 2004. Rainfed Agriculture in India. Research and Development Scenario. ICAR.

Course Name: Lab- Dry Land Farming and Water Shed Management
Course Code: 504008
Semester: 1st

L T P
1 0 0

Credits: 01
Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Get knowledge about skill development of seed treatment
CO2	Learn about the seed germination and crop establishment in relation to soil moisture contents
CO3	Attain the knowledge about development estimation of moisture index, aridity index, spray of anti- transparent and their effect on crops

CO4	Learn about development collection and interpretation of data for water balance equationwater use efficiency and preparation of crop plans
CO5	Conduct visits the dry land and soil conservation research station and watershed projects

Course Contents

Seed treatment, seed germination and crop establishment in relation to soil moisture contents, moisture stress effects and recovery behaviour of important crops, estimation of moisture index and aridity index; spray of anti-transpirants and their effect on crops, collection and interpretation of data for water balance equations, water use efficiency, preparation of crop plans for different drought conditions. Study of field experiments relevant to dryland farming, visit to dryland and soil conservation research stations and watershed projects.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	3	1	2	2	2	2	3	2	3	2	2
CO2	3	3	2	1	2	1	2	3	2	3	2	2	1
CO3	2	1	1	2	2	1	1	3	1	1	2	1	3
CO4	3	2	3	3	2	3	1	1	2	1	3	2	1
CO5	3	3	3	2	1	2	2	2	3	1	2	2	2
Average	2.4	2.2	2.4	1.8	1.8	1.8	1.6	2.2	2.2	1.6	2.4	1.8	1.8

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. P Dhopte. A.M. 2002. Agro technology for Dry land Farming. Scientific Publ.
2. Dhruv Narayana, V.V. 2002. Soil and Water Conservation Research in India. ICAR.
3. Gupta, U.S. (Ed.). 1995. Production and Improvements of Crops for Drylands. Oxford & IBH.
4. Katyal, J.C. and Farrington, J. 1995. Research for Rainfed Farming. CRIDA.
5. Rao, S.C. and Ryan, J. 2007. Challenges and Strategies of Dryland Agriculture. Scientific Publishers.
6. Singh, P. and Maliwal, P.L. 2005. Technologies for Food Security and Sustainable Agriculture. Agrotech Publishing Company.
7. Singh, R.P. 1988. Improved Agronomic Practices for Dryland Crops. CRIDA.
8. Singh, R.P. 2005. Sustainable Development of Dryland Agriculture in India. Scientific Publ.
9. Singh, S.D. 1998. Arid Land Irrigation and Ecological Management. Scientific Publishers.

10. Venkateshwarlu, J. 2004. Rainfed Agriculture in India. Research and Development Scenario. ICAR.

Course Name: Irrigation Water Management

Course Code: 504009

Semester: 1st

L T P
2 0 0

Credits: 02

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Empower the farmers to adopt irrigated agricultural practices in place of traditional rainfed agriculture
CO2	Transfer the location specific technology/ research recommendations of SAUs to the grass root level farmers
CO3	Motivate the farmers for adoption of improved agricultural practices for enhancement of crop production and productivity
CO4	Create specific awareness among the farmers to achieve sustainable agricultural production while maintaining soil health & safe guarding environment.
CO5	Learn about Micro irrigation system and less water requiring crops

Course Contents

History of irrigation in India; Major irrigation projects in India; Water resources development; Crop water requirements; Concepts of irrigation scheduling, Different approaches of irrigation scheduling; Soil water depletion plant indices and climatic parameters; Concept of critical stages of crop growth in relation to water supplies; Crop modeling, crop coefficients, water production functions; Soil water movement in soil and plants, transpiration, soil-water-plant relationships and water absorption by plants. Plant response to water stress. Methods of irrigation viz. surface methods, overhead methods, drip irrigation and air conditioning irrigation, merits and demerits of various methods, design and evaluation of irrigation methods; Measurement of irrigation water, application and distribution efficiencies; Management of water resources (rain, canal and ground water) for agricultural production; Agronomic considerations in tile-design and operation of irrigation projects, characteristics of irrigation and family systems affecting irrigation management; lrrigation legislation; Water quality, conjunctive use of water, irrigation strategies under different situation of water availability, optimum crop plans and cropping patterns in canal command areas; Drainage requirement of crops, methods of field drainage, their layout and spacing. Influence of agro-meteorological factors on incidence of pests and diseases, Effect of timing and effectiveness of control measures.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2

CO2	3	3	2	1	3	1	2	3	2	3	2	2	2
CO3	2	2	3	2	2	2	3	3	1	2	2	1	3
CO4	2	2	2	3	2	3	1	3	2	2	3	2	1
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2
Average	2.6	2.4	2.6	1.8	2.2	2	2	2.6	2.2	2.2	2.4	1.8	2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Hansen, V.E., Israelsen, O.W., and Stringham, G.E. 1979. Irrigation Principles and Practices (4th Ed.). John Wiley and Sons, New York
2. Lenka D.1999. Irrigation and Drainage. Kalyani publishing House, Ludhiana.
3. Michael, A.M. 1978. Irrigation: Theory and Practice. Vikas Publishing House, New Delhi.
4. Mishra.R.D. and Ahamed, M.1993. Manual of Irrigation Agronomy. Oxford and IBH Publishing Co., New Delhi
5. Paliwal, K.V. 1972. Irrigation with Saline Water. WTC, IARI, New Delhi.
6. Panda, S. C. 2003. Principles and Practices of Water Management. Agrobios.
7. Prihar, S. S. and Sandhu.B.S.1987. Irrigation of Field Crops - Principles and practices, ICAR, New Delhi.
8. Sankara Reddi, G.H. and Yellamanda Reddy, T. 2003 Efficient Use of Irrigation Water. Kalyani , Ludhiana.
9. Singh, P. and Maliwal, P. L. 2005. Technologies for Food Security and Sustainable Agriculture. Agrotech Publ.

Course Name: Lab- Irrigation Water Management

Course Code: 504010

Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Learn about the development regarding Prevention of excess use of water
CO2	Have knowledge about the development regarding Prevention of soil erosion
CO3	Have knowledge to determinate of irrigation requirements.
CO4	Understand the Maintenance of quality of ground water and downstream surface water

CO5	Attain the knowledge about development regarding the Increase in crop yield and maintenance of product quality

Course Contents

Measurement of soil water potential by using tensiometer, pressure plate and membrane apparatus. Soil-moisture characteristics curve. Water flow measurements using different devices. Determination of irrigation requirements. Calculation of irrigation efficiency. Determination of infiltration rate. Determination of saturated/ unsaturated hydraulic conductivity. Determination of Consumptive use, water requirement of a given cropping pattern.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	3	3	2	1	3	1	2	3	2	3	2	2	2
CO3	2	2	3	2	2	2	3	3	1	2	2	1	3
CO4	2	2	2	3	2	3	1	3	2	2	3	2	1
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2
Average	2.6	2.4	2.6	1.8	2.2	2	2	2.6	2.2	2.2	2.4	1.8	2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Hansen, V.E., Israelsen, O.W., and Stringham, G.E. 1979. Irrigation Principles and Practices (4th Ed.). John Wiley and Sons, New York
2. Lenka D.1999. Irrigation and Drainage. Kalyani publishing House, Ludhiana.
3. Michael, A.M. 1978. Irrigation: Theory and Practice. Vikas Publishing House, New Delhi.
4. Mishra.R.D. and Ahamed, M.1993. Manual of Irrigation Agronomy. Oxford and IBH Publishing Co., New Delhi
5. Paliwal, K.V. 1972. Irrigation with Saline Water. WTC, IARI, New Delhi.
6. Panda, S. C. 2003. Principles and Practices of Water Management. Agrobios.
7. Prihar, S. S. and Sandhu.B.S.1987. Irrigation of Field Crops - Principles and practices, ICAR, New Delhi.
8. Sankara Reddi, G.H. and Yellamanda Reddy, T. 2003 Efficient Use of Irrigation Water. Kalyani , Ludhiana.
9. Singh, P. and Maliwal, P. L. 2005. Technologies for Food Security and Sustainable Agriculture. Agrotech Publ.

Course Name: Weed Management

Course Code:

504011

Semester: 1st

L T P
2 0 0

Credits: 02

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Define a weed and its four stages of development
CO2	Understand the difference between annual, biennial and perennial weeds
CO3	Have knowledge about cultural weed controls
CO4	Know the advantages and disadvantages of the various method of herbicides applications
CO5	Understand herbicide carryover and how to prevent it

Course Contents

Weed biology, ecology and crop-weed competition including allelopathy Scope and principles of weed management and control/weed classification, biology, ecology and allopath, crop weed indices. History and development of herbicide. Classification and selectivity of herbicides based on chemical, physiological application and selectivity. Mode and mechanism of action of important herbicides. Herbicide structure- activity relationshipand factors affecting the efficiency of herbicides. Herbicide formulations and mixtures. Weed control through herbicides in soil and plants. Herbicide resistance in weeds and crops herbicide rotations. Weed management in major crops and cropping systems. Management of parasitic weeds and special weed problems. Weed shifts in cropping systems. Aquatic and perennial weed control. Integrated weed management. Cost: benefit analysis of weed management. Importance of weeds, classification, crop-weed competition, concepts of weed management principles and methods, herbicides- classification, selectivity and resistance, allele-pathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	3	3	2	3	3	3	2	3	2	3	3	2	2
CO3	2	2	3	2	2	2	3	3	3	2	2	3	3
CO4	2	2	2	3	3	3	3	3	2	2	3	2	3
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2
Average	2.6	2.4	2.6	2.2	2.4	2.4	2.4	2.6	2.6	2.2	2.6	2.2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Weed Science : Basic and Applications by T. K. Das
2. Weed Management : Principles and Practices by O.P. Gupta
3.

Course Name: Lab - Weed Management

Course Code:

504012

Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Identify different weeds.
CO2	Identify different Herbicides and their mode of action
CO3	Known about the method of weed control
CO4	Learn how to preserve weed plants in lab and herbarium
CO5	Know the advantages and disadvantages of the various method of herbicides applications

Course Contents

Identification of important crop weeds. Preparation of a weed herbarium. Weed survey in crops and cropping systems. Crop-weed competition studies. Weed indices. Preparation of spray solutions of herbicides for high and low-volume sprayers. Use of various types of spray pumps and nozzles and calculation of swath width. Economics of weed control. Herbicide residue analysis in plant and soil. Bioassay of herbicide residue. Calculation of herbicidal requirement.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	3	3	2	3	3	3	2	3	2	3	3	2	2
CO3	2	2	3	2	2	2	3	3	3	2	2	3	3
CO4	2	2	2	3	3	3	3	3	2	2	3	2	3
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2

Average	2.6	2.4	2.6	2.2	2.4	2.4	2.4	2.6	2.6	2.2	2.6	2.2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Weed Science: Basic and Applications by T. K. Das
2. Weed Management : Principles and Practices by O.P. Gupta

Course Name: Cropping system and Sustainable Agriculture
Course Code:
504013
Semester: 1st

L T P
3 0 0

Credits: 03

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Get familiar with the physical source, soil and water management in cropping system
CO2	Learn about the concept of sustainability in cropping system and objectives
CO3	Attain the knowledge about the different types of cropping system, organic manures and their applicability for sustainable agriculture
CO4	Get knowledge about the crop diversification for sustainable productivity
CO5	Get knowledge about the organic farming, organic standards and classifications in relevant to India and global agriculture

Course Contents

Cropping systems- definition, indices and its importance. Physical resources, soil and water management in cropping systems, assessment of land use. Concept of sustainability in cropping systems, scope and objectives. Production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping. Mechanism of yield advantage in intercropping systems. Multi-storied cropping and yield stability in intercropping. Role of nonmonetary inputs and low cost technologies. Research need on sustainable agriculture. Crop diversification for sustainability. Organic farming - concept and definition, its relevance to India and global agriculture and future prospects. Soil fertility-nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers. Farming systems, crop rotations, intercropping in relation to maintenance of soil productivity. Control of weeds, diseases and insect pest management, biological agents, pheromones and biopesticides. Socio-economic impacts. Marketing and export potential, Organic standards, certification, labeling and accreditation procedures. Organic farming and national economy.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	2	3	2	3	2	2	2	3	2	3	3	2	1
CO3	2	3	3	2	2	2	2	2	2	2	2	3	3
CO4	2	2	1	2	3	1	2	3	2	2	2	2	3
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2
Average	2.4	2.6	2.4	2	2.2	1.8	2	2.4	2.4	2.2	2.4	2.2	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Principles of Agronomy by S. R. Reddy
2. Principles Of Agronomy by Reddy & Reddy

Course Name: Modern Concepts in Crop Productions
Course Code:
504014
Semester: 1st

L T P
2 0 0

Credits: 02

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Acquire the knowledge about crop growth analysis
CO2	Attain the knowledge about quantitative agro-biological principles
CO3	Get knowledge about crop yield equation and physiology of grain yield in cereals
CO4	Acquire knowledge about the concept of ideal plant type and environmental stress
CO5	Learn about the knowledge about the resources conservation technology residue management- recycling and precision agriculture

Course Contents

Crop growth analysis in relation to environment. Agro-ecological zones of India. Quantitative agro-biological principles and inverse yield nitrogen law. Mitscherlich yield equation, its interpretation and applicability, Baule unit. Effect of lodging in cereals. Physiology of grain yield in cereals. Optimization of plant population and planting geometry in relation to different resources. Concept of ideal plant type and crop modeling for desired crop yield. Scientific principles of crop production and crop response production functions. Concept of soil plant relations. Yield and environmental stress. Integrated farming systems. Resource

conservation technology including modern concept of tillage, dry farming. Determining the nutrient needs for yield potentiality of crop plants. Crop residue management-recycling and its effective utilization. Remote sensing for yield forecasting. Precision agriculture. Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements-reversible plough, one way plough, harrow, leveller, seed drill.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	1	3	2	2	2	3	2	3	2	2
CO2	2	2	2	2	2	2	3	3	2	3	2	2	2
CO3	2	3	2	2	3	3	2	2	2	1	2	2	3
CO4	1	2	1	2	3	1	2	3	1	2	2	2	2
CO5	3	3	3	2	1	2	2	2	3	2	2	2	2
Average	2	2.4	2.2	1.8	2.4	2	2.2	2.4	2.2	2	2.2	2	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Balasubramaniyan P & Palaniappan SP. 2001. Principles and Practices of Agronomy. Agrobios.
2. Fageria NK. 1992. Maximizing Crop Yields. Marcel Dekker.
3. Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. Soil Fertility and Fertilizers. 7th Ed. Prentice Hall.
4. Paroda R.S. 2003. Sustaining our Food Security. Konark Publ. 14
5. Reddy SR. 2000. Principles of Crop Production. Kalyani Publ.
6. Sankaran S & Mudaliar TVS. 1997. Principles of Agronomy. The Bangalore Printing & Publ.
7. Singh SS. 2006. Principles and Practices of Agronomy. Kalyani.

Course Name: Soil Fertility and Fertilizer Use
Course Code: 504015
Semester: 1st

L T P
2 0 0

Credits: 02
Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Acquire the knowledge regarding the concept of soil fertility and soil Productivity
CO2	Get the knowledge regarding the concept of nutrients sources
CO3	Attain knowledge regarding the concept of transformation of nutrients (NPK)
CO4	Learn about the concept of availability of micro nutrients andtheir transformation
CO5	Know the concept of site specific nutrient management concept of soil fertility evaluation and soil quality

Course Contents

Soil fertility and soil productivity. Nutrient sources – fertilizers and manures. Soil N – sources and N transformations. Biological nitrogen fixation. Nitrogenous fertilizers - their fate in soils and enhancing N use efficiency. Soil P - forms, reactions in soils and factors affecting availability. Management of P fertilizers. Potassium- forms, mechanism of fixation, Q/I relationships. Management of K fertilizers. Sulphur, Ca and Mg – source, forms, fertilizers and their behavior in soils and management. Micronutrients- critical limits in soils and plants, factors affecting their availability, sources and management. Common soil test methods for fertilizer recommendations.Site-specific and plant need based nutrient management. Concept of balanced nutrition and integrated nutrient management. Blanket fertilizer recommendations- usefulness and limitations. Soil fertility evaluation. Soil quality in relation to sustainable agriculture. Phenology and seasonal changes of weather conditions. Crop Climatology. Thermoperiodism; Photoperiodism; Heat Unit concept and its applications; climatic water budgeting technique and its application in evaluation of moisture availability periods with in crop growing season, planning of multiple cropping pattern for different soil-climatic zones of India based on above techniques.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	2	3	3	2	2	2	3	3	3	3	2	3	3
CO3	2	3	2	3	1	1	2	2	2	1	2	2	3
CO4	1	2	1	2	3	1	2	3	1	2	2	2	2
CO5	3	3	3	2	1	1	2	3	3	2	2	2	2

Average	2.2	2.6	2.4	2.0	2	1.4	2.2	2.6	2.4	2	2.2	2.2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Brady NC & Weil R.R 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu.
2. Fageria NK, Baligar VC & Jones CA. 1991. Growth and Mineral Nutrition of Field Crops. Marcel Dekker.
3. Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. Soil Fertility and Fertilizers. 7th Ed. Prentice Hall.
4. Prasad R & Power JF. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.
5. Yawalkar KS, Agrawal JP & Bokde S. 2000. Manures and Fertilizers. Agri-Horti Publ.
6.

Course Name: Lab - Soil Fertility and Fertilizer Use
Course Code:
504016
Semester: 1st

L T P
1 0 0

Credits: 01
Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Have knowledge regarding the laboratory and green house experiment are evaluation of indices of nutrient availability
CO2	Acquire knowledge about calculation of critical values of nutrients in soil and plants
CO3	Determine the total and available nutrients in soils
CO4	Know about the skill development regarding analysis of nutrients in plants
CO5	Know the concept of site specific nutrient management concept of soil fertility evaluation and soil quality

Course Contents

Laboratory and greenhouse experiments for evaluation of indices of nutrient availability and their critical values in soils and plants. Chemical analysis of soil for total and availablenutrients. Analysis of plants for essential elements.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3

CO1	3	2	3	1	3	2	2	2	3	2	3	2	2
CO2	2	3	3	2	2	2	3	3	3	3	2	3	3
CO3	2	3	2	3	1	1	2	2	2	1	2	2	3
CO4	1	2	1	2	3	1	2	3	1	2	2	2	2
CO5	3	3	3	2	1	1	2	3	3	2	2	2	2
Average	2.2	2.6	2.4	2.0	2	1.4	2.2	2.6	2.4	2	2.2	2.2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Brady NC & Weil R.R 2002. The Nature and Properties of Soils. 13th Ed. Pearson Edu.
2. Fageria NK, Baligar VC & Jones CA. 1991. Growth and Mineral Nutrition of Field Crops. Marcel Dekker.
3. Havlin JL, Beaton JD, Tisdale SL & Nelson WL. 2006. Soil Fertility and Fertilizers. 7th Ed. Prentice Hall.
4. Prasad R & Power JF. 1997. Soil Fertility Management for Sustainable Agriculture. CRC Press.
5. Yawalkar KS, Agrawal JP & Bokde S. 2000. Manures and Fertilizers. Agri-Horti Publ.

Course Name: Crop production in Problem Soils and Water
Course Code: 504017
Semester: 1st

L T P
2 0 0

Credits: 02
Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Have knowledge regarding basic concept of problematic soils
CO2	Learn about the knowledge regarding the diagnosis and reclamation of saline - alkaline soils
CO3	Attain the knowledge regarding the diagnosis and reclamation of acidic soils
CO4	Learn regarding the management of sandy, clayey, compact and waterlogged soils
CO5	Acquire knowledge about the diagnosis and management of poor quality irrigationwater

Course Contents

Area, distribution, origin and basic concepts of problematic soils. Morphological features and characterization of salt-affected soils. 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. Acid soils – nature, sources and management. Effect on plant growth. Lime requirement of acid soils. Biological sickness of soils and its management. Quality of irrigation water, management of brackish water. Salt balance under irrigation. Characterization of brackish waters, area and extent. Agronomic practices in relation to problematic soils. Cropping pattern for utilizing poor quality ground waters. Phenology and seasonal changes of weather conditions. Crop Climatology. Thermoperiodism; Photoperiodism; Heat Unit concept and its applications; climatic water budgeting technique and its application in evaluation of moisture availability periods with in crop growing season, planning of multiple cropping pattern for different soil-climatic zones of India based on above techniques.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	2	2	2	3	2	3	2	2
CO2	3	2	2	2	2	3	2	2	2	2	2	3	3
CO3	2	2	2	3	1	1	2	2	2	3	1	2	3
CO4	1	2	2	2	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	2	3	3	1	2	2	2
Average	2.2	2.2	2.4	2.2	1.8	2	2	2.4	2.2	2	2	2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Introductory Soil Science by D.K. Das.
2. Principles of Agronomy by S. R. Reddy
3. Principles Of Agronomy by Reddy & Reddy

Course Name: Lab - Crop productions in Problem Soils and Water
Course Code: 504018
Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement

CO1	Have knowledge regarding the characterization of acid, acid sulphate, salt -affected and calcereous soils.
CO2	Attain knowledge about the determination of cations (Na+, K+, Ca++ and Mg++) in ground water and soil samples,
CO3	Learn about the development regarding the determination of anions (CI, SO4-2 , Co3-2 and HCO3) in ground water and soil
CO4	Acquire the knowledge about the determination of lime and gypsum requirement of acid and sodic soil
CO5	Learn regarding the management of sandy, clayey, compact and water logged soils

Course Contents

Characterization of acid, acid sulfate, salt- affected and calcareous soils. Determination ofcations (Na+, K+, Ca+, and Mg++) in ground water and soil samples. Determination ofanions (CI-, SO4 2-, CO3 2- and HCO3 -) in ground waters and soil samples. Lime and gypsum requirement of acid and sodic soil.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	3	2	2	2	3	2	3	2	2
CO2	3	2	2	2	2	3	2	2	2	2	2	3	3
CO3	2	2	2	3	1	1	2	2	2	3	1	2	3
CO4	1	2	2	2	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	2	3	3	1	2	2	2
Average	2.2	2.2	2.4	2.2	1.8	2	2	2.4	2.2	2	2	2	2.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Introductory Soil Science by D.K. Das.
2. Principles of Agronomy by S. R. Reddy
3. Principles Of Agronomy by Reddy & Reddy

Course Name: Plant Physiology
Course Code: 504019
Semester: 1st

L T P
2 0 0

Credits: 02
Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Have knowledge about the various plant water relations
CO2	learn about the mineral nutrition in plants
CO3	Understand the mechanism of various metabolic processes in plants
CO4	Know the basic knowledge about growth and development in plants
CO5	Do skills and techniques related to plant physiology so that they can design their own experiments

Course Contents

Photosynthesis, pigments, Co2 fixation and reduction. Carbohydrate synthesis in C3,C4 andCAM plants. Translocation of metabolites. Photo respiration. Environmental and agriculturalaspects of photosynthetic efficiency, source- sink relationship and productivity. Respiration.Concept of growth, differentiation and pattern formation. Factor affecting growth and general aspects of development. Hormones and growth requlators -auxins , gibberellins, cytokinins, ethylene and ABA. Other inhibitors. Retardants. Polyamines. Alliphatic alcohols. Brassins. Harmonal regulation of growth & development. Photoperiodism. Flowering hormones, Vernalization. Abscission.. Aging. Senescence. Physiology of seed and fruit development. Seed germination. Seed and bud dormancy. Plant water relationship. Osmotic potential, water potential . Pressure potential and their relationship. Plasmolysis. Imbibitions. Absorption and translocation of water. Stomata, stomata mechanism. Factor affecting water loss. Physiological role of nutrients. Weather forecasting for agriculture; General forecasting-medium range, short range and. seasonal forecasting for agriculture purpose.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	2	1	-	2	1	-	3	1	2
CO2	1	2	3	2	2	-	-	1	2	2	1	2	1
CO3	3	3	3	2	2	1	-	2	3	2	2	3	3
CO4	3	3	3	2	2	1	1	-	2	2	3	2	3
CO5	3	3	3	2	3	2	-	2	3	3	2	1	2

Average	2.6	2.6	3	1.8	2.2	1.2	1	1.6	2.2	1.8	2.2	1.8	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Plant Physiology and Development by Eduardo Zeiger and Lincoln Taiz.
2. Physicochemical and Environmental Plant Physiology by Park Nobel.
3. Fundamentals of Plant Physiology by V.K. Jain.

Course Name: Lab - Plant Physiology
Course Code:
504020
Semester: 1st

L T P
1 0 0

Credits: 01
Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Understand the mechanism of various metabolic processes in plants
CO2	Acquire basic knowledge about growth and development in plants
CO3	Equip students with skills and techniques related to plant physiology so that they can design their own experiments
CO4	Know the basic knowledge about growth and development in plants
CO5	Equip students with skills and techniques related to plant physiology so that they can design their own experiments

Course Contents

Experiments related to photosynthesis. Chlorophyll and other pigment determination. Experiments related to respiration, Osmosis, 1mbitition, Plasmolysis. Measurements of µw and µs. Membrane permeability. Transpiration experiments. catalase, peroxidase and nitrate reductase activities as indicators of Nutrient status of crop. Experiment on growthmeasurements. Experiment on quality of light on seed germination. Breaking of dormancy. Experiment on photoperiodism. Experiment on hormonal regulation and development.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	3	2	3	1	2	1	-	2	1	-	3	1	2
CO2	1	2	3	2	2	-	-	1	2	2	1	2	1
CO3	3	3	3	2	2	1	-	2	3	2	2	3	3

CO4	3	3	3	2	2	1	1	-	2	2	3	2	3
CO5	3	3	3	2	3	2	-	2	3	3	2	1	2
Average	2.6	2.6	3	1.8	2.2	1.2	1	1.6	2.2	1.8	2.2	1.8	2.2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Plant Physiology and Development by Eduardo Zeiger and Lincoln Taiz.

2. Physicochemical and Environmental Plant Physiology by Park Nobel.

3. Fundamentals of Plant Physiology by V.K. Jain.

Course Name: Agricultural Statistics
Course Code:
504021
Semester: 1st

L T P
3 0 0

Credits: 03

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Organize, manage and present data, analyze statistical data graphically using frequency distributions and cumulative frequency distributions
CO2	Analyze statistical data using measures of central tendency, dispersion and location
CO3	Use the basic probability rules, including additive and multiplicative laws, using the terms, independent and mutually exclusive events
CO4	Translate real-world problems into probability models and derive the probability density function of transformation of random variables
CO5	Calculate probabilities, and derive the marginal and conditional distributions of bivariate random variables

Course Contents

Frequency distribution, standard error and deviation, correlation and regression analyses, co-efficient of variation; Hypothesis testing. Concept of p-value. Tests of significance-t, F andchi-square (X2); Data transformation and missing plot techniques; Design of experiments and their basic principles, completely randomized, randomized block, split plot, strip-plot, factorial and simple confounding designs; Efficiency of designs; Methods of statistical analysis for cropping systems including intercropping; Pooled analysis. Selection of experimental designs, Rotational experiments. Experiments to study the effect of years and locations compilation, presentation and interpretation of the data.

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	3	1	2	2	3	2	3	2	2
CO2	1	1	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	1	1	1	2	2	1	1	2	1
CO4	1	2	1	1	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	1	1	3	1	2	2	2
Average	1.8	2	2.2	1.6	1.8	1.8	1.4	2	2	1.6	2	1.6	1.6

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Panse, V.G. and Sukhatme, P.V. 1954. *Statistical methods for agricultural workers.* pp. 361.
2. Gupta, S.C. and Kapoor, V.K. 2014. *Fundamentals of Mathematical Statistics.* Sultan Chand & Sons, New Delhi.pp. 230.
3. Snecdecor, G.W. and Cochran, W.G. 1989. *Statistical Methods,* 8th Edition. Wiley-Blackwell. Pp.524.
4. Rangaswamy, R. 2016. *Textbook of Agricultural Statistics.*New Age International (P) Ltd. New Delhi. pp. 531.

Course Name: Lab- Agricultural Statistics

Course Code: 504022

Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Statistical principles apply in all the areas of experimental work and they have a very important role in agriculture.
CO2	It is required at the national level and farm level for agriculture policy making, decision making, agriculture development and estimates agriculture and national income.
CO3	Statistics in agriculture are great importance in variety of area. One of the most important is to ascertain the volume of crop that needs to be produced based on output and demand of previous year.

CO4	It is helpful in land utilization and irrigation including the net area sown gross cultivated area, current follow, cultivable waste
CO5	Know how to analyze statistical data graphically using frequency distributions and cumulative frequency distributions

Course Contents

Correlation analysis. Regression analysis (exponential, power function, quadratic, multi-variate, selection of variables, validation of models, ANOVA and testing of hypothesis). Tests of significance (Z-test, t-test, F-test and Chi-square test). Analysis of variance. Completely randomized design. Randomized block and latin square designs. Missing plot and analysis of covariance. 23, 24 and 33 simple and confounded experiments. Split plot designs. Factorial in split plot designs.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	3	1	2	2	3	2	3	2	2
CO2	1	1	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	1	1	1	2	2	1	1	2	1
CO4	1	2	1	1	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	1	1	3	1	2	2	2
Average	1.8	2	2.2	1.6	1.8	1.8	1.4	2	2	1.6	2	1.6	1.6

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Panse, V.G. and Sukhatme, P.V. 1954. *Statistical methods for agricultural workers.* pp. 361.
2. Gupta, S.C. and Kapoor, V.K. 2014. *Fundamentals of Mathematical Statistics.* Sultan Chand & Sons, New Delhi.pp. 230.
3. Snecdecor, G.W. and Cochran, W.G. 1989. *Statistical Methods,* 8th Edition. Wiley-Blackwell. Pp.524.
4. Rangaswamy, R. 2016. *Textbook of Agricultural Statistics.*New Age International (P) Ltd. New Delhi. pp. 531.

Course Name: Seminar-I
Course Code: 504023
Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Show competence in identifying relevant information, defining and explaining topics under discussion
CO2	Present the classical and innovative work related to plant pathology subject.
CO3	Reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem
CO4	Judge when to speak and how much to say, speak clearly and audibly in a manner appropriate to the subject
CO5	Ask appropriate questions, use evidence to support claims, respond to a range of questions

Course Contents

Seminar topic will be suggested by faculty

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	3	2	3	1	2	2	3	2	3	2	2
CO2	1	1	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	1	1	1	2	2	1	1	2	1
CO4	1	2	1	1	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	1	1	3	1	2	2	2
Average	1.8	2	2.2	1.6	1.8	1.8	1.4	2	2	1.6	2	1.6	1.6

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Seminar-II

Course Code: 504023A

Semester: 1st

L T P
1 0 0

Credits: 01

Course Outcomes: On successful completion of this course, the students will able to learn:

CO	Statement
CO1	Show competence in identifying relevant information, defining and explaining topics under discussion
CO2	Present the classical and innovative work related to plant pathology subject
CO3	Reach across diverse disciplines to apply theories, methods and knowledge bases from multiple fields to a single question or problem
CO4	Judge when to speak and how much to say, speak clearly and audibly in a manner appropriate to the subject,
CO5	Ask appropriate questions, use evidence to support claims, respond to a range of questions

Course Contents

Seminar topic will be suggested by faculty

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	3	2	3	1	2	2	3	2	3	2	2
CO2	1	1	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	1	1	1	2	2	1	1	2	1
CO4	1	2	1	1	2	3	2	3	1	2	2	1	2
CO5	3	3	3	2	1	1	1	1	3	1	2	2	2
Average	1.8	2	2.2	1.6	1.8	1.8	1.4	2	2	1.6	2	1.6	1.6

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Fundamental of Computer Application

Course Code: 504024

Semester: 1st

L T P
1 0 0

Credits: 01(NC)

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Learn & understand basics of MS-Word, Excel, preparation of Graphs
CO2	Understand functions of MS-Excel.
CO3	Creating graphs in MS- Excel
CO4	Leaning about MS-Access basics.
CO5	Have knowledge about preparation of bar diagram and Power Point

Course Contents

Ms-word: creating a document, saving and editing, use of options from tool bars, format, insert and tools(spelling and grammar), alignment of text, creating a table, merging cells, column and row width. Ms-excel: entering expressions through the formula tool bar and use of inbuilt functions, sum, average, max, min. Creating graphs and saving with and without data in Ms-excel. Ms-access: creating database, structuring with different types of fields. Ms-power point: preparation of slides on power point. Internet Browsing: browsing a web page and creating of E-Mail ID. Agri. net (ARIS).

The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	1	2	1	1	2	2	1	2	1	2	2
CO2	1	2	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	2	2	1	1	2	1	1	2	2
CO4	1	2	1	1	2	3	2	1	1	2	2	1	2
CO5	2	3	1	2	1	1	1	1	3	1	2	2	2
Average	1.6	2.2	1.4	1.6	1.6	2	1.4	1.4	1.6	1.6	1.6	1.6	1.8

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

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Suggested Readings:

1. Salaria, R.S. 2017. *Computer Fundamentals.*Daryaganj, New Delhi. pp. 486.

2. Manish, S. and Bhatt, A. 2016. *Computers in Agriculture: Fundamentals and Applications.* New India Publishing Agency.New Delhi. pp. 190.
3. Manjunath, B.E. 2010.*Computer Basics.*Vasan Publications, Bengaluru, Karnataka. pp. 356.

Course Name: Lab - Library and Information Services
Course Code:
504025
Semester: 1st

L T P
1 0 0

Credits: 01(NC)
Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Identify library services and availability of resources in order to develop a realistic overall plan for research.
CO2	Use general information resources to increase familiarity with the topic and disciplinary vocabulary.
CO3	Define the research topic, question or thesis to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
CO4	Identify keywords, synonyms and related terms in order to flexibly search information resources.
CO5	Learn about how to search the research citations and research papers.

Course Contents

Introduction to Library and its services; five laws of library science; type of documents; classification and cataloguing; organization of documents; sources of information primary, secondary and tertiary; current awareness and SDI services; tracing information from reference sources; library survey; preparation of bibliography; use of Online Public Access Catalogue; use of CD-ROM databases and other computerized library services, CeRA, J-Gate; use of Internet including search engines and its resources; e-resources.

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/ CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PSO 1	PSO 2	PSO 3
CO1	2	2	1	2	1	1	2	2	1	2	1	2	2
CO2	1	2	2	2	2	3	1	2	1	2	2	1	1
CO3	2	2	2	1	2	2	1	1	2	1	1	2	2
CO4	1	2	1	1	2	3	2	1	1	2	2	1	2
CO5	2	3	1	2	1	1	1	1	3	1	2	2	2
Average	1.6	2.2	1.4	1.6	1.6	2	1.4	1.4	1.6	1.6	1.6	1.6	1.8

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Gita, S. 2012. *Library and Information Services.* LAP Lambert Academic Publishing.USA. pp. 76.
2. Kishore, A. 2021. *A Conceptual approach to library and information science A complete self study guide.*2nd edition. AKB Publication. Jaipur. pp. 250.
3. Pandey, D.K. 2004. *Library and Information Science.*Atlantic Publishers & Distributors. New Delhi. pp. 272.

Course Name: Lab - Technical Writing and Communication Skills
Course Code: 504026
Semester: 1st

L T P
3 0 0

Credits: 03

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Understand and know how to follow the stages of the writing process (prewriting/writing/rewriting) and apply them to technical and workplace writing tasks.
CO2	Produce a set of documents related to technology and writing in the workplace and will have improved their ability to write clearly and accurately.
CO3	Understand the basic components of definitions, descriptions, process explanations, and other common forms of technical writing.
CO4	Familiar with basic technical writing concepts and terms, such as audience analysis, jargon, format, visuals, and presentation.
CO5	Learn about how to do writing of abstracts, summaries and what are citations et

Course Contents

Various forms of scientific writings: thesis, technical papers, review, manuals etc., various parts of thesis and research communications: title page, authorship contents page, preface, introduction, review of literature, material and methods, experimental results and discussion; writing of abstracts, summaries, précis, citations etc. commonly used abbreviations in the theses and research communications; illustrations, photographs and drawings with suitable captions; paginations, numbering of tables and illustrations; writing of numbers and dates in scientific write-ups; editing and proof reading; writing a review article, access methods.

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The mappings of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	1	2	2	1	2	1	2	2
CO2	1	2	2	2	2	3	1	2	1	2	2	1	1

CO3	2	2	2	1	2	2	1	1	2	1	1	2	2
CO4	1	2	1	1	2	3	2	1	1	2	2	1	2
CO5	2	3	1	2	1	1	1	1	3	1	2	2	2
Average	1.6	2.2	1.4	1.6	1.6	2	1.4	1.4	1.6	1.6	1.6	1.6	1.8

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Suggested readings:

1. Day, R.A. and Gastel, B. 2011. *How to Write and Publish a Scientific Paper*, 7th Edition.GreenwoodPress,United States. pp. 300.
2. Laplante, P.A. 2011. *Technical Writing: A Practical Guide for Engineers and Scientists*.CRC Press, London. pp. 250.
3. Greenlaw,R. 2012. *Technical Writing, Presentational Skills and Online Communication: Professional Tools and Insights*. Idea Group,U.S. pp. 247.

Course Name: Master's Research
Course Code: 504027
Semester: 1st

L T P
3 0 0

Credits: 24 (NC)

Course Outcomes: On successful completion of this course, the students will be able to:

CO	Statement
CO1	Conduct an investigation and solve scientific problems using a range of methods, and apply appropriate and/or theoretical techniques
CO2	Get knowledge about Negotiate, plan, design and execute a research-based project, analyze data
CO3	Get knowledge about to provide a written report or thesis on the methodology and outcomes in an appropriate format
CO4	Learn about to teach methodology of planning, layout, data recording, analysis
CO5	Acquire knowledge about interpretation and reportwriting of agronomic experiments

Course Contents

The mapping of PO/PSO/CO attainment are as follow:

PO/PSO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	2	2	1	2	1	1	2	2	2	2	1	2	2

CO2	2	2	2	2	2	3	2	2	2	2	2	2	2
CO3	2	2	2	2	2	2	2	1	2	1	1	2	2
CO4	2	2	2	2	2	3	2	1	2	2	2	1	2
CO5	2	3	1	2	1	1	1	1	3	2	2	2	2
Average	2	2.2	1.6	2	1.6	2	1.8	1.4	2.2	1.8	1.6	1.8	2

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Integrated Disease Management

Course Code: 509106

L T P

Credits: 02 **2 0 0**

Course Outcomes: On successful completion of this course, the students will able to:

CO	Statement
CO1	Study importance of integrated disease management.
CO2	Understand the concept and tools of integrated disease management
CO3	Learn about the various components of integrated disease management, their limitations and implications
CO4	Study about the development of IDM for the control of diseases
CO5	Familiarize with the IDM adaptation in important crops, rice, wheat, cotton, sugarcane, chickpea, rapeseed mustard, pearl millet, Kharif pulses, vegetable and fruit crops

Course Content

Introduction, definition, concept and tools of disease management. Components of integrated disease management, their limitations and implications. Development of IDM and its adaptation in important crops, rice, wheat, cotton, sugarcane, chickpea, rapeseed mustard, pearlmillet, Kharif pulses, vegetable and fruit crops.

Suggested readings:

1. Sharma, R.C. and Sharma, J.N.2018. *Integrated Plant Disease Management*, Scientific Publisher,Jodhpur.pp. 362.
2. Nagarajan,S.2013. *Dynamics of Plant Diseases*, Allied Publishers,New Delhi, India. pp. 120.
3. Mehrotra, R.S. 2011.*Plant Pathology*, McGraw Hill Education, New York, United States. pp. 910.
4. Gupta, V.K. and Sharma, R.C. (Eds). 1995. *Integrated Disease Management and Plant Health.* Scientific Publ., Jodhpur. pp. 319.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PSO 1	PSO 2	PSO 3
CO1	3	2	1	1	1	1	1	1	1	2	1	2	1
CO2	2	1	2	1	1	2	1	1	1	2	1	1	1
CO3	1	1	2	2	2	1	1	1	2	3	2	1	2
CO4	2	2	3	1	1	1	2	2	1	1	1	2	2
CO5	2	1	1	1	1	2	1	1	2	1	1	1	1
Average	2.0	1.4	1.8	1.2	1.2	1.4	1.2	1.2	1.4	1.8	1.2	1.4	1.4

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Integrated Disease Management lab

Course Code: 509116

L T P

0 0 2

Credits: 01

Course Outcomes: On successful completion of this course, the students will able to:

CO	Statement
CO1	Study the introduction and definition of IDM.
CO2	Understand the concept and tools of disease management.
CO3	Learn about the various components of integrated disease management, their limitations and implications.
CO4	Study about the development of IDM for the control of diseases.
CO5	Familiarize with the IDM adaptation in important crops, rice, wheat, cotton, sugarcane, chickpea, rapeseed mustard, pearl millet, Kharif pulses, vegetable and fruit crops.

Course Content

Application of biological, cultural, chemical and biocontrol agents, their compatibility and integration in IDM. Demonstration of IDM in certain crops as project work.

Suggested readings:

5. Sharma, R.C. and Sharma, J.N.2018. *Integrated Plant Disease Management*, Scientific Publisher,Jodhpur.pp. 362.
6. Nagarajan,S.2013. *Dynamics of Plant Diseases*, Allied Publishers,New Delhi, India. pp. 120.
7. Mehrotra, R.S. 2011.*Plant Pathology*, McGraw Hill Education, New York, United States. pp. 910.

8. Gupta, V.K. and Sharma, R.C. (Eds). 1995. *Integrated Disease Management and Plant Health.* Scientific Publ., Jodhpur. pp. 319.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PS O 1	PS O 2	PS O 3
CO1	3	2	1	1	1	1	1	1	1	2	1	2	1
CO2	2	1	2	1	1	2	1	1	1	2	1	1	1
CO3	1	1	2	2	2	1	1	1	2	3	2	1	2
CO4	2	2	3	1	1	1	2	2	1	1	1	2	2
CO5	2	1	1	1	1	2	1	1	2	1	1	1	2
Averag e	2.0												

The correlation levels are: "1" – Low Correlation, "2" – Medium Correlation, "3" – High Correlation and "-" indicates there is no correlation.

Course Name: Insect-Pest Management

Course Code: 508007

Semester: All (1 to 4)

Credits: 2 **LTP**
2 0 0

Course Outcomes: On completion of this course, the successful students should be able to:

CO	Statement
CO1	Acquire knowledge about losses due to insect pests in crops and stored grains.
CO2	Learn about the components of IPM
CO3	Disseminate knowledge about surveillance, forecasting and issuing of pests alerts.
CO4	Analyse merits and constraints of IPM vis-à-vis chemical control measures.
CO5	Analyse different case studies related to IPM.

Course contents

History, origin, definition and evolution of various related terminology of pest management. Concept, philosophy and ecological principles of IPM. Determination of crop losses and economic thresholds. Pest survey and surveillance, forecasting, types of surveys including remote sensing methods, factors affecting surveys. Integration of different pest management techniques. Political, social and legal implications of IPM. Pest and pesticide risk analysis, cost-benefit ratios. Case studies of successful IPM programmes. National and international institutions for integrated pest management.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	1	2	3	1	1	2	1	2	1	2	2	1	1
CO2	1	2	1	2	1	2	1	1	2	1	1	1	2
CO3	2	1	1	3	2	1	2	1	1	3	1	1	1
CO4	2	3	3	2	1	1	1	1	3	2	2	1	1

CO5	1	2	2	1	2	2	2	2	3	3	3	3	3
Avg	1.4	2	2	1.8	1.4	1.6	1.4	1.4	2	2.2	1.8	1.4	1.6

Suggested Readings:

- Atwal, A.S., Dhaliwal, G.S. and David, B.V. 2001. *Elements of Economic Entomology*. Popular Book Depot, Chennai.
- Dhaliwal, G.S., Singh, R. and Chhillar, B.S. 2006. *Essentials of Agricultural Entomology*. Kalyani Publ., New Delhi. .
- Dunston, A.P. 2007. *The Insects: Beneficial and Harmful Aspects*. Kalyani Publishers, New Delhi
- Evans, J.W. 2005. *Insect Pests and their Control*. Asiatic Publ., New Delhi.
- Prakash, I. and Mathur, R.P. 1987. *Management of Rodent Pests*. ICAR, New Delhi.
- Saxena, R.C and Srivastava, R.C. 2007. *Entomology at a Glance*. Agrotech Publ. Academy, Jodhpur.
- Atwal, A.S. and Dhaliwal, G.S. 2002. *Agricultural Pests of South Asia and their Management*. Kalyani Publ., New Delhi.
- Butani, D.K. and Jotwani, M.G. 1984. *Insects and Vegetables*. Periodical Expert Book Agency, New Delhi.

Course Name: Insect-Pest Management Lab

Course Code: 508019

Semester: All (1 to 4)

Credits: 1 **LTP**
0 0 2

Course Outcomes: On completion of this course, the successful students should be able to:

CO	Statement
CO1	Work out cost benefit ratios of IPM in different crop scenarios
CO2	Estimate and evaluate methods of population estimation of insect pests in various agro ecosystems
CO3	Study avoidable and unavoidable losses by insects
CO4	Learn different strategies of IPM
CO5	Analyse crop loss assessments.

Course contents

Practical: Characterization of agro-ecosystems. Sampling methods and factors affecting sampling. Population estimation methods. Crop loss assessments, potential losses, avoidable and unavoidable losses.

The mapping of PO/PSO/CO attainment is as follows:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO 1	PSO 2	PSO 3
CO1	2	3	2	2	3	1	1	2	3	3	1	1	1
CO2	1	1	2	3	2	1	2	1	3	2	2	2	2
CO3	2	1	2	3	1	2	1	2	1	1	1	2	1
CO4	3	1	1	1	2	1	1	1	1	1	1	1	1
CO5	2	2	2	2	1	1	1	2	3	2	2	2	2

Suggested Readings:

- Dhaliwal, G.S. and Arora, R. 2003. *Integrated Pest Management – Concepts and Approaches*. Kalyani Publ., New Delhi.
- Dhaliwal, G.S., Singh, R. and Chhillar, B.S. 2006. *Essentials of Agricultural Entomology*. Kalyani Publ., New Delhi.
- Flint, M.C. and Bosch, R.V. 1981. *Introduction to Integrated Pest Management. 1st Ed*., Springer, New York.
- Horowitz, A.R.and Ishaaya, I. 2004. *Insect Pest Management: Field and Protected Crops.* Springer, New Delhi.
- Ignacimuthu, S.S. and Jayaraj, S. 2007. *Biotechnology and Insect Pest Management.* Elite Publ., New Delhi.

Total Number of Course	28
Number of Theory Course	12
Number of Practical Course	16
Total Number of Credits	**38+27 (NC)**

Annexure-4

ACADEMIC INSTURCTIONS

Attendance Requirements

A student shall have to attend 75% of the scheduled periods in each course in a semester; otherwise he / she shall not be allowed to appear in that course in the University examination and shall be detained in the course(s). The University may condone attendance shortage in special circumstances (as specified by the Guru Kashi University authorities). A student detained in the course(s) would be allowed to appear in the subsequent university examination(s) only on having completed the attendance in the program, when the program is offered in a regular semester(s) or otherwise as per the rules.

Assessment of a course

Each course shall be assessed out of 100 marks. The distribution of these 100 marks is given in subsequent sub sections (as applicable).

For Theory

	Internal (50)						**External (50)**	**Total**
Components	**Attendance**	**Assignment**			**MST1**	**MST2**	**ETE**	
		A1	A2	A3				
Weightage	10	10	10	10	30	30	50	
Average Weightage	10	10			30		50	100

For Practical

	Internal (60)				**External (40)**	**Total**
Components	**Lab Performance**	**Lab Record**	**Attendance**	**Viva**	**ETE**	
Weightage	30	10	10	10	60	
Average Weightage		30	10 10	10	60	100

Passing Criteria

The students have to pass both in internal and external examinations. The minimum passing marks to clear in examination is 40% of the total marks.