SCHEME & SYLLABUS
M. Sc. Ag. (Agronomy)

Dept. of Agricultural Sciences

UISH

Sant Baba Bhag Singh University

2018

INDEX

16	AGR516-18	Principles and practices of organic farming	**2+1**	**II**	**21-22**
17	AGR518-18	Mechanism of herbicide action	**2+1**	**II**	**22-24**
18	AGR500-18*	Masters Reserch	**0+5**	**II**	**24**
19	AGR550-18	Soil erosion and conservation	**2+1**	**II**	**24-25**
20	AGR552-18	Soil, water and air pollution	**2+1**	**II**	**25-26**
21	AGR603-18*	Masters Seminar	**1+0**	**III**	**27**
22	AGR605-18*	Masters Comprehensive	**0+2**	**III**	**27**
23	AGR601-18*	Masters Research	**0+5**	**III**	**27**
24	EVS501-18	Disaster management	**1+0**	**III**	**27-28**
25	AGR600-18*	Masters Research	**0+10**	**IV**	**29**

*Compulsory for Master's programm

List of Courses Offered

Sr. No.	Subject Code	Subject	Credit	Semester
Major Courses				
1	AGR501-18*	Modern concepts in crop production	**3+0**	**I**
2	AGR503-18*	Principles and practices of soil fertility and nutrient management	**2+1**	**I**
3	AGR505-18*	Principles and practices of weed management	**2+1**	**I**
4	AGR507-18*	Principles and practices of water management	**2+1**	**I**
5	AGR509-18	Agronomy of major cereals and pulses	**2+1**	**I**
6	AGR511-18	Agronomy of fodder and forage crops	**2+1**	**I**
7	AGR502-18	Agronomy of oilseed, fibre and sugar crops	**2+1**	**II**
8	AGR504-18	Cropping systems	**2+0**	**II**
9	AGR506-18	Dryland farming	**2+1**	**II**
10	AGR510-18	Agrometeorology and crop weather forecasting	**2+1**	**II**
11	AGR512-18	Agronomy of medicinal, aromatic and under-utilized crops	**2+1**	**II**
12	AGR514-18	Agrostology and agroforestry	**2+1**	**II**
13	AGR516-18	Principles and practices of organic farming	**2+1**	**II**
14	AGR518-18	Mechanism of herbicide action	**2+1**	**II**
15	AGR500-18*	Masters Reserch	**0+5**	**II**

16	AGR603-18*	Masters Seminar	**1+0**	**III**
17	AGR605-18*	Masters Comprehensive	**0+2**	**III**
18	AGR601-18*	Masters Research	**0+5**	**III**
19	AGR600-18*	Masters Research	**0+10**	**IV**
Minor Courses				
20	AGR550-18	Soil erosion and conservation	**2+1**	**II**
21	AGR552-18	Soil,water and air pollution	**2+1**	**II**
Supporting Courses				
22	MAT529-18	Experimental designs	**2+1**	**I**
23	LIB501-18	Library and information services	**0+1**	**I**
24	CSE551-18	Computer fundamentals and programming	**2+1**	**I**
25	EVS501-18	Disaster management	**1+0**	**III**

*Compulsory for Master's programm

M. Sc. Ag. Agronomy scheme

SEMESTER-I						
Sr. No.	**Subject Code**	**Subject Name**	**Credits (L:T:P)**	**Contact Hours (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	AGR501-18	Modern concepts in crop production	3:0:0	3:0:0	3	3
2	AGR503-18	Principles and practices of soil fertility and nutrient management	2:0:1	2:0:2	4	3
3	AGR505-18	Principles and practices of weed management	2:0:1	2:0:2	4	3
4	AGR507-18	Principles and practices of water management	2:0:1	2:0:2	4	3
	AGR509-18	Agronomy of major cereals and pulses	2:0:1	2:0:2	4	3
5	MAT529-18	Experimental designs	2:0:1	2:0:2	4	3
6	LIB501-18	Library and information services	0:0:1	0:0:2	2	1
7	CSE551-18	Computer fundamentals and programming	2:0:1	2:0:2	4	3

Total Contact hrs: 29

Total Credit Hours: 22

SEMESTER-II						
Sr. No.	**Subject Code**	**Subject Name**	**Credits (L:T:P)**	**Contact Hours (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	AGR502-18	Agronomy of oilseed, fibre and sugar crops	2:0:1	2:0:2	4	3
2	AGR504-18	Cropping systems	2:0:0	2:0:0	2	2
3	AGR506-18	Dryland farming	2:0:1	2:0:2	4	3
4	AGR550-18	Soil erosion and conservation	2:0:1	2:0:2	4	3
5	AGR552-18	Soil,water and air pollution	2:0:1	2:0:2	4	3
6	AGR500-18	Masters Reserch	0:0:5	0:0:10	10	5

Total Contact hrs: 28
Total Credit Hours: 19

SEMESTER-III						
Sr. No.	**Sub Code**	**Subject Name**	**Credits (L:T:P)**	**Contact Hours (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	EVS501-18	Disaster management	1:0:0	1:0:0	1	1
2	AGR603-18	Masters Seminar	1:0:0	1:0:0	1	1
3	AGR605-18	Masters Comprehensive	0:0:2	0:0:4	4	2
4	AGR601-18	Masters Research	0:0:5	0:0:10	10	5

Total Contact hrs: 16
Total Credit Hours: 9

SEMESTER-IV						
Sr. No.	**Sub Code**	**Subject Name**	**Contact Hours (L:T:P)**	**Credits (L:T:P)**	**Total Contact Hours**	**Total Credit Hours**
1	AGR600-18	Masters Research	0:0:20	0:0:10	20	10

Total Contact hrs: 20
Total Credit Hours: 10

Course Scheme Summary

Semester	L	T	P	Contact hrs/wk	Credits	Training
1	16	-	12	29	22	
2	10	-	18	28	19	
3	02	-	14	16	9	
4	0	-	20	20	10	
Total	**28**	**-**	**64**	**93**	**60**	

CREDIT LOAD FOR MASTER'S PROGRAM		
I	**MAJOR CREDITS**	**24**
II	**MINOR CREDITS**	**06**
III	**SUPPORTING**	**08**
IV	**MASTER'S COMPREHENSIVE**	**02**
V	**MASTER'S RESEARCH**	**20**
TOTAL I to IV		**40**
TOTAL		**40 + 20=60**

SEMESTER-I

Course Code	AGR501-18
Course Title	**Modern concepts in crop production**
Type of course	Theory
L T P	3:0:0
Credits	3(3+0)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the basic concepts of soil management and crop production.

Syllabus

Theory

UNIT-I

Crop growth analysis in relation to environment, Agroclimatic zones of India. Inverse yield nitrogen law, Mitscherlich's yield equation, its interpretation and applicability, Baule unit.

UNIT-II

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.

UNIT-III

Scientific principles of crop production, seed production techniques in various crops, crop response production functions, concept of soil plant relations, yield and environmental stress.

UNIT-IV

Integrated farming systems, organic farming, resource conservation technology including modern concept of tillage, dry farming, determining the nutrient needs for yield potentiality of crop plants, precision agriculture.

Recommended Books:

S. No	Name	Author(S)	Publisher
1	Principles of crop production	SR Reddy	Kalyani publishers
2	Principles of agronomy	Reddi and Reddy	Kalyani publishers
3	Principles of agronomy	SR Reddy	Kalyani publishers

Course Code	AGR503-18
Course Title	**Principles and practices of soil fertility and nutrient management**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)

Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To impart knowledge of soil fertility and plant nutrients and apprise about the integrated approach of plant nutrition and sustainability of soil resources.

Syllabus

Theory

UNIT-I

Soil fertility and productivity- factors affecting, features of a good soil management, problems of supply and factors affecting availability of nutrients, relation between nutrient supply and crop growth, organic farming - basic concepts and definitions. Criteria of essentiality of nutrients, essential plant nutrients – their functions and deficiency symptoms, transformation and dynamics of major plant nutrients in soil.

UNIT-II

Preparation and use of farmyard manure, compost, green manures, vermicompost, biofertilizers and other organic concentrates, their composition, availability and crop responses, recycling of organic wastes and residue management.

UNIT-III

Commercial fertilizers, composition, relative fertilizer value and cost, crop response to different nutrients, residual effects and fertilizer use efficiency, fertilizer mixtures and grades, agronomic, chemical and physiological methods of estimating and techniques of increasing fertilizer use efficiency, nutrient interactions.

UNIT-IV

Time and methods of manures and fertilizers application, foliar application and its concept, relative performance of organic and inorganic manures, economics of fertilizer use, concept of balanced nutrition and integrated nutrient management, use of vermi-compost and residue wastes in crops.

Practical

1. Identification of nutrients deficiency symptoms.
2. Determination of soil ph, EC and organic Carbon.
3. Determination of available N, P, K and S in soils.
4. Determination of total N, P, K and S in plants
5. Interpretation of interaction effects and computation of economic and yield optima.

Recommended Books:

S.No.	Name	Author(S)	Publisher
1	Introductory soil science	Dilip Kumar Das	Kalyani publishers
2	Fertilizers-Atextbook	Ranjan Kumar Das	Kalyani publishers
3	Manures and fertilizers	PC Das	Kalyani publishers
4	The nature and properties of soils	Brady NC and Weil RR	Pearson Edu.
5	Soil fertility and fertilizers	Tisdale SL WL and Nelson	Prentice Hall

Course Code	AGR505-18
Course Title	**Principles and practices of weed management**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To familiarize the students about the weeds, herbicides and methods of weed control.

Syllabus

Theory

UNIT-I

Classification and characteristics of weeds, special weed problems including aquatic and parasitic weeds, ecology and physiology of major weeds, ecophysiology of crop-weed competition including allelopathy.

UNIT-II

Principles and methods of weed control, concept of integrated weed management, principles of chemical weed control, weed control through bioherbicides.

UNIT-III

Mode and mechanism of action of herbicides, herbicide selectivity, herbicide combinations, adjuvants and safeners, degradation of herbicides in soils and plants, effect of herbicides in relation to environment, herbicide resistance in weeds and crops.

UNIT-IV

Weed management in major crops and cropping systems, weed shifts in cropping systems, control of weeds in non-cropped situations including grasslands, pastures, tea gardens, orchards and aquatic ecosystem in hills. Cost:benefit analysis of weed management, weed indices.

Practical

1. Identification of important weeds of different crops.
2. Preparation of a weed herbarium, weed survey in crops and cropping systems
3. Crop-weed competition studies, calculation of doses of herbicides and preparation of spray solutions of herbicides for high and low volume sprayers.
4. Use of various types of spray pumps and nozzles, their calibration and related calculations and economics of weed control.

Recommended books:

S.No.	Name	Author(S)	Publisher
1	Weed management principles and practices	OP Gupta	Kalyani publishers
2	Fundamentals of weed science	OP Gupta	Kalyani publishers

3	Weed management	US Walia	Kalyani publishers

Course Code	**AGR507-18**
Course Title	**Principles and practices of water management**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the principles of water management and practices to enhance the water productivity.

Syllabus

Theory

UNIT-I

Water and its role in plants, water resources of India, major irrigation projects, extent of irrigated area under different crops in India and in different states.

UNIT-II

Concept of water potential, water movement in soils and plants, transpiration, soil-water-plant relationships, water absorption by plants, crop plants response to water stress, crop plant adaptation to moisture stress condition.

UNIT-III

Soil, plant and meteorological factors determining water needs of crops, scheduling of irrigation, depth and methods of irrigation, micro-irrigation systems, fertigation, management of water in controlled environment and polyhouses.

UNIT-IV

Water management in crops and cropping systems, quality of irrigation water and management of saline water for irrigation, water use efficiency and practices to enhance water productivity. Excess of soil water and plant growth, water management in problem soils, drainage requirement of crops and methods of field drainage, their layout and spacing.

Practical

1. Measurement of soil water potential by using tensiometer, resistance block and pressure plate and membrane apparatus
2. Soil-moisture characteristics curves
3. Determination of FC and PWP
4. Water flow measurements using different devices.
5. Determination of infiltration rate and irrigation requirements
6. Calculation of irrigation efficiency
7. Determination of saturated hydraulic conductivity

Recommended Books:

S. No	Name	Author(S)	Publisher
1	Principles of crop production	SR Reddy	Kalyani publishers
2	Principles of agronomy	Reddi and Reddy	Kalyani publishers
3	Principles of agronomy	SR Reddy	Kalyani publishers

Course Code	**AGR509-18**
Course Title	**Agronomy of major cereals and pulses**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the crop husbandry of major cereals and pulses.

Syllabus

Theory

UNIT-I

Origin and history, adaptability, area and production, classification, improved varieties, climate, soil, nutrition, water and cultural requirements, quality components, post-harvest handling and processing of *Kharif* cereals- rice, maize, bajra & jowar

UNIT-II

Origin and history, adaptability, area and production, classification, improved varieties, climate, soil, nutrition, water and cultural requirements, quality components, post-harvest handling and processing of *Rabi* cereals- wheat, barley & oats

UNIT-III

Origin and history, adaptability, area and production, classification, improved varieties, climate, soil, nutrition, water and cultural requirements, quality components, post-harvest handling and processing of *Kharif* pulses- soybean, red gram, cowpea, green gram & black gram

UNIT-IV

Origin and history, adaptability, area and production, classification, improved varieties, climate, soil, nutrition, water and cultural requirements, quality components, post-harvest handling and processing of *Rabi* pulses- chickpea, lentil & field pea

Practical

1. Phenological studies of important crops
2. Estimation of crop yield on the basis of yield attributes
3. Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; computation of growth indices (LER, CGR,

RGR, NAR, LAD), aggressivity, relative crowding coefficient, monetary yield advantage and area-time equivalent ratio (ATER) of prominent intercropping systems

4. Estimation of protein content in pulses
5. Planning of field experiments on cultural, fertilizer, weed control and water management aspects
6. Layout of field experiments
7. Intercultural operations in different crops
8. Computation of cost of cultivation of different crops
9. Visit to nearby villages for identification of constraints in crop production

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles of crop production	SR Reddy	Kalyani publishers
2	Text Book of Field Crop Production	Rajendra Prasad	ICAR
3	Modern Techniques of Raising Field Crops	Chhidda Singh., Prem Singh and Rajbir Singh	Oxford & IBH Publishing Co., New Delhi

Course Code	**AGR511-18**
Course Title	**Agronomy of fodder and forage crops**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the crop husbandry of major fodder and forage crops.

Syllabus

Theory

UNIT-I

Adaptation, distribution, improved varieties, agro-techniques and quality aspects including anti-quality factors of important fodder crops like maize, sorghum, *bajra*, *guar*, cowpea, oats, barley, berseem, *senji*, etc.

UNIT-II

Adaptation, distribution, improved varieties, agro-techniques and quality aspects including anti-quality factors of important forage crops/grasses & legumes like, Napier grass, setaria, *Panicum, Lasiurus, Cenchrus, clovers, lucerne, fescue grass, brome grass, etc.*

UNIT-III

Year-round fodder production and management, preservation and utilization of forage and pasture crops

UNIT-IV

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 nutritive value, value addition of poor quality fodder. Economics of forage cultivation and seed production techniques

Practical

1. Training on raising fodder crops, canopy measurement
2. Yield and quality estimation *viz.* crude protein, NDF, ADF, lignin, silica, cellulose etc. of various fodder and forage crops
3. Anti-quality components like HCN in sorghum and such factors in other crops
4. Hay and silage making and economics of their preparation

Recommended Books:

S. No	Name	Author(S)	Publisher
1	Principles of crop production	SR Reddy	Kalyani publishers
2	Text Book of Field Crop Production	Rajendra Prasad	ICAR
3	Modern Techniques of Raising Field Crops	Chhidda Singh., Prem Singh and Rajbir Singh	Oxford & IBH Publishing Co., New Delhi

Course Code	**MAT529-18**
Course Title	**Experimental Designs**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To enable the students to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

Syllabus

Theory

UNIT-I

Need for designing of experiments, characteristics of a good design, basic principles of designs - randomization, replication and local control. Uniformity trials, analysis of variance and interpretation of data, transformations, orthogonality and partitioning of degrees of freedom.

UNIT-II

Completely randomized design, randomized block design and Latin square design, repeated Latin square design, analysis of covariance and missing plot techniques in randomized block and Latin square designs.

UNIT-III

Factorial experiments (symmetrical as well as asymmetrical), confounding in symmetrical factorial experiments, factorial experiments with control treatment.

UNIT-IV

Split plot and strip plot designs, crossover designs, balanced incomplete block design, lattice design-concepts, randomization procedure, analysis and interpretation of results, experiments with mixtures.

Practical

1. Analysis of data obtained from CRD, RBD, LSD.
2. Analysis of factorial experiments with and without confounding.
3. Analysis with missing data; balanced incomplete block design; split plot and strip plot designs.
4. Transformation of data.
5. Analysis of lattice design.

Recommended books:

S. No	Name	Author(S)	Publisher
1	Design and Analysis of Experiments.	RA Fisher	Oliver & Boyd.
2	Handbook on Analysis of Agricultural Experiments	AK Nigam & VK Gupta	IASRI Publication

Course Code	**LIB501-18**
Course Title	**Library and information services**
Type of course	Practical
L T P	0:0:2
Credits	1(0+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	1.Educate and assist students in the identification and effective use of information resources 2. Provide current library materials and databases that support the academic curriculum

Syllabus

Practical

UNIT-I

Introduction to library services; Role of libraries in University education, research, extension and technology transfer

UNIT-II

Classification systems and organization of Library; Sources of informationPrimary Sources, Secondary Sources and Tertiary Sources, with emphasis on reference tools and digital resources; Intricacies of abstracting and indexing, CAS, SDI services, (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts etc.)

UNIT-III

Tracing information from reference sources, information explosion and language barrier; Literature survey; Citation techniques/Bibliographic control and Preparation of bibliography

UNIT-IV

Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; e-abbreviations like ibid etc

Recommended books:

S. No	Name	Author(S)	Publisher
1.	Manual of Library and Information Services	Bhanu Pratap	STUDERA PRESS

Course Code	**CSE551-18**
Course Title	**Computer fundamentals and programming**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To impart comprehensive knowledge about the computer fundamentals and programming

Syllabus

Theory

UNIT-I

Computer fundamentals-number systems, decimal, octal, binary and hexadecimal, representation of integers, fixed and floating point numbers, character representation, ASCII, EBCDIC. Functional units of computer, I/O devices, primary and secondary memories.

UNIT-II

Programming fundamentals with C - algorithm, techniques of problem solving, flowcharting, stepwise refinement, representation of integer, character, real, data types, constants and variables, arithmetic expressions, assignment statement, logical expression.

UNIT-III

Sequencing, alteration and iteration, arrays, string processing.

UNIT-IV

Sub-programs, recursion, pointers and files. Program correctness, debugging and testing of programs.

Recommended books:

S. No	Name	Author(S)	Publisher
1	Digital logic and computer design	MM Mano	Prentice Hall of India
2	Digital computer electronics	AP Malvino & JA Brown	Tata McGraw Hill

SEMESTER-II

Course Code	**AGR502-18**
Course Title	**Agronomy of oilseed, fibre and sugar crops**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the crop husbandry of oilseed, fibre and commercial crops.

Syllabus

Theory

UNIT-I

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, nutrition**,** water and cultural requirements, quality components, post-harvest handling and processing of *Kharif* oilseeds - Groundnut, sesame, castor, sunflower, soybean, etc.

UNIT-II

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, nutrition**,** water and cultural requirements, quality components, post-harvest handling and processing of *Rabi* oilseeds – Rapeseed and mustard, linseed, safflower , etc.

UNIT-III

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, nutrition**,** water and cultural requirements, quality components, post-harvest handling and processing of Fiber crops - Cotton, jute, sunhemp, etc.

UNIT-IV

Origin and history, area and production, classification, improved varieties, adaptability, climate, soil, nutrition**,** water and cultural requirements, quality components, post-harvest handling and processing of Sugar crops – Sugar-beet and sugarcane.

Practical

1. Phenological studies of important crops
2. Familiarization with planting and growing techniques of sugarcane
3. Estimation of crop yield on the basis of yield attributes
4. Formulation of cropping schemes for various farm sizes and calculation of cropping and rotational intensities; computation of growth indices (LER, CGR, RGR, NAR, LAD)
5. Aggressivity; relative crowding coefficient, monetary yield advantage and area-time equivalent ratio (ATER) of prominent intercropping systems
6. Estimation of quality parameters of various crops
7. Planning of field experiments on cultural, fertilizer, weed control and water management aspects
8. Layout of field experiments; intercultural operations in different crops; computation of cost of cultivation of different crops
9. Visit to nearby villages for identification of constraints in crop production

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles of crop production	SR Reddy	Kalyani publishers
2	Text Book of Field Crop Production	Rajendra Prasad	ICAR
3	Modern Techniques of Raising Field Crops	Chhidda Singh., Prem Singh and Rajbir Singh	Oxford & IBH Publishing Co., New Delhi

Course Code	AGR504-18
Course Title	**Cropping systems**
Type of course	Theory and Practical
L T P	2:0:0
Credits	2(2+0)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To acquaint the students about prevailing cropping systems in the country and practices to improve productivity.

Syllabus

Theory

UNIT-I

Cropping system: definition, indices and its importance, physical resources, soil and water management in cropping systems, assessment of land use.

UNIT-II

Concept of sustainability in cropping systems and farming systems, scope and objectives, production potential under monoculture cropping, multiple cropping, alley cropping, sequential cropping and intercropping, mechanism of yield advantage in intercropping systems.

UNIT-III

Above and below ground interactions and allelopathic effects, competition relations, multi-storeyed cropping and yield stability in intercropping, role of non-monetary inputs and low cost technologies, research need on sustainable agriculture.

UNIT-IV

Crop diversification for sustainability, role of organic matter in maintenance of soil fertility, crop residue management, fertilizer use efficiency and concept of fertilizer use in intensive cropping systems. Plant ideotypes for drylands, plant growth regulators and their role in sustainability.

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles of agronomy	Reddi and Reddy	Kalyani publishers
2	Principles of agronomy	SR Reddy	Kalyani publishers

Course Code	AGR506-18
Course Title	**Dryland farming**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the basic concepts and practices of dryland farming and soil moisture conservation

Syllabus

Theory

UNIT-I

Definition, concept and characteristics of dry land farming areas/regions, dry land versus rainfed farming, significance and dimensions of dry land farming in Indian agriculture.

UNIT-II

Soil and climatic parameters with special emphasis on rainfall characteristics, constraints of crop production in dry land areas, types of drought, characterization of environment for water availability, contingent crop planning for erratic and aberrant weather conditions.

UNIT-III

Stress physiology and resistance to drought, adaptation of crop plants to drought, drought management strategies, preparation of appropriate crop plans for dry land areas, mid season contingent crop plan for aberrant weather conditions.

UNIT-IV

Tillage, tilth, frequency and depth of cultivation, compaction with 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 for increasing water use efficiency. Watershed- concept, resource management, problems, approach and components.

Practical

1. Seed treatment, seed germination and crop establishment in relation to soil moisture contents
2. Moisture stress effects and recovery behaviour of important crops; estimation of moisture index and aridity index
3. Spray of anti-transpirants and their effect on crops

4. Collection and interpretation of data for water balance equations; methods of increasing water use efficiency
5. Preparation of crop plans for different drought conditions
6. Study of field experiments relevant to dryland farming
7. Visit to watershed projects

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles of agronomy	Reddi and Reddy	Kalyani publishers
2	Principles of agronomy	SR Reddy	Kalyani publishers
3	Dryland Agriculture	SC Panda	Kalyani publishers

Course Code	**AGR510-18**
Course Title	**Agrometeorology and crop weather forecasting**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To impart knowledge about agro-meteorology and crop weather forecasting to meet the challenges of aberrant weather conditions

Syllabus

Theory

UNIT-I

Agro-meteorology - aim, scope and development in relation to crop environment, composition of atmosphere, distribution of atmospheric pressure and wind. Characteristics of solar radiation, energy balance of atmosphere system, radiation distribution in crop canopies, radiation utilization by field crops, photosynthesis and efficiency of radiation utilization by field crops, energy budget of plant canopies.

UNIT-II

Temperature profile in air, soil, crop canopies, soil and air temperature effects on plant physiological processes, measures of atmospheric temperature, relative humidity, vapour pressure and their relationships, evapo-transpiration and meteorological factors determining evapo-transpiration.

UNIT-III

Modification of plant environment: artificial rain, heat transfer, controlling heat load, heat trapping and shading, protection from cold, sensible and latent heat flux, controlling soil moisture, monsoon- origin, characteristics, onset, progress and withdrawal, weather hazards, drought monitoring and planning for mitigation.

UNIT-IV

Weather forecasting in India – short, medium and long range, aerospace science and weather forecasting, benefits of weather services to agriculture, remote sensing and its present status in India, atmospheric pollution and its effect on crop production, climate change and its impact on agriculture.

Practical

1. Recording of meteorological parameters *viz.* sun-shine duration, wind velocity, wind direction, relative humidity, soil and air temperature, evaporation, precipitation and atmospheric pressure
2. Measurement of solar radiation outside and within crop canopies
3. Measurement/estimation of evapo-transpiration by various methods
4. Measurement/estimation of soil water balance and rainfall variability

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles and Practices of agronomy	Balasubramaniyna	Agribios
2	Principles of agronomy	SR Reddy	Kalyani publishers
3	Agrometerology principles and applications of climate studies in agriculture	HS Mavi	Taylor Francis New Delhi

Course Code	**AGR512-18**
Course Title	**Agronomy of medicinal, aromatic and under-utilized crops**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the crop husbandry of medicinal, aromatic and under-utilized crops

Syllabus

Theory

UNIT-I

Importance of medicinal and aromatic plants in human health, national and state economy and industry, classification of medicinal and aromatic plants according to botanical characteristics and uses.

UNIT-II

Climate and soil requirements, cultural practices, yield and important constituents of medicinal plants (Isabgol, Rauwolfia, Poppy, *Aloe vera*, Satavar, Stevia, Safed Musli, Kalmegh, Asafoetida, *Nux vomica*, Roselle, Aconite**,** Viola, etc).

UNIT-III

Climate and soil requirements, cultural practices, yield and important constituents of aromatic plants (Citronella, Palmarosa, Mentha, Basil, Lemon grass, Rose, Patchouli, Geranium, Lavender, Tagetes, Kuth, etc.).

UNIT-IV

Climate and soil requirements, cultural practices, yield of under-utilized crops (Ricebean, Lathyrus, Sesbania, Clusterbean, French bean**,** Buckwheat, Chenopodium, Fenugreek, Grain Amaranth, Coffee, Tea and Tobacco, etc.).

Practical

1. Identification of crops based on morphological and seed characteristics
2. Raising of herbarium of medicinal; aromatic and under-utilized plants
3. Quality characters in medicinal and aromatic plants; methods of analysis of essential oils and other chemicals of importance in medicinal and aromatic plants
4. Visit to herbal garden

Recommended books:

S. No	Name	Author(S)	Publisher
1	Medicinal and aromatic crops	Jitendra Singh	Pointer Publisher
2	Cultivation of medicinal and aromatic crops	Farooqi and Sreeramu	Universities Press

Course Code	**AGR514-18**
Course Title	**Agrostology and agroforestry**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To study about the grassland ecology and agroforestry system

Syllabus

Theory

UNIT-I

Agrostology, definition and importance, grassland ecology – community, climax, dominant species, succession, biotype, ecological status of grasslands in India, grass cover of India, problems and management of grasslands.

UNIT-II

Importance, classification (various criteria), scope, status and research needs of pastures, establishment, improvement and renovation of natural and cultivated pastures, common pasture grasses.

UNIT-III

Agroforestry: definition and importance, agroforestry systems, agrisilviculture, silvipasture, agrisilvipasture, agrihorticulture, aquasilviculture, alley cropping and energy plantation.

UNIT-IV

Crop production technology in agro-forestry and agrostology system, silvipastoral system: meaning and importance for wasteland development, selection of species, planting methods and problems of seed germination in agro-forestry systems, irrigation and manuring in agro-forestry systems, associative influence in relation to above ground and underground interferences, lopping and coppicing in agro-forestry systems, social acceptability and economic viability, nutritive value of trees, tender operation, desirable tree characteristics.

Practical

1. Study of different pastures and agro-forestry systems of India through illustrations;
2. Identification of seeds and plants of common grasses, legumes and trees of economic importance with reference to agro-forestry
3. Seed treatment for improved germination
4. Methods of propagation/planting of grasses and trees in silvipastoral system;
5. Estimation of nutritional and anti- nutritional components

Recommended books:

S. No	Name	Author(S)	Publisher
1	An introduction to agroforestry	PKR Nair	Klower Academic Publishers
2	Grassland ecology	CRW Spedding	Oxford university Press

Course Code	**AGR516-18**
Course Title	**Principles and practices of organic farming**

Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To study about the concept of organic farming and different organic practices in crop production

Syllabus

Theory

UNIT-I

Organic farming - concept and definitions, its relevance to India and global agriculture and future prospects, biodynamic farming, vedic farming, land and water management - land use, minimum tillage, shelter zones, hedges, pasture management, agro-forestry.

UNIT-II

Organic farming and water use efficiency, soil fertility, nutrient recycling, organic residues, organic manures, composting, soil biota and decomposition of organic residues, earthworms and vermicompost, green manures and biofertilizers.

UNIT-III

Crop rotations, multiple and relay cropping systems, intercropping in relation to maintenance of soil productivity.

UNIT-IV

Control of weeds, diseases and insect pest management, biological agents and pheromones, biopesticides. Socio-economic impacts, certification, labeling and accreditation procedures, organic farming and national economy, marketing and export potential.

Practical

1. Preparation of vermicompost and bioformulations, etc.
2. Aerobic and anaerobic methods of making compost; identification and nursery raising of important agro-forestry trees and trees for shelter belts
3. Efficient use of biofertilizers, technique of treating legume seeds with *Rhizobium* cultures, use of *Azotobacter*, *Azospirillum* and PSB cultures in field
4. Quality standards, inspection, certification**,** labeling and accreditation procedures for farm produce from organic farms
5. Visits to organic experiments/farms

Recommended books:

S. No	Name	Author(S)	Publisher
1	Organic farming concepts, application and advances	Subhash Chand and Sartaj Ahmad Wani	Daya Publishing House
2	Organic farming	T.D.Pandey, RB Tiwari and SA Panday	Kushal Publication and Distributor
3	Principles of Organic Farming	SR Reddy	Kalyani Publisher

Course Code	**AGR518-18**
Course Title	**Mechanism of herbicide action**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To familiarize the students about the herbicides, methods of weed control and herbicide action

Syllabus

Theory

UNIT-I

Historical background of herbicides, definitions in herbicide usage, classification of herbicides based on their mode of action.

UNIT-II

Mechanism of absorption and translocation of herbicides, their effect on growth and development.

UNIT-III

Effect of herbicides on photosynthesis, respiration and protein synthesis, factors modifying the response of herbicides in plants, mechanisms of selectivity of herbicides

UNIT-IV

Persistence of herbicides, their residual effect and methods of overcoming the residual effect of herbicides. Mechanism of herbicide resistance, metabolism of herbicides, mechanism of action of adjuvant and herbicides antidotes.

Practical

1. Familiarization with herbicides
2. Application of various herbicides with different types of mechanism of action
3. Study on nature of mortality of weeds
4. Study of symptoms of phytotoxicity of herbicides in crop plants
5. Persistence of herbicides in soil by bioassay technique
6. Study of movement of herbicides in soil
7. Studies on herbicides resistance

Recommended books:

S. No	Name	Author(S)	Publisher
1	Principles of weed science	VS Rao	Oxford and IBH
2	Weed management principles and practices	OP Gupta	Kalyani publishers
3	Fundamentals of weed science	OP Gupta	Kalyani publishers

Course Code	**AGR500-18**
Course Title	**Master's Research**
Type of course	Practical
L T P	0:0:5
Credits	5(0+5)
Course prerequisite	B.Sc. (Agriculture)

MASTER'S RESEARCH

Course Code	**AGR550-18**
Course Title	**Soil erosion and conservation**
Type of course	Theory and Practical
L T P	2:0:2
Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	1. To teach the basic concepts of soil erosion and its management. 2. To learn about the soil conservation practices and watershed management.

Syllabus

Theory

UNIT-I

History, distribution, identification and description of soil erosion problems in India. Forms of soil erosion, effects of soil erosion and factors affecting soil erosion, types and mechanisms of water erosion, raindrops and soil erosion, rainfall erosivity - estimation as EI30 index and kinetic energy, factors affecting water erosion, empirical and quantitative estimation of water erosion, methods of measurement and prediction of runoff, soil losses in relation to soil properties and precipitation.

UNIT-II

Wind erosion- types, mechanism and factors affecting wind erosion, extent of problem in the country. Principles of erosion control, erosion control measures – agronomical and engineering, erosion control structures - their design and layout.

UNIT-III

Soil conservation planning, land capability classification, soil conservation in special problem areas such as hilly, arid and semi-arid regions, waterlogged and wet lands.

UNIT-IV

Watershed management - concept, objectives and approach, water harvesting and recycling, flood control in watershed management, socioeconomic aspects of watershed management, case studies in respect to monitoring and evaluation of watersheds, use of remote sensing in assessment and planning of watersheds.

Practical

1. Determination of different soil erodibility indices - suspension percentage, dispersion ratio, erosion ratio, clay ratio, clay/moisture equivalent ratio, percolation ratio and raindrop erodibility index.
2. Computation of kinetic energy of falling rain drop.
3. Computation of rainfall erosivity index using rain gauge data.
4. Visits to a watershed.

Recommended books:

S. No	Name	Author(S)	Publisher
1	Soil erosion and conservation	RPC Morgan	Wiley Blackwell
2	Principles and Practices of agronomy	Balasubramaniyna	Agribios
3	Principles of agronomy	SR Reddy	Kalyani publishers

Course Code	**AGR552-18**
Course Title	**Soil, water and air pollution**
Type of course	Theory and Practical
L T P	2:0:2

Credits	3(2+1)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To teach the basic concepts of pollution problems associated with agriculture.

Syllabus

Theory

UNIT-I

Soil, water and air pollution problems associated with agriculture, nature and extent. Nature and sources of pollutants – agricultural, industrial, urban wastes, fertilizers and pesticides, acid rains, oil spills etc., air, water and soil pollutants - their CPC standards and effect on plants, animals and human beings.

UNIT-II

Sewage and industrial effluents – their composition and effect on soil properties/health, and plant growth and human beings, soil as sink for waste disposal. Pesticides – their classification, behavior in soil and effect on soil microorganisms.

UNIT-III

Toxic elements – their sources, behavior in soils, effect on nutrients availability, effect on plant and human health. Pollution of water resources due to leaching of nutrients and pesticides from soil, emission of greenhouse gases – carbon dioxide, methane and nitrous oxide.

UNIT-IV

Remediation/amelioration of contaminated soil and water, remote sensing applications in monitoring and management of soil and water pollution.

Practical

1. Sampling of sewage waters; sewage sludge, solid/liquid industrial wastes, polluted soils and plants
2. Estimation of dissolved and suspended solids, chemical oxygen demand (COD) and biological oxygen demand (BOD)
3. Estimation of nitrate and ammonical nitrogen and phosphorus
4. Estimation of heavy metal content in effluents
5. Estimation of heavy metals in contaminated soils and plants.

Recommended books:

S. No	Name	Author(S)	Publisher

1	Environmental pollution and control	NH Gopaldutt	Neelkamal
2	Pollution causes and control	RM Harrson	RSC Publishing

SEMESTER-III

Course Code	**AGR603-18**
Course Title	**Master's Seminar**
Type of course	Theory
L T P	1:0:0
Credits	1(1+0)
Course prerequisite	B.Sc. (Agriculture)

MASTER'S SEMINAR

Course Code	**AGR605-18**
Course Title	**Master's Comprehensive**
Type of course	Practical
L T P	0:0:2
Credits	2(0+2)
Course prerequisite	B.Sc. (Agriculture)

MASTER'S COMPREHENSIVE

Course Code	**AGR601-18**
Course Title	**Master's Research**
Type of course	Practical
L T P	0:0:5
Credits	5(0+5)
Course prerequisite	B.Sc. (Agriculture)

MASTER'S RESEARCH

Course Code	EVS 501-18
Course Title	**Disaster Management**
Type of course	Theory
L T P	1:0:0
Credits	1(1+0)
Course prerequisite	B.Sc. (Agriculture)
Course Objectives	To study about the natural disaster and their management.

Syllabus

Theory

UNIT-I

Natural Disasters- Meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT-II

Man-made disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, field fires-burning of straw, stables and residues oil fire, air pollution, water pollution, deforestation, industrial waste water pollution, road accidents, rail accidents, air accidents, sea accidents.

UNIT-III

Disaster Management- Effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements;

UNIT-IV

Role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Recommended books:

S. No	Name	Author(S)	Publisher
1	Disaster management future challenges and opportunity	Jagbir Singh	IK International Publishing House Pvt.
2	National hazards and disaster management	RB Singh	UBS

SEMESTER-IV

Course Code	AGR600-18
Course Title	**Master's Research**
Type of course	Practical
L T P	0:0:10
Credits	10(0+10)
Course prerequisite	B.Sc. (Agriculture)

MASTER'S RESEARCH