Program Syllabus Booklet

Master of Science in Agronomy

(M.Sc. Agronomy-504)

Session: 2016-17

University College of Agriculture,

Guru Kashi University,

Talwandi Sabo

GURU KASHI UNIVERSITY
PUNJAB - INDIA

TABLE OF CONTENTS

S No.	Content	Page No
1	Curriculum / Scheme - Annexure-2	3-5
2	Semester wise Syllabi - Annexure-3	6-23
3	Academic Instructions - Annexure-4	24-26

Introduction

Agronomy is not just plowing and planting, but a major component of agro-ecology which includes several activities that affect the environment and human populations. An Agronomist remains in the center of efforts to work with issues related to environmental and ecological concerns, and to increase the production of food, feed, fuels and fiber for a growing world citizenry. Agronomists today are involved with many issues including producing food, creating healthier food, managing environmental impacts, and creating energy from plants. Research activities in Agronomy focus on systems analysis and simulation modeling of environmental and management impacts on agricultural production; these are key to sustainability of the agriculture production systems. In fact, agronomy is a discipline that combines the application of sciences like Biology, Chemistry, Ecology, Earth Science, and Genetics. It is a science that directly deals with the crop production technologies with a view to improve and sustain factor productivity; decline in factor productivity is the major cause of concern to Agricultural Scientists today. The significance of agronomy in agriculture and to Society can never be undermined.

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	T	2	0	0	2	50	50	100

		Productions								
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	P	0	0	2	1	60	40	100
16	504004	Lab- Agronomy of Oilseed, Fiber, 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 Manageme	P	0	0	2	1	60	40	100

		nt								
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
Total No. of Credits								38+ 27 (NC)		

Annexure 3

Course Name: Agronomy of Major Cereal and Pulse crops

Course Code: 504001

Semester: 1st

L T P
3 0 0

Credits: 03

Course Contents

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).

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
1 0 0

Credits: 01

Course Contents

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 Ofcropping 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 ofcultivation of different crops; Working out harvest index of various crops; Study of seed production techniques in various crops; Visit of field experiments.

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

Credits: 02 **2 0 0**

Course Contents

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 underutilized crops, viz., Isabgol, Mentha, Lemongrass, Citronella, Lathyrus,Sesbania,Clusterbean, French bean, Celery, Fenugreek, Grain Amaranth, Coffee, Tea andTobacco, Turmeric.

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 Oilseed, Fiber, Sugar and important Medicinal and Aromatic Crops

Course Code: 504004

Semester: 1st

L T P

Credits: 01 **1 0 0**

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;

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
1 0 0

Credits: 01

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.

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
1 0 0

Credits: 01

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.

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 Contents

Definition, concept and characteristics of dry land farming; Dry land versus rain fed 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;Fertilizer placement, top dressing, and foliage application.

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 contents

Seed treatment, seed germination and crop establishment in relation to soil moisture contents, moisture stress effects and recovery behavior 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 dry land farming, visit to dry land and soil conservation research stations and watershed projects.

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 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 anddistribution efficiencies; Management of water resources (rain, canal and ground water) foragricultural production; Agronomic considerations in tile-design and operation of irrigation projects, characteristics of irrigation and family systems affecting irrigation management; irrigation 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.

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 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;

Suggested readings:

1. 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 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;

Suggested readings:

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

Course Name: Lab - Weed Management

Course Code: 504012

Semester: 1st

L T P
1 0 0

Credits: 01

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;

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 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.

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
Credits: 02	**2 0 0**

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;

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 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.

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

L T P
1 0 0

Credits: 01

Course contents

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

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
Credits: 02	**2 0 0**

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 groundwaters.

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

Credits: 01 **1 0 0**

Course contents

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

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 contents

Photosynthesis, pigments, Co2 fixation and reduction. Carbohydrate synthesis in C3,C4 and CAM plants. Translocation of metabolites. Photo respiration. Environmental and agricultural aspects of photosynthetic efficiency, source- sink relationship and productivity. Respiration.Concept of growth, differentiation and pattern formation. Factor affecting growth and general aspects of development. Harmones 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 dormany. 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.

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 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.

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
Credits: 03 **3 0 0**

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.

Course Name: Lab- Agricultural Statistics

Course Code: 504022

Semester: 1st

L	T	P
1	0	0

Credits: 01

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.

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
Credits: 01 **1 0 0**

Course Name: Seminar-II
Course Code: 504023A
Semester: 1st

L T P
Credits: 01 **1 0 0**

Course Name: Fundamental of Computer Application

Course Code: 504024 Semester: 1st

L T P
1 0 0

Credits: 01(NC)

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).

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.

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

L T P
Credits: 01(NC) **1 0 0**

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.

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 contents

Various forms of scientific writings: theses, 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, precise, 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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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

Credits: 24 (NC) **3 0 0**

Elective Subject

Course Name: Integrated Disease Management

Course Code: 509106

L T P

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.

Course Name: Integrated Disease Management lab

Course Code: 509116

L T P

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.

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	40	
Average Weightage	30	10	10	10	40	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.