

SCHOOL OF AGRICULTURE

GALGOTIAS UNIVERSITY

Email: admissions@galgotiasuniversity.edu.in

Website: www.galgotiasuniversity.edu.in

COURSE BOOK SCHOOL OF AGRICULTURE -2019 Volume-I

Curriculum and syllabus for SCHOOL
OF AGRICULTURE

1. **B.Sc. Agriculture**.....2



(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Program: B.Sc. Agriculture

Scheme: 2019-2020

Vision: To be recognized globally for value based, socially driven learning through innovation and research in the field of agricultural sciences.

Mission:

Mission 1: To establish state of the art facilities for education and research using advanced technologies.

Mission 2: The efficient delivery of high-quality content by experienced faculties who ensure the concept of lifelong learning.

Mission 3: To develop unique academic curriculum designed throughout the interaction with the major stakeholders like industry and professional societies.

Program Educational Objectives:

PEO1: Graduates of agriculture shall lead in the agriculture and allied industries during the services and entrepreneurship.

PEO2: Graduates of agriculture shall effectively identify and design sustainable solution to address responsibilities and Global opportunities.

PEO3: Graduates of agriculture shall be successful professional careers in agro industries, government organization, educational and research Institutions.

Program Specific Objectives:

PSO1: To Develop the ability to know farming practices and their scope to improve the rural development through technology-based approaches.

PSO2: Embellish the students with specialization in smart agricultural systems through integrated farming system, skill-based program should be added. vertical farming, hydroponics, multi-layer farming, aeroponics, use of information and communication technologies, agriculture automation, robotics, Weather forecasting systems, remote sensing and GIS techniques etc.

Program Outcomes:

PO 1: Understand and apply the fundamental principles, concepts and methods in key areas of agriculture science and multidisciplinary fields.

PO 2: Understand the importance and judicious use of agricultural technologies and resources for the sustainable growth of human beings in synergy with nature.

PO 3: Understand the professional, ethical and social responsibilities.

PO 4: Enhance the research culture and uphold the scientific integrity and objectivity.

PO 5: Engage in continuous lifelong learning in the context of technological and scientific advancements.

PO 6: Develop the critical thinking with scientific temper weather friendly and entrepreneurial.

PO 7: Communicate the subject effectively to reached out the agriculture sector. Should be update.

Curriculum

Semester 1										
Sl. No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI1001	Fundamentals Of Horticulture	1	0	2	2	5	30	50	15
2	AGRI1002	Fundamentals Of Plant Biochemistry And Biotechnology	2	0	2	3	5	30	50	15
3	AGRI1003	Fundamentals Of Plant Pathology	3	0	2	4	5	30	50	15
4	AGRI1004	Introduction To Forestry	1	0	2	2	5	30	50	15
5	AGRI1005	Comprehension And Communication Skills In English	1	0	2	2	5	30	50	15
6	AGRI1006	Fundamentals Of Agronomy	3	0	2	4	5	30	50	15
7	AGRI1007	Introductory Biology	1	0	2	2	5	30	50	15
8	AGRI1008	Elementary Mathematics	2	0	0	2	10	40	50	0
9	AGRI1009	Rural Sociology And Educational Psychology	2	0	0	2	10	40	50	0
10	AGRI1010	Human Values And Ethics	1	0	0	1	10	40	50	0
11	AGRI1011	Physical Education & Yoga Practices	0	0	4	2	0	0	0	100
		Total	17	0	18	26				
Semester II										
Sl No	Course Codee	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI1012	Fundamentals Of Genetics	2	0	2	3	5	30	50	15
2	AGRI1013	Agricultural Microbiology	1	0	2	2	5	30	50	15
3	AGRI1014	Soil And Water Conservation Engineering	1	0	2	2	5	30	50	15
4	AGRI1015	Fundamentals Of Crop Physiology	2	0	2	3	5	30	50	15
5	AGRI1016	Fundamentals Of Agricultural Economics	2	0	0	2	10	40	50	0
6	AGRI1017	Fundamentals Of Soil Science	2	0	2	3	5	30	50	15
7	AGRI1018	Fundamentals Of Entomology	3	0	2	4	5	30	50	15
8	AGRI1019	Fundamentals Of Agricultural Extension	2	0	2	3	5	30	50	15
9	AGRI1020	Communication Skills And Personality Development	1	0	2	2	5	30	50	15
10	AGRI1021	Agriculture Heritage	1	0	0	1	10	40	50	0
		Total	17	0	16	25				
Semester III										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI2001	Crop Production Technology - I (Kharif Crops)	1	0	2	2	5	30	50	15
2	AGRI2002	Fundamentals Of Plant Breeding	2	0	2	3	5	30	50	15
3	AGRI2003	Diseases Of Field And Horticultural Crops And Their Management - I	2	0	2	3	5	30	50	15
4	AGRI2004	Agri - Informatics	1	0	2	2	5	30	50	15
5	AGRI2005	Farm Machinery And Power	1	0	2	2	5	30	50	15

6	AGRI2006	Production Technology For Vegetables And Spices	1	0	2	2	5	30	50	15
7	AGRI2007	Environmental Studies And Disaster Management	2	0	2	3	5	30	50	15
8	AGRI2008	Statistical Methods	1	0	2	2	5	30	50	15
9	AGRI2009	Agricultural Finance And Co-Operation	2	0	2	3	5	30	50	15
10	AGRI2020	Fundamentals of Artificial Intelligence	2	0	0	2	10	40	50	0
		Total	15	0	18	24				

Semester IV

Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI2010	Crop Production Technology - Ii (Rabi Crops)	1	0	2	2	5	30	50	15
2	AGRI2011	Production Technology For Ornamental Crops, Map And Landscaping	1	0	2	2	5	30	50	15
3	AGRI2012	Renewable Energy And Green Technology	1	0	2	2	5	30	50	15
4	AGRI2013	Problematic Soils And Their Management	2	0	0	2	10	40	50	0
5	AGRI2014	Production Technology For Fruit And Plantation Crops	1	0	2	2	5	30	50	15
6	AGRI2015	Principles Of Seed Technology	1	0	2	2	5	30	50	15
7	AGRI2016	Farming System & Sustainable Agriculture	1	0	0	1	10	40	50	0
8	AGRI2017	Agricultural Marketing Trade & Prices	2	0	2	3	5	30	50	15
9	AGRI2018	Introductory Agro-Meteorology & Climate Change	1	0	2	2	5	30	50	15
10	AGRI2019	Agribusiness management	2	0	2	3	5	30	50	15
		Total	13	0	16	21				

Semester V

Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1.	AGRI3001	Principles Of Integrated Pest And Disease Management	2	0	2	3	5	30	50	15
2.	AGRI3002	Manures, Fertilizers And Soil Fertility Management	2	0	2	3	5	30	50	15
3.	AGRI3003	Pests Of Crops, Stored Grain And Their Management	2	0	2	3	5	30	50	15
4.	AGRI3004	Livestock And Poultry Management	3	0	2	4	5	30	50	15
5.	AGRI3005	Crop Improvement - I (Kharif Crops)	1	0	2	2	5	30	50	15
6.	AGRI3006	Entrepreneurship Development And Business Communication	1	0	2	2	5	30	50	15
7	AGRI3007	Geoinformatics And Nano Technology For Precision Farming	1	0	2	2	5	30	50	15
8	AGRI3008	Practical Crop Production - I (Kharif Crops) - Lab	0	0	4	2	0	0	0	100
9	AGRI3009	Intellectual Property Rights	1	0	0	1	10	40	50	0

10	AGRI3010	Agricultural Journalism	2	0	2	3	5	30	50	15
		Total	16	0	18	25				
Semester VI										
Sl No	Course Code	Name of the Course					Assessment Pattern			Pr
			L	T	P	C	IA	MTE	ETE	
1	AGRI3011	Rain-Fed Agriculture & Watershed Management	1	0	2	2	5	30	50	15
2	AGRI3012	Protected Cultivation And Secondary Agriculture	1	0	2	2	5	30	50	15
3	AGRI3013	Diseases Of Field And Horticultural Crops And Their Management - Ii	2	0	2	3	5	30	50	15
4	AGRI3014	Post-Harvest Management And Value Addition Of Fruits And Vegetables	1	0	2	2	5	30	50	15
5	AGRI3015	Management Of Beneficial Insect	1	0	2	2	5	30	50	15
6	AGRI3016	Crop Improvement - Ii (<i>Rabi</i> Crops)	1	0	2	2	5	30	50	15
7	AGRI3017	Practical Crop Production - Ii (<i>Rabi</i> Crops)	0	0	4	2	0	0	0	100
8	AGRI3018	Principles Of Organic Farming	1	0	2	2	5	30	50	15
9	AGRI3019	Farm Management, Production & Resource Economics	1	0	2	2	5	30	50	15
10	AGRI3020	Principles Of Food Science And Nutrition	2	0	0	2	10	40	50	15
11	AGRI3021	Hi-tech. Horticulture	2	0	2	3	5	30	50	15
		Total	14	0	20	24				
Semester VII										
Sl No	Course Code	Name of the Course					Assessment Pattern			15
			L	T	P	C	IA	MTE	ETE	
1	AGRI4001	General orientation & On campus training by different faculties	0	0	4	2	-	-	-	100
2	AGRI4002	Village attachment	0	0	10	5	-	-	-	100
3	AGRI4003	Unit attachment in Univ./ KVK/ Research Station/Agro-Industrial Attachment	0	0	10	5	-	-	-	100
4	AGRI4004	Plant clinic	0	0	8	4	-	-	-	100
5	AGRI4005	Project Report Preparation, Presentation and Evaluation	0	0	8	4	-	-	-	100
		Total	0	0	40	20				
Semester VIII										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	
1	AGRI4006	Mushroom Cultivation Technology	0	0	20	10	-	-	-	100
2	AGRI4007	Seed Production and Technology	0	0	20	10	-	-	-	100
		Total				20				

List of Electives

Elective-1

SI No	Course Code	Name of the Electives					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI2019	Agribusiness management	2	0	2	3	5	30	50	15

Elective-2

SI No	Course Code	Name of the Elective					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
1	AGRI3010	Agricultural Journalism	2	0	2	3	5	30	50	15

Name of The Course	Fundamentals Of Horticulture			
Course Code	AGRI1001			
Prerequisite	NA			
Co-requisite	NA			
Anti-requisite	NA			
	L	T	P	C
	1	0	2	2

Course Objectives

1.To teach the basic and fundamental aspects of horticulture.

Course Outcomes

CO1	The students will acquire the basic and fundamental knowledge of horticulture.
CO2	Horticultural crops and their classification
CO3	Plant propagation methods
CO4	Types of vegetable gardens & ornamental garden
CO5	Methods of training and pruning and Methods of pollination

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Horticulture - Its definition and branches, Importance and scope of horticulture, Horticultural and botanical classification, Climate and soil for horticultural crops. 6 Hours
Unit II: gardens & ornamental garden types and parts; Lawn making, Use of plant bio-regulators in horticulture, Irrigation methods in horticulture crops, Fertilizers application-methods. 5 Hours
Unit III: Plant propagation-methods (sexual & asexual), propagating structures; separation, division, grafting, budding, layering), High density planting; Use of rootstocks; Orchard establishment; (Principles & Layout) 7 Hours
Unit IV: Principles and Objectives of horticulture, types and methods of training and pruning of fruit crops. Rejuvenation of old orchards. 6 Hours

Unit V: Juvenility and flower bud differentiation; Unfruitfulness; pollination, pollenizer and pollinators; fertilization and parthenocarpy. 6 Hours
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Suggested Reading

1. Chadha, K.L. 2001. *Handbook of Horticulture*. ICAR, New Delhi.
2. Jitendra Singh, 2012. *Basic Horticulture*. Kalyani Publishers. New Delhi.
3. Randhawa, G.S. and Mukhopadhyaya, A. 1994. *Floriculture in India*. Allied Publishers Pvt. Ltd., New Delhi
4. Kumar, N. 1997. *Introduction to Horticulture*. Rajyalakshmi Publications, Nagorcoil, Tamilnadu

Name of The Course	Fundamentals Of Plant Biochemistry And Biotechnology			
Course Code	AGRI1002			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To impart education about applied bio-chemistry in agriculture with a view to tell them carbohydrates, protein, fat and bio-synthesis of bio- molecules in human body through agricultural products. To educate bio-technology, tissue culture and plant genetic engineering for crop improvement.

Course Outcomes

CO1	Bio-chemical aspects in the use of agricultural products for consumption of carbohydrates, protein, fat etc
CO2	Micro-propagation methods
CO3	Scope of organ culture, embryo culture, cell suspension culture etc
CO4	Breeding methods for crop improvement
CO5	The knowledge of bio-technology and plant genetic engineering will help the students to evolve high yielding and disease resistant varieties of horticultural and agronomical crops for high yield.

CO6	Advances technique of breeding methods for crop improvement
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Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Importance of Biochemistry - Properties of Water, pH and Buffer - Carbohydrate, Importance and classification - Structures of Monosaccharide's - Reducing and oxidizing properties of Monosaccharide's - Mutarotation, Structure of Disaccharides and Polysaccharides. **6 Hours**

Unit II: Lipid, Importance and classification - Structures and properties of fatty acids - Storage lipids and membrane lipids - Proteins, Importance of proteins and classification, Structures - titration and zwitterions nature of amino acids - Structural organization of proteins - Enzymes, General properties and classification - Mechanism of action - Michaelis & Menten and Line Weaver Burk equation & plots - Introduction to allosteric enzymes - Nucleic acids - Importance and classification - Structure of Nucleotides, A, B & Z DNA - RNA, Types and Secondary & Tertiary structure. **7 Hours**

Unit III: Metabolism of carbohydrates - Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain -Metabolism of lipids - Beta oxidation, Biosynthesis of fatty acids. **5 Hours**

Unit IV: Concepts and applications of plant biotechnology - Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications. Introduction to recombinant DNA methods - Physical (Gene gun method), Chemical (PEG mediated) and Agrobacterium mediated gene transfer methods - Transgenics and its importance in crop improvement - PCR techniques and its applications - RFLP, RAPD, SSR - Marker Assisted Breeding in crop improvement - Biotechnology regulations. **5 Hours**

Unit V: Micro-propagation methods; organogenesis and embryogenesis - Synthetic seeds and their significance - Embryo rescue and its significance - Somatic hybridization and cybrids - Somaclonal variation and its use in crop improvement - Cryo-preservation. **6Hours**

Unit-6 Advances technique of breeding methods for crop improvement

Suggested Reading

- David L. Nelson, Michael M.Cox; W.H. Freeman. *Lehninger Principles of Biochemistry*, 6th Edition.
- Biochemistry*, Dr.U.Satyanarayana, Dr.U. Chakrapani, Books and Allied(P) Ltd, Kolkata
- Biochemistry*, S.N.Gupta, Rastogi Publications, First Edition, 2011.
- Introduction to Plant Biotechnology* by HS Chawla (3rd Edition), Oxford & IBH Publishing Co. Pvt Ltd., New Delhi.

Name of The Course	Fundamentals Of Plant Pathology			
Course Code	AGRI1003			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	2	4

Course Objectives

1.To introduce the students about important plant pathogenic organisms with examples of disease caused by them and their respective control measures.

Course Outcomes

CO1	Acquaintance of the students with various diseases, causal agents, mode of infection and their control measures will make them skilled man power in the field of Plant Pathology which will yield fruitfully to save the crops and plants against the diseases and microbes.
CO2	Scope and objectives of Plant Pathology.
CO3	Plant a pathogenic organism, which causes plant diseases.

CO4	Structure of fungi bacteria nematodes etc.
CO5	Defense mechanism in plants.
CO6	Advances in IPM

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis, Causes / factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. **10 Hours**

Unit II: Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic plant parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes. **8 Hours**

Unit III: Dispersal and survival of plant pathogens. Defense mechanism in plants. Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics **8 Hours**

Unit IV: Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Binomial system of nomenclature, rules of nomenclature, classification of fungi. Basics of divisions, sub-divisions, orders and classes. **7 Hours**

Unit V: Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction. *Viruses:* nature, structure. Study of phanerogamic plant parasites. **6 Hours**

Unit-6 Advancement of integrated pest management, *Nematodes:* General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne, Anguina*, etc.). **5 Hours**

Suggested Reading

1. Agrios, G.N. 2005. *Plant Pathology*. Elsevier Academic Press, New York.
2. Chaube, H.S. and Ramji Singh. 2001. *Introductory Plant Pathology*. International Book Distribution Co., Lucknow, 136.
3. Mehrotra, R.S. 1980. *Plant Pathology*. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
4. Singh, R.S. 2002. *Introduction to Principles of Plant Pathology*. Oxford & IBH Publ. Co. Pvt. Ltd., New Delhi.
5. Vidyasekharan, P. 1993. *Principles of Plant Pathology*. CBS Publishers and Distributors, New Delhi.

Name of The Course	Introduction To Forestry			
Course Code	AGRI1004			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To familiarize the students with forestry and its application in agriculture.

Course Outcomes

CO1	Silviculture, forest classification, Indian forest policies; Forest regeneration, natural regeneration etc
CO2	Methods of weeding, cleaning, thinning etc.
CO3	Concepts of agroforestry
CO4	Shifting cultivation, taungya, alley cropping etc
CO5	Cultivation practices of trees

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction, definitions of basic terms related to forestry; Objectives of silviculture, forest classification, salient features of Indian forest policies; Forest regeneration, natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers **6 Hours**

Unit II: Artificial regeneration, objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification **5 Hours**

Unit III: Tending operations, weeding, cleaning, thinning, mechanical, ordinary, crown and advance thinning **7 Hours**

Unit IV: Forest mensuration, objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement, shadow and single pole method, instrumental methods of height measurement, geometric and trigonometric principles, instruments used in height measurement, tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees. **4 Hours**

Unit V: Agroforestry, definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens; Cultivation practices of two important fast growing tree species of the region. **6 Hours**

Suggested Reading

- 1 Dwivedi, A.P.1980.Forestry in India, Jugal Kishore and Company, DehraDun.
2. Negi, S.S.1999. Agroforestry hand book, International book distributor, DehraDun.
3. Ram Prakash and Drake Hocking.1986. Some favourite trees for fuel and fodder, International book distributor, Dehradun.

4. Singh, S.P. 2009. Tree farming -.Agrotech Publishing academy, Udaipur.
5. Singh, S.P. 2010. Favourite Agroforestry trees, Agrotech Publishing academy, Udaipur.

Name of The Course	Comprehension And Communication Skills In English			
Course Code	AGRI1005			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

- 1.To teach students in regard to comprehension and communication skills in English for excellent and correct communication in writing and speaking

Course Outcomes

CO1	Vocabulary - Synonyms, Antonyms, Homophones etc.
CO2	Grammar - Tenses - Active voice and passive voice.
CO3	Report writing and proposal writing etc
CO4	Importance of professional writing.
CO5	Preparation of Curriculum vitae and job applications

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: War Minus Shooting - A lesson from the text book, "The Sporting Spirit" by George Orwell. A Dilemma - A lesson from the text book, "Layman looks at Science" by Raymond - B. Fosdick. You and Your English - A lesson from the text book," A Spoken English and Broken English"by G.B. Shaw. **5 Hours**

Unit II:Reading Comprehension, Vocabulary - Synonyms, Antonyms, Homophones,

Homonyms, often confused words	4 Hours
Unit III: Functional Grammar - Tenses - Active voice and passive voice - Degrees of comparison and types of sentences - Direct and indirect speech and agreement of verb with subject functional grammar - Articles - Prepositions - Parts of speech and agreement verb with subject - Glossary.	7 Hours
Unit IV: Written skills - Paragraph writing, precise writing, report writing and proposal writing. Importance of professional writing.	4 Hours
Unit V: Preparation of Curriculum vitae and job applications, synopsis writing. Kinds, importance and process of interviews.	4 Hours

Suggested Reading

1. Balasubramanian, T. 1989. *A Text Book of Phonetics for Indian Student*, Orient Longman, New Delhi.
2. Balasubramanyam, M. 1985. *Business Communication*. Vani Education Books, New Delhi.
3. Jean Naterop, B. and Rod Revell. 1977. *Telephoning in English*. Cambridge University Press, Cambridge.
4. Narayanaswamy V R. 1979. *Strengthen Your Writing*. Orient Longman, New Delhi.

Name of The Course	Fundamentals Of Agronomy			
Course Code	AGRI1006			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	2	4

Course Objectives

1. To acquaint the students with weeds, planting geometry with cropping system and its effect on yield.

Course Outcomes

CO1	Agronomy and its scope, growth and development of crops.
CO2	Seeds and sowing, tillage and tith etc.
CO3	Crop management technologies.

CO4	Herbicides and its application
CO5	Water use efficiency; irrigation methods, scheduling criteria etc.
CO6	Advancement of agronomical practices

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Agronomy and its scope. Growth and development of crops, factors affecting growth and development, plant ideotypes; Crop rotation and its principles.	7 Hours
Unit II: Seeds and sowing, tillage and tith, crop density and geometry; Crop nutrition, manures and fertilizers, nutrient use efficiency.	5 Hours
Unit III: Adaptation and distribution of crops, crop management technologies in problematic areas; Harvesting and threshing of crops.	7 Hours
Unit IV: Weeds, importance, classification, crop weed competition, concepts of weed management, principles and methods; Herbicides, classification, selectivity, resistance, allelopathy.	5 Hours
Unit V: Water resources, soil plant water relationship, crop water requirement, water use efficiency.	7 Hours
Unit 6: Irrigation, scheduling criteria, methods, quality of irrigation water and water logging.	

Suggested Reading

1. Reddy, S.R. 2016. Principles of Agronomy. Kalyani Publishers, Ludhiana - 5th edition.
2. Yellamanda Reddy, T. and Sankara Reddi, G.H. (2016). Principles of Agronomy. Kalyani Publishers, Ludhiana.
3. Gopal Chandra de. 1989. Fundamentals of Agronomy. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Gupta, O.P. 2011. Modern weed management. Agrobios (India), Jodhpur.

Name of The Course	Introductory Biology
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Course Code	AGRI1007			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To give the student an overview of basic cell biology and its application to develop an understanding of basic biological concepts.

Course Outcomes

CO1	Evolution and origin of life.
CO2	Binomial nomenclature and classification.
CO3	Cell and cell division.
CO4	Morphology of flowering plants.
CO5	Role of animals in agriculture.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction to the living world. Diversity characteristics of life, Origin of life, Evolution and genetics. 4 Hours
Unit II: Binomial nomenclature and classification, Cell and cell division. 4 Hours
Unit III: Morphology of flowering plants. Seed and seed germination. 5 Hours
Unit IV: Plant systematic - viz. Brassicaceae, Fabaceae and Poaceae. 4 Hours
Unit V: Role of animals in agriculture. 2 Hours

Suggested Reading

1. *Biology* - Raven P, Mason Johnson G B, Losos J. B, Singer. S.S, 10th edition, 2014. McGraw Hill Publications.
2. M.G. Simpson, 2006. *Plant systematics*. Elsevier Publications.
3. H. C. Gangulee 1972 *College Botany* 4th edition.
4. A. C. Dutta 1964. *A class book of Botany for Degree Students*, Oxford University Press, Calcutta.
5. N. T. Gill. 1966. *Agricultural Botany*. 2nd edition

Name of The Course	Elementary Mathematics			
Course Code	AGRI1008			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	0	2

Course Objectives

1. To encourage and enable students to understand the language, symbol and notations of mathematics to develop logical skills.

Course Outcomes

CO1	Addition- Subtraction - Multiplication methods
CO2	Differentiation of functions
CO3	Differentiation of inverse trigonometric functions.
CO4	Standard and General Equation of circle etc.
CO5	Equation of tangent and normal to a given point

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Matrices and Determinants: Definition of matrices - Addition- Subtraction- Multiplication - Transpose and Inverse up to 3 rd order, Properties of determinants up to 3 rd order and their evaluation. Cramer's rule and simple problems based on it. 6 Hours
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Unit II: Differential Calculus: Definition of function- limit and continuity (Simple problems). Differentiation of x^n , e^x , $\sin x$ and $\cos x$ by first principle - Derivatives of sum difference product and quotient of two functions. Differentiation of functions (Simple problems based on it). 5 Hours
Unit III: Differential Calculus: Definition of function- limit and continuity (Simple problems). Differentiation of x^n , e^x , $\sin x$ and $\cos x$ by first principle - Derivatives of sum difference product and quotient of two functions. Differentiation of functions (Simple problems based on it). 7 Hours
Unit IV: Integral Calculus: Integration of functions - Integration of Product of two functions integration by substitution method - Definite Integral (Simple problems based on it) Area under simple well-known curves (simple problems based on it). Circle : Standard and General Equation of circle - Equation of circle passing through three given points - Equation of circle whose diameters is line joining two points - Tangent and Normal to a given circle at given point (Simple problems) -Condition of tangency of a line to circle. 4 Hours
Unit V: Parabola : General and standard equations of parabola - Vertex, focus, equation of directrix, length of latus rectum - Equation of tangent and normal to a given point (simple problems) - Conditions of tangency of line $y = mx + c$ to $y^2 = 4ax$. Ellipse: Standard form of the ellipse - Focus - directrix, vertex of the ellipse in both cases ($a > b$, $b > a$) - Equation of tangent - normal at given points to a given ellipse (Simple problems). 6 Hours

Suggested Reading

1. MVSL DN Raju and Dr.K .V. Ramana - *Engineering Mathematics - 1*.
2. MVSL DN Raju and Dr.K .V. Ramana - *Engineering Mathematics - 2*.
3. *Text Book for A.P Intermediate Mathematics - Paper (IA & IIB)*.

Name of The Course	Rural Sociology And Educational Psychology			
Course Code	AGRI1009			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	0	2

Course Objectives

1.The knowledge about Rural Society, the psychology of rural people the rural culture and the resources to the students is means to strengthen their level of understanding and outlook.

Course Outcomes

CO1	Significance in agriculture extension
CO2	About Role of Social Groups in Agricultural Extension
CO3	Social Institution and its types
CO4	Dimensions of social change and factors of social change.
CO5	Scope and its Importance in Agricultural Extension

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Sociology and Rural Sociology: Meaning, definition, scope, its significance in agriculture extension, Importance of Rural Sociology in Agricultural Extension and their Interrelationship. 6 Hours
Unit II: Indian Rural Society - Characteristics, Differences and Relationship between Rural and Urban Society, Social Group(s) - Meaning, Definition, Classification, Factors to be considered in formation of groups; Role of Social Groups in Agricultural Extension 5 Hours
Unit III: Social Stratification - Meaning, Definition, Bases and Forms of Social Stratification, Characteristics and Differences between Class System and Caste System. Different Cultural Concepts viz., Culture, Tradition, Customs, Folkways, Mores, Taboos, Ritual: Definition, Meaning, Concept and Examples and their Role in Extension Education. Social Values: Meaning, Definition and Types; Social Control - Meaning, Definition, Need of social control and means of social control; and Attitudes - Types and their Role in Agricultural Extension. 7 Hours

Unit IV: Social Institution - Types - Family, Education, Religious, Economic (Co - Operative Society) & Political (Panchayat). Characteristics, Functions and their importance / role in Agricultural Extension. Social Change - Meaning, definition, Nature of Social change, Dimensions of social change and factors of social change & Development: 5 Hours
Unit V: Psychology and Educational Psychology - Meaning, Definition, Scope and its Importance in Agricultural Extension. Behavior: Cognitive, affective, psychomotor domain, Intelligence - Meaning, Types, Factors and Importance in Agricultural Extension 6 Hours

Suggested Reading

1. Adivi Reddy, A. 2006. *Extension Education*. Sree Lakshmi Press, Bapatla.
2. Chitamber, J. B. 1997. *Introductory Rural Sociology*. Wiley Eastern Limited, New Delhi.
3. Daivadeenam, P. 2006. *Educational Psychology in Agriculture*. Agrotech Publishing Academy, Udaipur

Name of The Course	Human Values And Ethics			
Course Code	AGRI1010			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	0	1

Course Objectives

1. To understand the moral values that ought to resolve the moral issues in the profession

Course Outcomes

CO1	Concept, definition, significance and sources of human ethics.
CO2	Human aspirations, happiness and prosperity
CO3	Human relations and family harmony
CO4	Sensitization against drug abuse and other social evils
CO5	Management of anger and stress.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Universal human aspirations: Happiness and prosperity 3 Hours
Unit II: Human values and ethics: Concept, definition, significance and sources; Fundamental values: Right conduct, peace, truth, love and non-violence; Principles and Philosophy. Self-Exploration, natural acceptance 4 Hours
Unit III: Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives. Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination 4 Hours
Unit IV: Ethics: professional, environmental, ICT; Sensitization towards others particularly senior citizens, developmentally challenged and gender. 2 Hours
Unit V: Human relations and family harmony; Modern challenges and value conflict: Sensitization against drug abuse and other social evils; developing personal code of conduct (SWOT Analysis); Management of anger and stress. 3 Hours

Suggested Reading

1. Mathur S.S. 2010. Education for Values, Environment and Human Rights. RSA International.
2. Sharma R.P. and Sharma M. 2011. Value Education and Professional Ethics. Kanishka Publishers.
3. Srivastava S. 2011. *Human Values and Professional Ethics*. S.K. Kataria and Sons

Name of The Course	Physical Education & Yoga Practices			
Course Code	AGRI1011			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	0	0	4	2

Course Objectives

1.To orient the students about NSS, NCC, weapons training, attacks and counter attacks indoor games physical fitness Yoga etc

1. Vishnoi, U. (2012): Sports psychology on physical education.
2. Vishnoi, U. (2012): Research in physical education

Course Outcomes

CO1	Objectives and scope of physical education
CO2	Effects of Exercise on Muscular, Respiratory, Circulatory & Digestive systems
CO3	Balanced Diet and Nutrition
CO4	Role of sports in personality development
CO5	Yoga and Pranayama

Name of The Course	Fundamentals Of Genetics			
Course Code	AGRI1012			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
-	-	-	100

Course Objectives

1.Imparting education and training to the students in the field of genetics and plant breeding activities so as to develop capabilities in them for generation of new varieties of the crops.

Course Outcomes

CO1	To know details about cell cycle and cell division (mitosis and meiosis).
CO2	Sex determination and sex linkage
CO3	Mutation and mutagens
CO4	Genetic disorders. Nature, structure & replication of genetic material.
CO5	Gene structure, function and regulation

Course Content:

<p>Unit I: Introduction to physical education: definition, objectives, scope, history, development and importance; physical culture; Meaning and importance of Physical Fitness and Wellness. Effects of Exercise on Muscular, Respiratory, Circulatory & Digestive systems; Balanced Diet and Nutrition: Effects of Diet on Performance; Physiological changes due to ageing and role of regular exercise on ageing process; Personality, its dimensions and types; 5 Hours</p>
<p>Unit II: Role of sports in personality development; Motivation and Achievements in Sports; Learning and Theories of learning; Adolescent Problems & its Management; Posture; Postural Deformities; Exercises for good posture. 5 Hours</p>
<p>Unit III: Yoga; Introduction to - Asanas, Pranayam, Meditation and Yogic Kriyas; Role of yoga in sports; Issues related environment, Disaster management, Entrepreneurship development, Formulation of production oriented project. 5 Hours</p>

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

<p>Unit I: Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. 10 Hours</p>
<p>Unit II: Chromosomal theory of inheritance - cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example 8 Hours</p>

Suggested Reading

Unit III: Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. 8 Hours
Unit IV: Mutation, classification, Methods of inducing mutations, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. 7 Hours
Unit V: Genetic disorders. Nature, structure & replication of genetic material. 5Hours
Unit VI: Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Suggested Reading

1. Punthian Singh. 2006. *Genetics*. Kalyani Publishers, Ludhiana.
2. Singh, B.D. 2015. *Fundamentals of Genetics*. Kalyani Publishers, Ludhiana.
3. Gupta, P.K.2007. *Genetics*. Rastogi Publications, Meerut

Name of The Course	Agricultural Microbiology			
Course Code	AGRI1013			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To introduce the students about Agricultural Microbes, Genetic Engineering, Soil Micro Biology, Microbial spoilage and Principles of food preservation etc.

Course Outcomes

CO1	Prokaryotic and eukaryotic microbes
CO2	Genetic recombination-transformation, conjugation and transduction etc

CO3	Role of microbes in soil fertility
CO4	Different cycle's viz., Carbon, Nitrogen, Phosphorus etc
CO5	Rhizosphere and phyllosphere
CO6	Protein synthesis, Transcription and translational mechanism of genetic material

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction - Scope of microbiology & brief history of microbiology. Microbial world - Prokaryotic and eukaryotic microbes and their differences, Bacteria - Detailed cell structure of bacteria. Growth - Phases in bacterial Growth. 6 Hours
Unit II: Bacterial genetics: Genetic recombination-transformation, conjugation and transduction, plasmids, transposon 5 Hours
Unit III: Role of microbes in soil fertility and crop production: Carbon cycle. Nitrogen, Phosphorus and Sulphur cycles. 6 Hours
Unit IV: Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste. 5 Hours
Unit V: Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons. 5 Hours

Suggested Reading

1. *Microbiology*. Pelczar, J.r., M.J.E.C.S. Chan and Krieg, N.R. (5th Ed.)2015. McGraw Hill Publishers, New York.
2. *Microbiology*. Prescott, L.M., Harley, J.P. and Klein, D.A. (9th Ed.) 2014. McGraw Hill Publishers, New York.
3. *Brock Biology of Microorganisms*. Madigan, M., Martinko, J.M and Parker, J. (14Ed.) 2015. Prentice hall of India Pvt Ltd., New Delhi.

4. *Soil Microbiology*: Subba Rao, N.S. (4th Ed.) 2014. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.

Name of The Course	Soil And Water Conservation Engineering			
Course Code	AGRI1014			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. Enriching perception of the students in fundamentals of Soil Water and conservation engineering for better and proper use of soil water through conservation engineering.

Course Outcomes

CO1	Soil erosion, causes and types
CO2	Measurement of soil erosion - Runoff plots, soil samplers etc
CO3	Engineering measures - Bunds and terraces
CO4	Gully and ravine reclamation
CO5	Factors affecting, mechanics, soil loss estimation

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Soil erosion - Introduction, causes and types - geological and accelerated erosion, agents, factors affecting and effects of erosion. Water erosion - Mechanics and forms - splash, sheet, rill, gully, ravine and stream bank erosion. 4 Hours
Unit II: Gullies - Classification, stages of development. Soil loss estimation – Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity - estimation by $KE > 25$ and EI_{30} methods. Soil erodibility - topography, crop management and conservation practice factors. 5 Hours

Unit III: Measurement of soil erosion - Runoff plots, soil samples. Water erosion control measures - agronomical measures - contour farming, strip cropping, conservation tillage and mulching. Engineering measures - Bunds and terraces. Bunds - contour and graded bunds - design and surplussing arrangements. **4 Hours**

Unit IV: Terraces - level and graded broad base terraces, bench terraces - planning, design and layout procedure, contour stonewall and trenching. Gully and ravine reclamation - principles of gully control - vegetative measures, temporary structures and diversion drains. Grassed waterways and design **4 Hours**

Unit V: Wind erosion - Factors affecting, mechanics, soil loss estimation and control measures - vegetative, mechanical measures, wind breaks and shelter belts and stabilization of sand dunes. Land capability classification. Rate of sedimentation, silt monitoring and storage loss in tanks. **4 Hours**

Suggested Reading

1. Ghanshyam Das., 2012. *Hydrology and Soil Conservation Engineering, including Watershed Management*. Second edition, PHI Learning Private Limited, New Delhi - 110001.
2. Murthy, V. V.N., 2004. *Land and Water Management Engineering*. Kalayani Publishers, New Delhi.
3. Michael A.M., 2007. *Irrigation Theory and Practice*. Second edition. Vikas Publishing House Pvt. Ltd.
4. Mal, B.C. 1995. *Introduction to Soil and Water Conservation Engineering*. Kalayani Publishers, Rajinder Nagar, Ludhiana
5. Kanetakar, T. P. 1993. *Surveying and Leveling*. Pune Vidyarthi Griha, Prakashan, Pune.
6. Suresh, R. 2008. *Land and Water Management*. Standard Publishers Distributors, Delhi

Name of The Course	Fundamentals Of Crop Physiology			
Course Code	AGRI1015			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To tell the students about seed physiology, Mathematical formulae related to crop, water and sun: Photosynthesis and crop productivity, Functions of plant nutrients and Seed dormancy etc., as a course contents of crop physiology

Course Outcomes

CO1	Seed structures, seed development seed viability and vigour etc
CO2	Diffusion and osmosis and its role in agriculture crops
CO3	Photosynthesis, dark and light reaction
CO4	Plant growth regulators and its biosynthesis
CO5	Photoperiodism, importance and its classification
CO6	Senescence and Abscission

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; seed physiology: seed structures, seed development seed viability and vigour, Physiological maturity, seed germination. Physiological aspects of growth and development: Growth analysis 7 Hours
Unit II: Diffusion and osmosis; Absorption of water, transpiration and Stomatal complex; Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms; assimilation of mineral nutrients: nitrate, ammonium, Biological nitrogen fixation 7 Hours
Unit III: Photosynthesis: Light and Dark reactions, C3, C4 and CAM plants; Respiration: energy balance, significance, OPPP pathway. Lipids: Biosynthesis and functions of lipids, significance in plant metabolism 6 Hours
Unit IV: Physiology of flowering; Photoperiodism, importance classification of plants based on photoperiodism, biological clock.

Phytochrome, vernalization importance 6 Hours
Unit V: Plant growth regulators: Biosynthesis, Mode of action, Physiological roles and commercial uses in agriculture. 5 Hours
Unit VI: Senescence and Abscission: definition, types, changes that occur during senescence, abscission versus senescence. Post-harvest physiology: dormancy, fruit ripening, physiology of cut flowers

Suggested Reading

1. Taiz, L. and Zeiger, E. 2010. *Plant Physiology* 5th edition, Sinauer Associates, Sunderland, MA, USA.
2. Gardner, F.P., Pearce, R.B., and Mitchell, R.L. 1985. *Physiology of Crop Plants*. Scientific Publishers, Jodhpur.
3. Noggle, G.R. and Fritz, G.J., 1983. *Introductory Plant Physiology*. 2nd Edition. Prentice Hall Publishers, New Jersey, USA

Name of The Course	Fundamentals Of Agricultural Economics			
Course Code	AGRI1016			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	0	2

Course Objectives

1.Teaching in the field of Agricultural Economics to the students will make them capable to learn and use the theory of consumption, value and price of the commodities, law of diminishing returned, marginal utility, demand and supply system and welfare economics.

Course Outcomes

CO1	Economic activity and concept of economy
CO2	Consumer's equilibrium and derivation of demand curve, concept of consumer surplus
CO3	Market dynamics- changes in demand and supply and prices
CO4	Natural and socio-economic determinants

CO5	Role in modern economy, borrowing and lending etc
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Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Economic activity and concept of economy, its functions and basic economic problems. Meaning, scope, importance and subject matter, definitions of economics. Approaches to economic analysis: - micro and macro economics, positive and normative analysis. Nature of economic theory-rationality assumption, economic laws as generalization of human behavior. Basic concepts:- scarcity, choice and decision making Goods and services, wants, demand, utility, cost and price, wealth, capital, income, investment, welfare, efficiency, equilibrium, and firm. **6 Hours**

Unit II: Demand: - meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, Equi-marginal utility principle. Indifference curve analysis, Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: - Production process, creation of utility, factors of production, input - output relationship. Laws of returns. Cost: - Production costs, Supply: meaning, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply and its measurement **7 Hours**

Unit III: Market: - meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; equilibrium price. Market dynamics- changes in demand and supply and prices. Distribution theory: - meaning, factor of market and pricing, factors of production. Concepts of rent, wage interest and profit. Public Finance/Public policy: - meaning importance, Public revenue and public expenditure and their importance. Sources of public revenue, Taxes: -

meaning, direct and indirect taxes, agricultural taxation, VAT and GST 6 Hours
Unit IV: National income: - Meaning and importance, circular flow in the economy, concepts of national income accounting and approaches to measurement, difficulties in measurement. Trends in contribution of different sectors' to GDP. Indian economy in the globalised economy. Population:- Economic importance, Malthusian population theory, technological transition and economic growth, natural and socio-economic determinants, demographic transition in India, population growth 5 Hours
Unit V: Money: - Evolution, meaning and functions of money, classification of money, flows of money in the economy, money supply, general price index, inflation and deflation. Banking: Role in modern economy, borrowing and lending, functions of commercial and central bank. Credit: - meaning, role of credit in modern economy, credit policy. Economic systems:- Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning 5 Hours

Suggested Reading

1. Dewett, K.K. and Varma, J.D. 2003. *Elementary Economic Theory*. S. Chand and Co., New Delhi.
2. Dewett, K.K and Chand, A. 2009. *Modern Economic Theory*. S. Chand and Co., New Delhi.
3. Paul A. Samuelson and Nordhus. 2010. *Economics*. 19th Edition, Tata-McGraw Hill Education, New Delhi.
4. Jhingan, M.L.1990. *Advanced Economic Theory*. Vikas Publishing House, New Delhi.
5. Koutsoyiannis. 2015. *Modern Microeconomics*. Tata Mac-Graw Hill Publishers, New Delhi.

Name of The Course	Fundamentals Of Soil Science			
Course Code	AGRI1017			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To educate the students about soil and soil properties with a view to develop their skills to take suitable decisions for selecting and growing the pertinent crops in the soils concerned

Course Outcomes

CO1	Soil forming rocks and minerals; weathering, processes and factors of soil formation etc
CO2	Soil water retention, movement and availability
CO3	Inorganic and organic matters
CO4	Soil pollution chemical pesticides etc
CO5	Macro and micro organisms, their beneficial and harmful effects
CO6	problematic soil and their management

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction to soil science. Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation. Elementary knowledge of soil, classification of Indian soil. Soil physical properties: Soil-texture, structure, density, porosity and colour 7 Hours
Unit II: Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro organisms, their beneficial and harmful effects 7 Hours
Unit III: Soil water retention, movement and availability; soil air, composition, gaseous exchange, problem and plant growth; source, amount and flow of heat in soil; soil temperature and plant growth; Soil reaction-pH, soil acidity and alkalinity, effect of pH on nutrient availability 6 Hours
Unit IV: Soil colloids - inorganic and organic; silicate clays: constitution and properties; sources of charge ion exchange 6 Hours
Unit V: Soil pollution - behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution 5 Hours

Unit VI: General introduction about problematic soil and their management, enlist of problematic soil, Salt affected soil and Characteristic of salt affected soil
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Suggested Reading

1. Indian Society of Soil Science. 2012. *Fundamentals of Soil Science*, IARI, New Delhi.
2. Das, D. K. 2015. *Introductory Soil Science*, 4th Edition, Kalyani Publishers, New Delhi.
3. Sehgal, J. 2015. *A Text Book of Pedology - Concepts and Applications*, Kalyani Publishers, New Delhi

Name of The Course	Fundamentals Of Entomology			
Course Code	AGRI1018			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	2	4

Course Objectives

1.To teach students about the insect morphology and taxonomy with a view to acquaint them with beneficial and harmful insects and their measures of control

Course Outcomes

CO1	Details about phylum insect
CO2	Structure and functions of insect body parts
CO3	Metamorphosis in insects
CO4	Classification of class insect
CO5	Structure and functions of digestive, circulatory, excretory, respiratory systems
CO6	Agricultural importance of classes Orthoptera, Dictyoptera, Hemiptera etc

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: History of Entomology in India. Factors for insect's abundance. Major points related to dominance of Insecta in Animal kingdom. 7 Hours
Unit II: Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, wing venation, modifications and wing coupling apparatus. 7 Hours
Unit III: Metamorphosis in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory and reproductive systems in insects 7 Hours
Unit IV: Types of reproduction in insects. Structure of male and female genital organs. Major sensory organs like simple and compound eyes and chemoreceptor's. 7 Hours
Unit V: Classification of phylum Arthropoda up to classes. Systematics: Taxonomy - importance, history and development and binomial nomenclature. 7 Hours
Unit VI: Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto orders, basic groups of present day insects with special emphasis to orders and families of agricultural importance like Orthoptera, Dictyoptera, Hemiptera etc. 7 Hours

Suggested Reading

1. Chapman, R.F., 2013 *Insects: Structure and Function*. Ed. by Simpson, S.J. and Douglas, A.C. Cambridge Uni. Press, UK.
2. Richards, O.W. and Davies, R.G 1977. *Imm's General Text Book of Entomology* (Vol. I and II). Chapman and Hall, London.
3. Wigglesworth, V.B 2013. *Insect Physiology*. Springer (Originally published by Chapman and Hall, London, 1974).
4. Pant, N.C. and Ghai, S. 198. *Insect Physiology and Anatomy*. ICAR, New Delhi.
5. Kapoor, V.C., 2008. *Theory and Practice of Animal Taxonomy*. Oxford and IBH Publishing, New Delhi

Name of The Course	Fundamentals Of Agricultural Extension
Course Code	AGRS1019
Prerequisite	

Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1. To acquaint the students with the concept of domains of Agricultural Extension, development programmes of pre and post independence era, three tier Panchayati Raj system, Social justice and poverty alleviation programme.

Course Outcomes

CO1	Extension Education- meaning, definition, scope and process
CO2	Different extension systems in India
CO3	Details about various rural development programmes
CO4	Extension teaching methods
CO5	Rural Leadership
CO6	Monitoring and evaluation of extension programmes

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning- Meaning, Process, Principles and Steps in Programme Development 7 Hours
Unit II: Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.

8 Hours
Unit III: Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Development - meaning, definition, concept & principles, Philosophy of C.D. 7 Hours
Unit IV: Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. 7 Hours
Unit V: Extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories. 6 Hours
Unit VI: Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models 6 Hours

Suggested Reading

1. Adivi Reddy, A. 2006. *Extension Education*. Sree Lakshmi Press, Bapatla.
2. Dahama, O.P. and Bhatnagar, O.P. 1999. *Extension and Communication for Development*. Oxford & IBH Private Limited, New Delhi/Mumbai.
3. Ganesh, R., Mohammad Iqbal and Ananda Raja. 2003. *Reaching the Unreached Basics of Extension Education*. Associate Publishing Company, New Delhi.
4. Jalihal, K.A. and Veerabhadraiah, V. 2007. *Fundamentals of Extension Education and Management in Extension*. Concept Publishing House, New Delhi.
5. Ray, G.L. 2006. *Extension Communication and Management*. Naya Prokash/Kalyani Publishers, Kalkatta/Ludhiana.

Name of The Course	Communication Skills And Personality Development
Course Code	AGRI1020
Prerequisite	
Co-requisite	
Anti-requisite	

	L	T	P	C
	1	0	2	2

Course Objectives

1. To develop skills of effective communication and to understand the concept of personality and its significance

Course Outcomes

CO1	Details about Communication Skills
CO2	Structural and functional grammar
CO3	Verbal and nonverbal communication
CO4	Reading and comprehension of general and technical articles
CO5	Organizing seminars and conferences

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Communication Skills: Structural and functional grammar; meaning and process of communication 5 Hours
Unit II: Verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures 5 Hours
Unit III: Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation, public speaking 6 Hours
Unit IV: Group discussion. Organizing seminars and conferences 6 Hours

Suggested Reading

1. Dangi K.L., S.S. Sisoda, Pravesh Singh Chauhan and Yogita Ranavat. *A Text Book of Communication Skills*. Agrotech Publications.
2. Mangal S.K. 2016. *Essentials of Educational Psychology*. PHI Learning Private Ltd., New Delhi.
3. Niraj kumar. 1997. *A Genesis of Behavioural Science*. Gyan Publishing House, New Delhi.

4. Eric Berne. 1964. *Games People Play-The Psychology of Human Relationship*. Grove Press Publishers.
5. Thomas Anthony Harris. 1967. *I am Ok You are Ok*. Harper Publishers

Unit V: Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects. 2 Hours
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Name of The Course	Agricuture Heritage			
Course Code	AGRI1021			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	0	1

Suggested Reading

1. Choudary S.L, Sharma, G.S, and Nene, Y.L (eds). 2000. Ancient and Medieval History of Indian agriculture and its relevance to sustainable agriculture in the 21st century; Proceedings of the summer school held from 28 May to 17 June 1999. Rajasthan college of Agriculture, Udaipur - 313001.
2. Nene, Y.L (Ed). 2005. Agricultural Heritage of Asia proceedings of the international conference, 6-8 December 2004, Asian-Agri history Foundation, Secunderabad- 500009, Andhra Pradesh, India.
3. Nene, Y.L 2007. Glimpses of Agricultural heritage of India. Asian- Agri- History Foundation, 47 - ICRISAT Colony-1 Brig sayeed Road, Secunderabad -500009 A.P India 901PP ISBN-81-903963-0-7

Course Objectives

1.To make the students aware with the scenario of ancient agricultural heritage and gender equity of women in agriculture.

Course Outcomes

CO1	Indian agricultural heritage
CO2	Relevance of heritage to present day agriculture
CO3	Scope and importance of agriculture
CO4	National agriculture setup in India
CO5	Current scenario of Indian agriculture

Name of The Course	Crop Production Technology - I (Kharif Crops)			
Course Code	AGRI2001			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Objectives

1.To educate the students about geographic distribution, soil and climatic requirements and production technology of different cereals, millets and pulses crops as per agro ecological zones

Course Content:

Unit I: Introduction of Indian agricultural heritage; Ancient agricultural practices 4 Hours
Unit II: Relevance of heritage to present day agriculture; past and present status of agriculture and 3 Hours
Unit III: Agriculture scope; Importance of agriculture and agricultural resources available in India; farmers in society 3 Hours
Unit IV: Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge 2 Hours

Course Outcomes

CO1	<i>Kharif</i> crops and their classification
CO2	Pop of pulses - pigeonpea, mungbean and urdbean
CO3	Pop of oilseeds- groundnut, and soybean
CO4	Sowing methods of fibre crops- cotton & Jute
CO5	Economic importance, soil and climatic requirements, varieties, cultural practices forage crops-sorghum, cowpea,

CO6	Economic importance, soil and climatic requirements, varieties, cultural practices cluster bean and napier
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Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops. 8 Hours
Unit II: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of pulses - pigeonpea, mungbean and urdbean 5 Hours
Unit III: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of oilseeds- groundnut, and soybean 5 Hours
Unit IV: Economic importance, soil and climatic requirements, varieties fibre crops- cotton & Jute 4 Hours
Unit V: Cereals - rice, maize, sorghum, pearl millet and finger millet, pulses –pigeon pea, mung bean and urd bean; oilseeds - groundnut, and soybean; fibre crops- cotton & Jute; forage crops -sorghum, cowpea, cluster bean and napier. 6 Hours

Suggested Reading

1. Rajendra Prasad. 2006. Text book of field crops production. ICAR, New Delhi.
2. Reddy, S.R. and Reddi Ramu. 5th edition. 2016. Agronomy of field crops. Kalyani publishers, Ludhiana.
3. Gururaj hunsigi and Krishna, K.R. 2007. Scientific field crop production. Oxford & IBH Publishing Co.Pvt.LTD.

Name of The Course	Fundamentals Of Plant Breeding
Course Code	AGRI2002
Prerequisite	

Co-requisite	
Anti-requisite	
	L T P C
	2 0 2 3

Course Objectives

1. To impart education and training to the students regarding modes of reproduction, pollination, methods of breeding with a view to develop their personalities as a qualified plant breeder.

Course Outcomes

CO1	Learning about historical development and concept of plant breeding
CO2	Domestication, Centre of origin/diversity etc
CO3	Different types of breeding methods
CO4	Learning about methods in asexually propagated crops
CO5	Mutation breeding-methods and biotechnological tools
CO6	DNA markers and marker assisted selection. Participatory plant breeding.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Historical development, concept, nature and role of plant breeding, major achievements and future prospects. Modes of reproduction and apomixes and its genetic consequences. 8 Hours
Unit II: Domestication, Acclimatization, introduction, Centre of origin/diversity. Self-incompatibility and male-sterility. Genetics in relation to plant breeding; Heritability and genetic advance. 6 Hours
Unit III: Genetic basis and breeding methods in self pollinated crops-mass and pure line selection, hybridization techniques and handling of segregating population. Multiline concept. 7 Hours
Unit IV: Breeding methods in asexually propagated crops- clonal selection and hybridization. Wide hybridization and pre-

breeding; Polyploidy in relation to plant breeding. 6 Hours
Unit V: Mutation breeding-methods and uses. Breeding for important biotic and abiotic stresses. 6 Hours
Unit VI: Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding. 6 Hours

Suggested Reading

1. Phundan Singh, 2014. *Essentials of Plant Breeding*. Kalyani Publishers, New Delhi.
2. Singh, B.D. 2015. *Plant Breeding: Principles and Methods*. Kalyani Publishers, New Delhi.
3. Gupta, S.K. 2010. *Plant Breeding Theory and Techniques*. Wiley India Pvt. Ltd. New Delhi.
4. Allard, R.W. 2010. *Principles of Plant Breeding*. John Wiley and Sons, New York

Name of The Course	Diseases Of Field And Horticultural Crops And Their Management - I			
Course Code	AGRI2003			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To educate the students about the disease of field crops and their management of control measures to protect the crops

Course Outcomes

CO1	To understanding symptoms, etiology, disease cycle and management of major cereal crops diseases
CO2	To understanding symptoms, etiology, disease cycle and management of major millets crops diseases
CO3	To understanding symptoms, etiology, disease cycle and management of major oilseed crops diseases
CO4	To understanding symptoms, etiology, disease cycle and management of major pulses crops diseases

CO5	To understanding symptoms, etiology, disease cycle and management of major cash crops diseases
CO6	To understanding symptoms, etiology, disease cycle new plant disease

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Symptoms, etiology, disease cycle and management of major diseases of following crops: Rice: blast, brown spot, Sheath rot, stem rot, narrow brown leaf spot, sheathblight, false smut, bacterial leaf blight, Bacterial leaf streak, tungro and Khaira; Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and ear cockle; Sorghum: anthracnose, rust, ergot, grain mold , leaf blight, smuts, Charcoal rot, downy mildew, and Striga; Maize: stalk rots, downy mildew, leaf spots, banded leaf and sheath blight and blights 6 Hours
Unit II: Symptoms, etiology, disease cycle and management of major diseases of following crops: Bajra: downy mildew, ergot, rust and smut; Finger millet: Blast and leaf spot, smut and mosaic; Cotton: anthracnose, vascular wilts, leaf spots, rust and black arm; Sugarcane: red rot, smut, wilt, rust, ring spot, mosaic, grassy shoot, ratoon stunting and PokkahBoeng; 5 Hours
Unit III: Symptoms, etiology, disease cycle and management of major diseases of following crops: Tobacco: Damping off, frog eye leaf spot, Brown spot, black shank, black root rot and mosaic, leaf curl and Orobanche; Groundnut: early and late leaf spots, Collor rot, pepper leaf spot, Sclerotium wilt, rust, PBNB, PSND and Kalahasti malady. Sesamum: Phyllody, Alternaria leaf spot, Powdery mildew, macrophomina stem rot and bacterial leaf spot; Castor: Phytophthora blight, grey mold, root rot, bacterial leaf spot, seedling blight, rust and wilt; 5 Hours
Unit IV: Symptoms, etiology, disease cycle and management of major diseases of following crops: Sunflower: Downy mildew, powdery mildew head rot, rust, mosaic, necrosis, Sclerotinia stem rot and Alternaria blight; Safflower : wilt, Alternaria leaf spot, mosaic and rust; Mustard:

Alternaria blight, white rust, downy mildew, powdery mildew and Sclerotinia stem rot; Pigeonpea: Phytophthora blight, wilt and sterility mosaic, bacterial leaf spot **6 Hours**

Unit V: Symptoms, etiology, disease cycle and management of major diseases of following crops: Gram: rust, dry root rot, wilt, grey mould and Ascochyta blight; Black & green gram: Cercospora, Corynospora leaf spot, bacterial leaf spot, angular black spot, anthracnose, powdery mildew, rust, web blight, yellow mosaic, leaf crinkle and cuscuta; Pea: downy mildew.

6 Hours

Unit VI: Symptoms, etiology, disease cycle and management of major diseases of following crops; powdery mildew and rust; Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot, rust and mosaic; Lentil: rust and wilt. **6 Hours**

Suggested Reading

1. Rangaswami, Gand K. Mahadevan. 2001. *Diseases of crop plants in India*. Prentice Hall of India Pvt. Ltd., New Delhi.
2. Singh, R.S. 2005. *Plant Diseases*. Oxford & IBH Publications, New Delhi

Name of The Course	Agri - Informatics			
Course Code	AGRI2004			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To encourage the exchange of information for development of knowledge, systems and to achieve productive agricultural resource.

Course Outcomes

CO1	Learning introduction about computers
CO2	Uses of DBMS in Agriculture
CO3	Concept of e-Agriculture
CO4	Computer Models in Agriculture
CO5	Agriculture Information/Expert Systems

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction to Computers, Anatomy of Computers, Memory Concepts, Units of Memory, Operating System, definition and types. Applications of MS - Office for creating, Editing and formatting a document. **4 Hours**

Unit II: Data presentation, tabulation and graph creation, statistical analysis, mathematical expressions, Database, concepts and types, creating database, uses of DBMS in Agriculture, Internet and World Wide Web (WWW), Concepts, components and creation of web, HTML, XML coding, KCC **5 Hours**

Unit III: E-Agriculture, concepts, design and development. Application of innovative ways to use information and communication technologies (IT) in Agriculture. ICT for Data Collection, formation of development programmes, monitoring and evaluation of Programmes

4 Hours

Unit IV: Computer Models in Agriculture: statistical, weather analysis and crop simulation models, concepts, structure, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation. IT application for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management, Smartphone mobile apps in Agriculture for farm advises, market price, postharvest management etc. **4 Hours**

Unit V: Geospatial technology, concepts, techniques, components and uses for generating valuable agri-information. Decision support systems, taxonomy, components, framework, classification and applications in Agriculture, DSS, Agriculture Information/Expert System, Soil Information Systems etc for supporting Farm decisions. Preparation of contingent crop-planning and crop calendars using IT tools.

4 Hours

Suggested Reading

1. John Walkenbach, Herb Tyson, Michael R. Groh, Faith Wempen, Microsoft Office 2010 Bible.

2. Bangia, Learning Ms Office 2010.
3. Prof. Satish Jain and M. Geetha, MS-Office 2010 Training Guide

Name of The Course	Farm Machinery And Power			
Course Code	AGRI2005			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To impart knowledge about farm power in India, i.e. Tillage implements, Seed drills, Paddy Trans planters, Plant protection equipment and land development and soil conservation so as to work on farms and guide other farmers to use farm power machineries for tillage and cultural operations to grow the crops mechanically.

Course Outcomes

CO1	Study about Farm Power in India
CO2	Different systems of Tractor
CO3	Tillage implements
CO4	Implements for inter-cultural operations
CO5	Seed drills and Paddy transplanter.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Farm Power in India: Sources (Renewable, Mechanical, Electrical, Animal, Human Power). Engine terminology. Engines-working principles of two stroke and four stroke engines. Air cleaning - cooling and lubrications. 4 Hours
Unit II: Tractors - Different systems of Tractor, Types and Selection of Tractors, operating cost of Tractor 5 Hours
Unit III Tillage implements, primary and secondary tillage implements 4 Hours

Unit IV: Implements for inter - cultural operations 4 Hours
Unit V: Seed drills, Calibration of seed drill, Paddy transplanter, Plant protection equipment, harvesting and threshing equipment. 4 Hours

Suggested Reading

1. Raghava Chauhan (2012): Farm structure, Power and machinery.
- 2-Singh (2010): Agricultural Machinery, industry in India: Growth structure marketing and buyer behavior.
- 3-Selvan (2010): Farm Machinery and Power.
- 4-Irshad Ali (1982). Farm Machinery in India

Name of The Course	Production Technology For Vegetables And Spices			
Course Code	AGRI2006			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To educate the students about production technology of vegetable and spices to upgrade their extent of knowledge

Course Outcomes

CO1	Importance of vegetables and spices in human nutrition
CO2	Different systems of cultivation practices
CO3	Cultivation practices of different crops
CO4	Cultivation of improved varieties crops
CO5	Implements for inter-cultural operations and Growing of Perennial vegetables

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Importance of vegetables and spices in human nutrition and national economy - Classification of vegetables - 1) Botanical 2) Based on Hardiness 3) Parts Used 4) Method of culture 5) Season **2 Hours**

Unit II: Tomato, Brinjal & Chilli - origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production **4 Hours**

Unit III: Okra & Leafy vegetables (Amaranthus and Gogu) -origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production. Cucurbits – Cucumber & Melons, (Watermelon and Muskmelon) Gourds - Ridge gourd, Bitter gourd, Bottle gourd Snake gourd-Flowering, sex expression, sex ratio. origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production. **4 Hours**

Unit IV: Cole crops- Cabbage & Cauliflower, Peas & beans (Cluster bean, French bean, Dolichos), Root crops (carrot & radish), Tapioca & sweet potato- origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements, irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production **4 Hours**

Unit V: Perennial vegetables – drumstick & curry leaf, Bulb crops – onion & garlic, Black pepper, Cardamom, Ginger & turmeric, Coriander, Cumin & Fenugreek origin, area, production, improved varieties and cultivation practices such as time of sowing, sowing, transplanting techniques, planting distance, fertilizer requirements,

irrigation, weed management, harvesting, storage, physiological disorders, disease and pest control and seed production **4 Hours**

Suggested Reading

1. Pranab Hazra, A. Chattopadhyay, K. Karmakar and S. Dutta. 2010. *Modern Technology in Vegetable Production*. New India Publishing Agency, New Delhi.
2. Neeraj Pratap Singh, 2007. *Basic Concepts of Vegetable Science*. International Book Distributing Co. New Delhi. Academic Press, New Delhi.
3. Nempal Singh, Singh, D.K., Singh, Y.K. and Virendra Kumar. 2006. *Vegetable Seed Production Technology*. International Book Distributing Co. Lucknow.

Name of The Course	Environmental Studies And Disaster Management			
Course Code	AGRI2007			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1. To aware the students about the environmental issues and to reduce the potential losses from hazards of disaster and to achieve rapid and effective recovery

Course Outcomes

CO1	General study about environmental resources
CO2	Different mineral resources
CO3	Awareness about biodiversity and its conservation
CO4	Environmental Pollution
CO5	General ideas about disaster management
CO6	Role of NGOs community-based organizations and media in management of Disaster.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Environmental studies - Definition - Scope and importance, need for public awareness, people and institutions in environment. : Natural Resources: Renewable and non renewable resources, Natural resources and associated problems. Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems **8 Hours**

Unit II: Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, case studies. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. Land resources: Land as a resource, land degradation, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles. **7 Hours**

Unit III: Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and bio-geographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. **6 Hours**

Unit IV: Environmental Pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. nuclear hazards. Solid Waste Management: causes, effects and control

measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. **4 Hours**

Unit V: Disaster management: Natural Disasters and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International strategy for disaster reduction. **6 Hours**

Unit VI: Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media. Central, state, district and local administration; Armed forces, Police and other organizations in disaster response. Social Issues and the Environment from Unsustainable to Sustainable development, Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. HIV/AIDS. Role of Information Technology in Environment and human health. **6 Hours**

Suggested Reading

1. Bharucha, E. 2005. Text book of Environmental Studies for undergraduate courses. University Grants Commission, New Delhi.
2. Anjaneyalu, Y. 2004. Introduction to Environmental Science. BS Publications, Hyderabad, A.P. India

Name of The Course	Statistical Methods			
Course Code	AGRI2008			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To teach the students about statistical tools and techniques needed for valid support to facts and

figures of research to write and present the issues authoritatively.

Course Outcomes

CO1	Domestication and introduction to Statistics and its Applications in Agriculture
CO2	Different types of distribution
CO3	Learning about methods of Linear Regression Equations
CO4	Sampling
CO5	Types of tests to Analysis of Variance

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction to Statistics and its Applications in Agriculture - Graphical Representation of Data. Measures of Central Tendency- Dispersion - Skewness and Kurtosis. Definition of Probability - Addition and Multiplication Theorem - Simple Problems Based on Probability Theory 4 Hours
Unit II: Binomial - Poisson - Normal Distributions and their Properties. Definition of Correlation - Scatter Diagram - Karl Pearson's Coefficient of Correlation. 3 Hours
Unit III: Linear Regression Equations. Introduction to Test of Significance - One sample -Two Sample Test for Means. 3 Hours
Unit IV: Introduction to Sampling Methods - Sampling versus Complete Enumeration - Simple Random Sampling with and without replacement - Use of Random Number Tables for selection of Simple Random Sample 4 Hours
Unit V: Chi-Square Test of Goodness of fit - Chi-Square Test of Independence of Attributes in 2x2 contingency table. Introduction to Analysis of Variance - Analysis of One Way and Two Way Classification 4 Hours

Suggested Reading

1. Nageswara Rao, G., 2007. *Statistics for Agricultural Sciences*. B.S. Publications, Hyderabad.

2. Rangaswamy, R. 1995. *A Text Book of Agricultural Statistics*. New Age International (P) Limited, Hyderabad.

3. Chandel, S.R.S., *Hand Book of Agricultural Statistics*. AchalPrakashan Mandir publications, New Delhi

Name of The Course	Agricultural Finance And Co-Operation			
Course Code	AGRI2009			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To make students fully aware with the agriculture finance and cooperation with intention to train them about the exercise of finance procedures in banking system and also the cooperative credit structure.

Course Outcomes

CO1	Learning about scope and significance of agricultural financing
CO2	Sources of agricultural finance
CO3	Micro financing and schemes for financing weaker sections
CO4	Agril - Projects
CO5	Agricultural Cooperative institutions in India
CO6	Basic guidelines for preparation of project reports.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Agricultural Finance- meaning, scope and significance, capital and credit needs and their role in Indian agriculture. Credit: meaning, definition, need, classification. Credit analysis: 3 R's, and 5C's and 7 Ps of credit analysis 8 Hours
Unit II: Sources of agricultural finance: institutional and non-institutional sources, social

control and nationalization of commercial banks, RRBs, Lead bank scheme. Crop loan scheme, Scale of finance and unit cost. Cost of credit, KCC. 6 Hours
Unit III: Financial inclusion, Micro financing, and schemes for financing weaker sections. Crop insurance, AICI, PMFBY. Introduction to higher financing institutions - RBI, NABARD, World Bank group institutions 7 Hours
Unit IV: Recent developments in agricultural credit. Agril - Projects: project- meaning, importance, Project cycle and phases. 6 Hours
Unit V: Agricultural Cooperative institutions in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, , cooperative warehousing; Role of ICA, NCUI, NCDC. 6 Hours
Unit VI: Basic guidelines for preparation of project reports. Agricultural Cooperation - Meaning, objectives, principles of cooperation, brief history of cooperative development in India, significance of cooperatives in Indian agriculture. 6 Hours

Suggested Reading

1. Johil S.S. and C.V. Moore. 1970. *Essentials of Farm Financial Management*. Today and Tomorrow Printers and Publishers, New Delhi.
2. John, J. Hampton. 1983. *Financial Decision Making: Concepts, Problems and Cases, of India*. New Delhi.
3. Mamoria, C.B. and R.D. Saksena. 1973. *Co-operatives in India*. Kitab Mahal, Allahabad,
4. Mamoria, C.B. and Saxena. *Agricultural Problems in India*. Kitab Mahal, Allahabad.

Name of The Course	Crop Production Technology - Ii (Rabi Crops)			
Course Code	AGRI2010			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To impart education to the students about package and practices of different agronomical crops for the better production.

Course Outcomes

CO1	Understanding of the Origin, geographical distribution, economic importance, of various crops
CO2	Different types of Oilseeds crop
CO3	Learning about Cash crops
CO4	Incubation about forage crops
CO5	Fiber crops

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of oil seeds, fiber, sugar, cash and fodder crops 4 Hours
Unit II: Oilseeds, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of groundnut, sesamum, soybean, rapeseed, mustard, sunflower, safflower, castor, linseed and niger 3 Hours
Unit III: Fibre crops, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of cotton, jute, mesta 3 Hours
Unit IV: Cash crops, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of potato, tobacco 4 Hours
Unit V: Forage crops, Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of sorghum, cowpea, cluster bean, napier, maize, lucerne, berseem and oat. 4 Hours

Suggested Reading

1. Reddy, S.R. and ReddiRamu. 5th edition, 2016. Agronomy of field crops. Kalyani publishers, Ludhiana.
2. Chidda Singh, Singh, P and Singh, R. 2003. Modern techniques of raising field crops. Oxford & IBH Publishing house, New Delhi.
3. Rajendra Prasad. 2004. Text book of field crops production. Commercial crops, volume-II, Technical Editor, ICAR, New Delhi.
4. Panda S.C.2014. Agronomy of fodder and forage crops, Kalyani publishers, Ludhiana

Name of The Course	Production Technology For Ornamental Crops, Map And Landscaping			
Course Code	AGRI2011			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To teach the students regarding package and practices of spices, aromatic crops and medicinal plants.

Course Outcomes

CO1	Importance and scope of ornamental crops
CO2	Learning about production technology of important cut flowers
CO3	Production technology of important medicinal plants
CO4	Processing and value addition
CO5	Production technology of important Aromatic plants

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Importance and scope of ornamental crops, medicinal and aromatic plants and landscaping. Principles of landscaping, Landscape uses of trees, shrubs and climbers. Production technology of important cut flowers like rose,

gerbera, carnation, under protected conditions 4 Hours
Unit II: Production technology of important cut flowers liliun and orchids under protected conditions and gladiolus & tuberose, chrysanthemum under open conditions. Package of practices for loose flowers like marigold and jasmine under open conditions 3 Hours
Unit III: Production technology of important medicinal plants like asparagus, aloe, costus, periwinkle, isabgol. 3 Hours
Unit IV: Production technology of important Aromatic plants like mint, lemongrass, citronella, Palmarosa. Ocimum, Geranium, Vetiver 4 Hours
Unit V: Processing and value addition in ornamental crops and MAPs produce 4 Hours

Suggested Reading

1. Bose, T.K. 1999. *Floriculture and Landscaping*. Naya Prakash, Kolkatta.
2. Bose, T.K. and Yadav, L.P. 1992. *Commercial Flowers*. Naya Prakash, Kolkatta.
3. Randhawa, G.S. and Mukhopadhyaya, A. 1994. *Floriculture in India*. Allied Publishers Pvt. Ltd., New Delhi
4. Chattopadhyay, S.K. 2007. *Commercial Floriculture*. Gene-Tech Books, New Delhi.
5. Srivastava, H.C.2014. *Medicinal and Aromatic Plants*. ICAR, New Delhi

Name of The Course	Renewable Energy And Green Technology			
Course Code	AGRI2012			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To teach he students how to search the alternate renewable energy sources

Course Outcomes

CO1	Importance and scope of energy sources
CO2	Learning about types of biogas plants
CO3	Introduction of solar energy

CO4	Solar photovoltaic system and its application
CO5	Introduction of wind energy

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Classification of energy sources - Contribution of non-conventional energy sources in agricultural sector - Familiarization with biomass utilization for biofuel production and its application. 4 Hours
Unit II: Biogas, Familiarization with types of biogas plants. Gasifiers. Bio-alcohol - Biodiesel and bio oil production and their utilization as bioenergy resource 3 Hours
Unit III: Introduction of solar energy - Collection and its application - Solar cooker, solar water heater 3 Hours
Unit IV: Solar drying - Solar pond - Solar distillation - Solar photovoltaic system and its application 3 Hours
Unit V: Introduction of wind energy and their application 3 Hours

Suggested Reading

1. Rai, G.D. 2004. *Non-conventional Energy Sources*. Khanna Publishers, New Delhi.
2. Rajput, R.K. 2012. *Non-conventional Energy Sources*. S. Chand Publishers.
3. Ojha, T.P. and Michael, A.M. *Principles of Agricultural Engineering*. Vol. I, Jain Brothers, New Delhi.
4. Rathore, N.S., Mathur, A.N. and Kothari, S. *Alternate Sources of Energy*. ICAR Publication.

Name of The Course	Problematic Soils And Their Management
Course Code	AGRI2013
Prerequisite	
Co-requisite	

Anti-requisite		L	T	P	C
		2	0	0	2

Course Objectives

1.To introduce that students about management of problem of soil and water for befitting crop production management.

Course Outcomes

CO1	Importance of soil quality and health
CO2	Reclamation and management of soil
CO3	Introduction of remote sensing and GIS
CO4	Bio remediation
CO5	Introduction of problematic soils under different Agro-eco systems

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties. Reclamation and management of Saline and Sodic soils, Acid soils, Acid Sulphate soils. 5 Hours
Unit II: Reclamation and management of Eroded and Compacted soils, flooded soils, Polluted soils. Irrigation water - quality and standards, utilization of saline water in agriculture. 4 Hours
Unit III: Remote sensing and GIS in diagnosis and management of problem soils 3 Hours
Unit IV: Bio remediation through multipurpose tree species of soils, land capability and classification, land suitability, classification. 3 Hours
Unit V: Problematic soils under different Agro-eco systems 3 Hours

Suggested Reading

- 1.Indian Society of Soil Science. 2012. *Fundamentals of Soil Science*, IARI, New Delhi.

2. Das, D. K. 2015. *Introductory Soil Science*. 4th Edition, Kalyani publishers, New Delhi
3. *Soils of Andhra Pradesh*, Monograph of I.V. Subbarao.

Name of The Course	Production Technology For Fruit And Plantation Crops			
Course Code	AGRI2014			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To introduce that students about importance and scope of fruit and plantation crop in India.

Course Outcomes

CO1	Importance of scope of fruit and plantation crop industry in India
CO2	Production technologies for the cultivation of major fruits-mango, banana
CO3	Importance of production technologies for the cultivation of major fruits; citrus, grape, litchi, etc
CO4	Production technologies about minor fruits - arecanut, cashew etc.
CO5	Production technologies about minor fruits- date, ber, pineapple

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction, definition and importance of seed and seed technology. Seed quality; Definition, Characters of good quality seed. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production. 5 Hours
Unit II: Different classes of seed. Foundation and certified seed production of important cereals, pulses, oilseeds, fiber crops; Seed certification, phases of certification, procedure for seed certification, field inspection. Seed Act and Seed Act enforcement; Duty and powers of seed

inspector, offences and penalties; Seeds Control Order 1983. 4 Hours
Unit III: Varietal Identification through Grow-Out Test and Electrophoresis, Molecular and Biochemical test; Detection of genetically modified crops, Transgene contamination in non-GM crops, GM crops and organic seed production 3 Hours
Unit IV: Seed treatment, its importance, method of application and seed packing Seed storage: general principles, stages and factors affecting seed longevity during storage; Measures for pest and disease control during storage 3 Hours
Unit V: Seed marketing: structure and organization, sales generation activities, promotional media; Factors affecting seed marketing, Role of WTO and OECD in seed marketing 3 Hours

Suggested Reading

1. Agarwal, P.K. 1994. *Principles of Seed technology*. ICAR, New Delhi.
2. Agarwal, P.K. and Dadlani, M. 1986. *Techniques in Seed Science and Technology*. South Asian Publishers, New Delhi.
3. Agarwal, R.L. 1995. *Seed Technology*. Oxford and IBH Publication Co., New Delhi.
4. Dharendra Khare and Mohan S. Bhale. 2007. *Seed Technology*. Scientific Publisher (India), Jodhpur.
5. Thomson, J.R. 1979. *An introduction of Seed Technology*. Leonard Hill, London.

Name of The Course	Farming System & Sustainable Agriculture			
Course Code	AGRI2016			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	0	1

Course Objectives

1. To educate the students about farming system and sustainable agriculture the save the natural resources while exploiting the boons of the nature for better out come from the resources available all the year round.

Course Outcomes

CO1	Importance and scope of farming system
CO2	Understanding about component of farming system
CO3	Sustainable agriculture
CO4	Understanding about integrated farming system
CO5	Resource use efficiency and optimization techniques

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Farming system-scope, importance, and concept; Types and systems of farming system and factors affecting types of farming. 4 Hours
Unit II: Farming system components and their maintenance; Cropping system and pattern, multiple cropping system, efficient cropping system and their evaluation; Allied enterprises and their importance, tools for determining production and efficiencies in cropping and farming system. 4 Hours
Unit III: Sustainable agriculture ,problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability 3 Hours
Unit IV: Resource use efficiency and optimization techniques, resource cycling and flow of energy in different farming system, farming system and environment; Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field. 4 Hours
Unit V: Resource use efficiency and optimization techniques, resource cycling and flow of energy in different farming system, farming system and environment; Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field. 3 Hours

Suggested Reading

1. Arun K. Sharma. 2006. A hand book of organic farming - Agrobios (India) Jodhpur.

- Jayanthi C, Devasenapathy P and Vinnila, C. 2008. Farming systems principles and practice. Satish serial publishing house, Delhi.
- Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur.
- Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university press

Name of The Course	Agricultural Marketing Trade & Prices			
Course Code	AGRI2017			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1. To make the students well equipped with agricultural marketing trade and pricing issues so as to get the better price of the products there in the market.

Course Outcomes

CO1	Importance and scope of agricultural marketing
CO2	Understanding about marketing process and functions
CO3	Product life cycle (PLC) and competitive strategies
CO4	Understanding about role of Govt. agencies in agricultural marketing
CO5	Agricultural commodities
CO6	Awareness about WTO

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Agricultural Marketing: concepts and definitions of market, marketing, agricultural marketing, market structure, classification and characteristics of agricultural markets. Demand, supply and producer's surplus of agri-commodities: nature and determinants of demand and supply of farm products, producer's surplus – meaning and its types, marketable and marketed
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surplus, factors affecting marketable surplus of agri-commodities 8 Hours
Unit II: Marketing process and functions: Marketing process-concentration, dispersion and equalization; exchange functions – buying and selling; physical functions – storage, transportation and processing; facilitating functions - packaging, branding, grading, quality control and labeling, AGMARK. Market functionaries and marketing channels: Types and importance of agencies involved in agricultural marketing and their meaning. Marketing channel-definition and meaning, marketing channels for different farm products and farm inputs. Marketing mix and Market segmentation 7 Hours
Unit III: Product life cycle (PLC) and competitive strategies: Meaning and stages in PLC, characteristics of PLC, strategies in different stages of PLC, pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing; market promotion – advertising, personal selling, sales promotion and publicity - their meaning and merits & demerits. Market Integration, efficiency, costs and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting cost of marketing; Reasons for higher marketing costs of farm commodities; ways of reducing marketing cost 7 Hours
Unit IV: Role of Govt. agencies in agricultural marketing: Public sector institutions- CWC, SWC, FCI, & DMI - their objectives and functions; cooperative marketing in India-NAFED, MARKFED. Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy. Risk in marketing: Types of risk in marketing; speculation & hedging 7 Hours
Unit V: An overview of futures trading in agricultural commodities and role of commodity exchanges. Role of regulatory bodies in futures markets- SEBI, etc Trade: Concept of International Trade and its importance in globalised world economies, theories of absolute and comparative advantage. Present status and prospects of Indian agri-commodities trade in international trade. 7 Hours

Unit VI: WTO: its genesis, objectives, functions and principles of multilateral trade, WTO agreements- Agreement on Agriculture (AoA) and its implications on Indian agriculture; TRIPS and Intellectual property rights and their implications to Indian agriculture

Suggested Reading

1. S.S. Acharya and N.L. Agarwal, 2012. *Agricultural Marketing in India*. Oxford & IBH Publications Co. Pvt. Ltd., New Delhi.
2. S.S. Acharya and N.L. Agarwal. *Agricultural Price: Analysis and Policy*. Oxford & IBH Publications Co. Pvt Ltd., New Delhi.
3. Subba Reddy, S., P. Raghu Ram., Sastry, T.V.N and Bhavani Devi, I. 2016. *Agricultural Economics*. Oxford & IBH Publishing Company Private Ltd., New Delhi.
4. Kahlon, A.S. and Tyagi.D.S. 1983. *Agricultural Price Policy in India*. Allied Publishers Pvt. Ltd., New Delhi.
5. Mamoria, C.B. and Joshi. R.L.1995. *Principles and Practices of Marketing in India*. Kitab Mahal, Allahabad.

Name of The Course	Introductory Meteorology & Agro-Climate Change
Course Code	AGRI2018
Prerequisite	
Co-requisite	
Anti-requisite	
	L T P C
	1 0 2 2

Course Objectives

1.To acquaint the students with Agro-Climatic zones, different climatic conditions and its effect on yield.

Course Outcomes

CO1	Learning about spheres of the earth
CO2	Atmospheric weather variables
CO3	Nature and properties of solar radiation
CO4	Monsoon, mechanism and importance in Indian agriculture

CO5	Agriculture and weather relations
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Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction: The three spheres of the earth; Terminology and definitions: Meteorology, Climatology, Agrometeorology, Agroclimatology climate and weather - Scope and importance of agro-meteorology. Agro- climatic regions of India and Agro-climatic zones of Madhya Pradesh.

5 Hours

Unit II: Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze.

4 Hours

Unit III: Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, long wave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, energy balance of earth

3 Hours

Unit IV: Atmospheric humidity, concept of saturation, vapor pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon, mechanism and importance in Indian agriculture; Weather hazards, drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold wave

3 Hours

Unit V: Agriculture and weather relations, modifications of crop microclimate, climatic normal for crop and livestock production; Weather forecasting, types of weather forecast and their uses; Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national Agriculture

3 Hours

1. Radha Krishna Murthy, V. 2016. Principles and practices of agricultural disaster management. B.S Publications, Koti, Hyderabad.

2. Reddy, S.R. 2014. Introduction to Agriculture and Agrometeorology. Kalyani Publishers, Ludhiana, Punjab.

3. Radha Krishna Murthy, V. 2002. Basic Principles of Agricultural meteorology. B.S Publications, Koti, Hyderabad

Name of The Course	Agribusiness management			
Course Code	AGRI2019			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To teach the students regarding guidelines for starting farm enterprises, the intricacies in preparing an effective agri-business plans inspiring agribusiness enterprises

Course Outcomes

CO1	Importance of Agribusiness in the Indian Economy
CO2	Management Functions and Planning in Agribusiness management
CO3	Financial Management of Agribusiness
CO4	Details about Marketing Management
CO5	Details about agricultural projects
CO6	Writing of agricultural projects

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Agribusiness: Meaning, Definition, Structure of Agribusiness, Importance of Agribusiness in the Indian Economy, Agricultural Policy. Agribusiness Management, Distinctive

Suggested Reading

features, Importance of Good Management, Definitions of Management 4 Hours
Unit II: Management Functions, Planning, Meaning, Definition, Types of Plans(Purpose or Mission, Goals or Objectives, Strategies, Policies, Procedures, rules, programmes, Budget) characteristics of sound plan, Steps in planning, Organisation, Staffing, Directing, Ordering, Leading, Supervision, Communication and control. 5 Hours
Unit III: Financial Management of Agribusiness: Importance of Financial Statements, Balance sheet, Profit and Loss Statement, Analysis of Financial statements. Agro-based Industries: Importance and Need, Classification of Industries, Types of Agro-based Industries, Institutional arrangement, Procedure to set up agro-based industries. 6 Hours
Unit IV: Marketing Management: Meaning, Definitions, Marketing Mix, 4Ps of Marketing. Mix, Market segmentation, Methods of Market, Product life cycle. Pricing policy, Meaning, pricing method. Prices at various stages of Marketing. 5 Hours
Unit V: Project, definitions, project cycle, Identification, Formulation, Appraisal, Implementation, Monitoring and evaluation, Appraisal and Evaluation techniques, NPW, BCR, IRR, N/K ratio, sensitivity analysis. 5 Hours
Unit VI: Characteristics of agricultural projects: preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc. 5 Hours

Suggested Reading

1. I.W. David Downey and John K Trocke, Agribusiness Management, Mc Graw Hill Book Co. New Delhi/ New York.
2. A. C Broadway A. A Broadway, A Text Book of Agri-Business Management , Kalyani Publishers, Ludhiana/New Delhi.
3. U. K Pandey, An Introduction to Agricultural Finance, Kalyani Publishers New Delhi.
4. V S Ramaswamy and S Namakumari, Marketing Management, Macmillan Publishers India ltd. New Delhi

Name of The Course	Principles Of Integrated Pest And Disease Management
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Course Code	AGRI3001			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To make aware the students with pests and integrated pest management, chemical control measure and spray techniques for protection of crops against insects, pest and disease

Course Outcomes

CO1	Understanding about insect pests and diseases
CO2	Different types of insect pests and diseases management
CO3	Learning about pesticides
CO4	Learning about IPM
CO5	Implementation and impact of IPM
CO6	strategy for IPM

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Categories of insect pests and diseases, Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control 6 Hours
Unit II: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment 5 Hours
Unit III: Introduction to conventional pesticides for the insect pests and disease management. Survey, surveillance and forecasting of Insect pest and diseases. 4 Hours
Unit IV: Introduction, history, importance, concepts, principles and tools of IPM.

Development and validation of IPM module 5 Hours
Unit V: Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. 5 Hours
Unit VI: Political, social and legal implication of IPM. Case histories of important IPM program. 5 Hours

Suggested Reading

1. Dhaliwal, G. S. and Ramesh Arora 2001. *Integrated pest management: Concepts and approaches*, Kalyani Publishers Ludhiana.
2. Metcalf, R. L. and Luckman, W. H. 1982. *Introduction to insect pest management*. Wiley interscience publishing, New York.
3. Larry P Pedigo 1991. *Entomology and pest management*, Prentice Hall of India Private Ltd., New Delhi.
4. Venugopala Rao, N., Umamaheswari, T., Rajendraprasad, P., Naidu, V.G and Savithri, P. 2004. *Integrated Insect Pest Management*. Agrobios (India) Limited, Jodhpur.
5. Chaube, H.S. and Ramji Singh. 2001. *Introductory Plant Pathology*. International Book Distribution Co., Lucknow, pp. 136.

Name of The Course	Manures, Fertilizers And Soil Fertility Management			
Course Code	AGRI3002			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1. Orienting students in the areas of Soil Chemistry, Soil Fertility and Management.

Course Outcomes

CO1	Understanding the importance of organic manures
CO2	Different types of Chemical fertilizers
CO3	Learning about plant nutrition
CO4	Learning about Soil testing

CO5	Implementation and methods of fertilizer recommendations
CO6	Factor influencing nutrient use efficiency

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Introduction, traditional concepts and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Integrated nutrient management 6 Hours
Unit II: Chemical fertilizers: classification, composition and properties of major nitrogenous, phosphatic, potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, Nano fertilizers, Soil amendments, Fertilizer Storage, Fertilizer Control Order. 5 Hours
Unit III: History of soil fertility and plant nutrition. Criteria of essentiality, role, deficiency and toxicity symptoms of essential plant nutrients. Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. 4 Hours
Unit IV: Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. 5 Hours
Unit V: Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. 5 Hours
Unit VI: Factor influencing nutrient use efficiency (NUE), methods of application under rain fed and irrigated conditions

Suggested Reading

1. Indian Society of Soil Science. 2012. *Fundamentals of Soil Science*. IARI, New Delhi.
2. Yawalkar K.S, Agarwal, T.P and Bokde, S 1995. *Manures and Fertilisers*. Agril. Publishing House, Nagpur

3. Samuel Tisdale, Nelson Werner L, Beaton James D and Havlin John L. 2005. *Soil Fertility and Fertilizers: An Introduction to Nutrient Management*, Macmillian Publishing Co., New York.

4. D. K .Das 2014. *Introductory Soil Science*. Kalyani Publishers, New Delhi

Name of The Course	Pests Of Crops, Stored Grain And Their Management			
Course Code	AGRI3003			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1.To impart education about crop pest and stored grain pest and their management

Course Outcomes

CO1	Understanding about different arthropod pests
CO2	Distribution, nature of damage and control practices pests
CO3	Factors affecting losses of stored grain
CO4	Learning about management of insect pests
CO5	Storage structures for grain
CO6	New strategy for integrated pest and diseases management

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: General account on nature and type of damage by different arthropod pests. Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests of various field crops. 6 Hours
Unit II: Scientific name, order, family, host range, distribution, nature of damage and control practices for other important arthropod pests of

various field crops. Mites, birds, nematodes and rodent pests of field crops and their management. Locust management. 5 Hours
Unit III: Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain 4 Hours
Unit IV: Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management 5 Hours
Unit V: Storage structures and methods of grain storage and fundamental principles of grain store management 5 Hours
Unit VI: Methods of detection and diagnosis of insect pest and diseases. New strategy for integrated pest and diseases management,

Suggested Reading

1. Vasantharaj David, B. and Rama Murthy V.V. 2016. *Elements of Economic Entomology*, Popular Book Depot, Coimbatore.
2. Vasantharaj David, B and Aanathakrishnan, T.N. 2006. *General and Applied Entomology*. Tata McGraw-Hill Publishing House, New Delhi.
3. Nair MRGK. 1986. Insects and Mites of crops in India. *Indian Council of Agricultural Research* New Delhi.
4. Ramakrishna Ayyar, T.V. 1963. *Handbook of Economic Entomology for South India*. Government Press, Madras.

Name of The Course	Livestock And Poultry Management			
Course Code	AGRI3004			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	3	0	2	4

Course Objectives

1.Role of live-stock in the national economy. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry.

Course Outcomes

CO1	Understanding the role of live-stock in the national economy
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CO2	Different types of distribution
CO3	Learning about management of calves, growing heifers and milch animals
CO4	Incubation, hatching and brooding
CO5	Housing principles

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Role of live-stock in the national economy. Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine and poultry 8 Hours
Unit II: Management of calves, growing heifers and milch animals. Digestion in livestock. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. Feed ingredients for ration for livestock. Feed supplements and feed additives. Feeding of live-stock 6 Hours
Unit III: Incubation, hatching and brooding. Management of growers and layers. Digestion in poultry. Classification of feedstuffs. Proximate principles of feed. Nutrients and their functions. 6 Hours
Unit IV: Housing principles, space requirements for different species of livestock and poultry 5 Hours
Unit V: Introduction of live-stock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry 4 Hours
Unit VI: Models for poultry houses and the cost benefit ratio. Feed ingredients for ration for poultry. Feed supplements and feed additives. Feeding of poultry

Suggested Reading

1. Prasad J. (2003): Live Stock Production and Management

Name of The Course	Crop Improvement - I (Kharif Crops)
Course Code	AGRI3005

Prerequisite	
Co-requisite	
Anti-requisite	
	L T P C
	1 0 2 2

Course Objectives

1. To impart education and training to the students regarding germplasm, breeding concepts, breeding objectives and breeding methods of cereals, millets, pulses and oilseeds

Course Outcomes

CO1	Understanding about genetics of qualitative and quantitative characters
CO2	Different concepts of breeding
CO3	Floral biology of different cereals
CO4	Learning about breeding objectives
CO5	Floral biology of different pulses and oilseeds crops
CO6	Models for poultry houses

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Plant genetic resources, its utilization and conservation. Study of genetics of qualitative and quantitative characters. 4 Hours
Unit II: Important concepts of breeding self pollinated, cross pollinated and vegetatively propagated crops 4 Hours
Unit III: Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different cereals 4 Hours
Unit IV: Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different pulses and oilseeds. Ideotype concept and climate resilient crop varieties for future 3 Hours
Unit V: Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic

and biotic stress tolerance and quality (physical, chemical, nutritional). 3 Hours

Suggested Reading

1. Allard, R.W. 1960. *Principles of Plant Breeding*. John Wiley & Sons, New York.
2. Phundan Singh. 2006. *Essential of Plant Breeding*. Kalyani Publishers, Ludhiana.
3. Poehlman, J.M. and Borthakur, D. 1995. *Breeding of Asian Field Crops*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Sharma, J.R. 1994. *Principles and Practices of Plant Breeding*. Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
5. Kalloo, G. 1994. *Vegetable Breeding*. Panima Educational Book Agency, New Delhi.

Name of The Course	Entrepreneurship Development And Business Communication			
Course Code	AGRI3006			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To acquaint the students about entrepreneurial and managerial attributes helped in operating managing and enterprises.

Course Outcomes

CO1	Understanding about concept of, entrepreneurship
CO2	Different concepts of Agri - Entrepreneurship.
CO3	Entrepreneurship Development Programmes (EDPs).
CO4	Globalization and the emerging business entrepreneurial environment.
CO5	Stakeholders in business

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Concept of Entrepreneur, Entrepreneurship, Distinction between an Entrepreneur and a Manager ; Management - Levels & Functions of Management - planning- Organizing - Directing - motivation - ordering - leading –supervision - Communication and control. Characteristics of Entrepreneurs; Opportunities for entrepreneurship and rural entrepreneurship. Types of Entrepreneurs, Functions of Entrepreneurship. Hours
Unit II: Agri - Entrepreneurship - Concept, Need and Scope. Assessing overall business environment in Indian economy; Globalization and the emerging business entrepreneurial Environment. 8 Hours
Unit III: Objectives, Phases, Problems of EDPs, Entrepreneurial behavior and Role of Achievement Motivation, Factors Affecting Entrepreneurship Development; Generation, Incubation and Commercialization of Business Ideas. Environment scanning and opportunity identification, Researching / Managing Competition - Entrepreneurship Development Programmes (EDPs) Ways to define possible Competitors. 8 Hours
Unit IV: Globalization and the emerging business entrepreneurial environment; Role of ED in economic development of a country- Overview of Indian social, political systems and their implications for decision making by individual entrepreneurs SWOT Analysis - Concept, Meaning and Advantages. Government Policies, Incentives, Programmes and Schemes for Entrepreneurship Development; Export and Import Policies relevant to Indian Agriculture Sector. Institutional Support - Financial Institutions and other agencies in entrepreneurship development. Venture capital (VC), contract farming (CF) and joint ventures (JV), Public-private partnerships (PPP); Overview of agricultural Input industry – Seed, Fertilizer, Pesticides, Farm Machinery, Agricultural Food Processing Industry. 3 Hours
Unit V: Definition of business; Stakeholders in business; Stages of Indian business; Importance of agribusiness in Indian economy; Business Communication for Public Relation , Advertisement and crisis communication. Social responsibility of business. Morals and ethics in enterprise management Assessment of

Entrepreneurship skills, Business Leadership Skills; Communication Skills for entrepreneurship development, Developing organizational skill, Managerial skills, Problem solving skill and Time management skills. 3 Hours

Suggested Reading

1. Anil Kumar, S., Poornima, S. C., Mini, K., Abraham and Jayashree, K. 2003. *Entrepreneurship Development*. New Age International Publishers, New Delhi.
- 2 Bhaskaran, S. 2014. *Entrepreneurship Development & Management*. Aman Publishing House, Meerut
- 3 Gupta, C.B. 2001. *Management: Theory and Practice*. Sultan Chand and Sons, New Delhi
- 4 Indu Grover 2008. *Handbook on Empowerment and Entrepreneurship*. Agrotech Publishing Academy, Udaipur

Name of The Course	Geoinformatics And Nano Technology For Precision Farming			
Course Code	AGRI3007			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To educate engineering and technology undergraduate students which includes environment ,health, social, ethical and safety issues in nanotechnology and to collect various geo-spatial relates from various data, analyze and user oriented applications.

Course Outcomes

CO1	Concepts and techniques of Precision agriculture.
CO2	Crop discrimination and yield monitoring
CO3	Remote sensing concepts and application in agriculture
CO4	Application of crop simulation models
CO5	Use of Nanotechnology

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Precision agriculture: concepts and techniques; their issues and concerns for Indian Agriculture, Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture. 4 Hours
Unit II: Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; spatial data and their management in GIS; Geodesy and its basic principles. 4 Hours
Unit III: Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions 4 Hours
Unit IV: System Simulation- Concepts and principles, Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture. 3 Hours
Unit V: Nanotechnology, definition, concepts and techniques, brief introduction about nano scale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in tillage, seed, water, fertilizer, plant protection for scaling-up farm productivity. 3 Hours

Suggested Reading

1. Pradeep. T. 2007. NANO: The Essentials: Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Lillesand, T.M. and Kiefer, R. W. 1994. Remote sensing and image interpretation.
3. (3rd edition), John Wiley and Sons.
4. Anji Reddy, M. 2006. Text book of Remote sensing and Geographical Information Systems, (3rd edition), B.S. Publications, Hyderabad.

Name of The Course	Practical Crop Production - I (Kharif Crops) - Lab
Course Code	AGRI3008
Prerequisite	

Co-requisite	
Anti-requisite	
	L T P C
	0 0 4 2

Course Objectives

1.To educate undergraduate students about technology and practices by cultivating various cropping system in the field.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
0	0	0	100

Suggested Reading

1. Practical Crop Production by- Ram Narayan Meena

Name of The Course	Intellectual Property Rights
Course Code	AGRI3009
Prerequisite	
Co-requisite	
Anti-requisite	
	L T P C
	1 0 0 1

Course Objectives

1.The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge based economy

Course Outcomes

CO1	Concepts and learning about intellectual property.
CO2	Types of Intellectual Property and legislations
CO3	Patents Act 1970 and Patent system in India
CO4	Plant breeder's rights and registration of plant varieties
CO5	Convention on biological diversity

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Introduction and meaning of intellectual property. Brief introduction to GATT, WTO, TRIPs and WIPO Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, etc. 4 Hours
Unit II: Types of Intellectual Property and legislations covering IPR in India: Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. 4 Hours
Unit III: Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, Compulsory licensing, Patent Cooperation Treaty, Patent search and patent database; Origin and history including a brief introduction to UPOV for protection of plant varieties; Protection of plant varieties under UPOV and PPV&FR Act of India; system (GPS), components and its functions. 4 Hours
Unit IV: Plant breeders rights; Registration of plant varieties under PPV&FR Act 2001; breeders, researcher and farmers rights. Traditional knowledge-meaning and rights of TK holders 3 Hours
Unit V: Convention on Biological Diversity; International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing 3 Hours

Suggested Reading

1. Pradeep. T. 2007. NANO: The Essentials: Understanding Nanoscience and Nanotechnology. Tata McGraw-Hill Publishing Company Limited, New Delhi.
2. Lillesand, T.M. and Kiefer, R. W. 1994. Remote sensing and image interpretation.
3. (3rd edition), John Wiley and Sons.

4. Anji Reddy, M. 2006. Text book of Remote sensing and Geographical Information Systems, (3rd edition), B.S. Publications, Hyderabad

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Name of The Course	Rain-Fed Agriculture & Watershed Management			
Course Code	AGRI3011			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.To teach the students about rain fed agriculture and watershed management for better yield with suitable crops varieties.

Course Outcomes

CO1	Learning about rain fed agriculture
CO2	Types of drought
CO3	Water harvesting
CO4	Utilization of water by soil and crop management practices
CO5	Contingent crop planning

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Rain fed agriculture: Introduction, types, History of rain fed agriculture & watershed in India. Problems and prospects of rain fed agriculture in India . Soil and climatic conditions prevalent in rain fed areas	4 Hours
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Unit II: Drought: types, effect of water deficit on physio- morphological characteristics of the plants, Mechanism of crop adaptation under moisture deficit condition.	4 Hours
Unit III: Water harvesting: importance, its techniques	4 Hours
Unit IV: Efficient utilization of water through soil and crop management practices, Management of crops in rain fed areas	3 Hours
Unit V: Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management	3 Hours

Suggested Reading

- 1.Reddy, S. R. and Prabhakar Reddy, G. 2015. Dryland Agriculture. Kalyani Publishers.
2. Arnon,I. 1972. Crop Production in Dry Regions (Vol.I), Leonard Hill Pub. Co, London.
3. Dhruva Narayana, V.V., Sastry, G.S. and Patnaiak, V.S. 1999. Watershed Management in India. ICAR, New Delhi.
4. Jeevananda Reddy, S.2002. Dryland Agriculture in India: An agro-climatological and agrometeorological perspective. B.S. publications.

Name of The Course	Protected Cultivation And Secondary Agriculture			
Course Code	AGRI3012			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1.Imparting education to UG students about protected cultivation and post harvest technology with a view to store the grains for future use and learning more through value addition in farm products.

Course Outcomes

CO1	Learning about green houses
CO2	Types of green houses
CO3	Irrigation systems used in greenhouses

CO4	Important engineering work in greenhouses
CO5	Drying theory

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

<p>Unit I: Introduction to green-houses - History, definition, greenhouse effect, advantages of green houses. Types of greenhouses.</p> <p style="text-align: right;">4 Hours</p>
<p>Unit II: Plant response to greenhouse environment - Planning and design of greenhouses - Design criteria of green house for cooling and heating purposes - Green house equipments - Materials of construction for traditional and low cost green houses.</p> <p style="text-align: right;">4 Hours</p>
<p>Unit III: Irrigation systems used in greenhouses - Typical applications - Passive solar greenhouse - Hot air greenhouse heating systems - Greenhouse drying - Cost estimation and economic analysis</p> <p style="text-align: right;">4 Hours</p>
<p>Unit IV: Important engineering properties such as physical - Thermal and aerodynamic properties of cereals - Pulses and oilseeds - Their application in PHT equipment design and operation - Drying and dehydration - Moisture measurement - EMC.</p> <p style="text-align: right;">3 Hours</p>
<p>Unit V: Drying theory- Various drying methods - Commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, re-circulatory dryer and solar dryer) - Material handling equipment - Screw conveyer and bucket elevator - Their principle - Working and Selection- Primary processing of cereals, pulses and oilseed, like cleaning, grading, packaging etc.</p> <p style="text-align: right;">3 Hours</p>

Suggested Reading

1. Radha Manohar, K and Igathinathane. C. *Greenhouse Technology and Management*, 2nd Edition, B.S. Publications.
2. Tiwari, G.N. *Greenhouse Technology for Controlled Environment*. Narosa Publishing House Pvt. Ltd.

3. Singh Brahma and Balraj Singh., 2014. *Advances in Protected Cultivation*, New India Publishing Company.
4. Sahay, K.M. and Singh, K.K. 1994. *Unit operations of Agricultural Processing*. Vikas Publishing house Pvt. Ltd. New Delhi.

Name of The Course	Diseases Of Field And Horticultural Crops And Their Management - Ii			
Course Code	AGRI3013			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	2	3

Course Objectives

1. To teach the student about diseases of horticulture crops and their management for better and assured yield of horticultural crops and timely availability in the market.

Course Outcomes

CO1	Understanding symptoms, etiology, disease cycle and management of major diseases of fruit plants
CO2	Understanding symptoms, etiology, disease cycle and management of major diseases of fruit plants
CO3	Understanding symptoms, etiology, disease cycle and management of major diseases of tomato, potato, onion etc.
CO4	Understanding symptoms, etiology, disease cycle and management of major diseases of coconuts, oil palm etc.
CO5	Understanding symptoms, etiology, disease cycle and management of major diseases of Marigold, jasmine etc.
CO6	Understanding symptoms, etiology, disease cycle and management of major diseases of tomato and other cash crops etc.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks

5	30	50	15	100
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Course Content:

<p>Unit I: Symptoms, etiology, disease cycle and management of following diseases: Citrus: canker, gummosis, felt, tristeza and greening; Mango: anthracnose, malformation, bacterial blight, powdery mildew, sooty mould, red rust and Loranthus; Guava: wilt and anthracnose; Papaya: foot rot, anthracnose, leaf curl and mosaic and powdery mildew. Ber: Powdery mildew. Sapota: Flat limb. Banana: Panama wilt, bacterial wilt, Erwinia rhizome rot, Sigatoka, bunchy top, banana mosaic and banana bract mosaic; Pomegranate: Anthracnose and bacterial blight.</p> <p style="text-align: center;">8 Hours</p>
<p>Unit II: Symptoms, etiology, disease cycle and management of following diseases: Grape vine: downy mildew, Powdery mildew, anthracnose, alternaria leaf spot and rust; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl; Strawberry: leaf spot Chillies: Damping off, anthracnose and fruit rot, wilt, powdery mildew, Choanephora blight cercospora leaf spot, bacterial leaf spot, mosaic complex and leaf curl; Brinjal: Phomopsis blight and fruit rot, bacterial wilt, Sclerotinia blight and little leaf; Okra: Cercospora leaf spot, powdery mildew and Yellow Vein Mosaic; Potato: early and late blight, black scurf, common scab, wart, black leg, brown rot, leaf roll, mosaics, potato spindle tuber</p> <p>7 Hours</p>
<p>Unit III: Symptoms, etiology, disease cycle and management of following diseases: Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl, Septoria leaf spot, bacterial canker, root knot, Tomato spotted wilt and mosaic; Cruciferous vegetables: Club root, white rust, Downy mildew, powdery mildew, Alternaria leaf spot and black rot; Cucurbits: downy mildew, powdery mildew.</p> <p style="text-align: center;">7 Hours</p>
<p>Unit IV: Symptoms, etiology, disease cycle and management of following diseases: Coriander: stem gall; Coconut: Stem bleeding, Ganoderma wilt, bud rot, grey blight and tatipaka; Oilpalm: Bunchrot and spear rot; Tea: blister blight; Coffee: rust; Turmeric: leaf spot, leaf blotch, rhizome rot</p> <p style="text-align: center;">6 Hours</p>
<p>Unit V: Symptoms, etiology, disease cycle and management of following diseases: Ginger: rhizome rot/soft rot, leaf spot; Mulberry: powdery</p>

<p>mildew; Rose: dieback, powdery mildew and black leaf spot; Marigold: Botrytis blight; Chrysanthemum: wilt, stunt, septoriablotch;. Jasmine: rust; Crossandra wilt.</p> <p style="text-align: right;">6 Hours</p>
<p>Unit VI: Symptoms, etiology, disease cycle and management of following diseases: Cercospora leaf spot, wilt and CMV; Betelvine: Root and stem rot, Sclerotialwilt, Fusarial wilt, Anthracnose; Onion and garlic: Smudge, smut, purple blotch, and Stemphylium blight; Beans: anthracnose, rust, yellow mosaic, Bean common mosaic virus and bacterial blight; Colocasia: Phytophthora blight</p>

Suggested Reading

1. Rangaswami, G & Mahadevan, K. 2001. *Diseases of crop plants in India*, Prentice Hall of India Pvt. Ltd, New Delhi.
2. Singh, R.S. 2005. *Plant Diseases*. Oxford & IBH Publications, New Delhi
3. Pathak, V.N. 2001. *Diseases of Fruit crops*. Oxford & IBH Publications, New Delhi
4. Singh, R.S. 1999. *Diseases of Vegetable crops*. Oxford & IBH Publications, New Delhi

Name of The Course	Post-Harvest Management And Value Addition Of Fruits And Vegetables			
Course Code	AGRI3014			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To teach the post-harvest management and value addition in fruit and vegetables keeping in view the income and employment generation

Course Outcomes

CO1	Understanding the importance of fruits and vegetables
CO2	Understanding about respiration and factors affecting respiration rate
CO3	Principles and methods of preservation
CO4	Understanding fermented and non-fermented beverages
CO5	Concepts and Standards, Packaging of products

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Importance of fruits and vegetables, extent and possible causes of post-harvest losses; Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening. 4 Hours
Unit II: Respiration and factors affecting respiration rate; Role of ethylene; Post harvest disease and disorders; Heat, chilling and freezing injury; Harvesting and field handling. 4 Hours
Unit III: Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept; Principles and methods of preservation 4 Hours
Unit IV: Intermediate moisture food- Jam, jelly, marmalade, preserve, candy - Concepts and Standards; Fermented and non-fermented beverages 3 Hours
Unit V: Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables - Concept and methods, osmotic drying. Canning – Concepts and Standards, Packaging of products 3 Hours

Suggested Reading

- Rathore, N.S., Mathur, G.K., Chasta, S.S. 2012. *Post-harvest Management and Processing of Fruits and Vegetable*, ICAR, New Delhi.
- Srivastava, R.P. and Sanjeev Kumar. 2002. *Fruit and Vegetable Preservation: Principles and Practices*. International Book Distribution Company, Lucknow.
- Giridharilal, G.S., Siddappa and Tondon, G.L. 2007. *Preservation of Fruits and Vegetables*. ICAR, New Delhi.
- Mitra, S.K. 2005. *Post Harvest Physiology and Storage of Tropical and Subtropical Fruits*. CABI Publishers, Kolkatta

Name of The Course	Management Of Beneficial Insect
Course Code	AGRI3015

Prerequisite	
Co-requisite	
Anti-requisite	
	L T P C
	1 0 2 2

Course Objectives

- To aware students about the beneficial insects in agricultural fields and how to keep them

Course Outcomes

CO1	Understanding the importance of beneficial Insects
CO2	Understanding about sericulture
CO3	Principles and methods of disease control in silkworm
CO4	Understanding about lack culture
CO5	Concepts of mass multiplication techniques of predators

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Insect pests and diseases of honey bee. Role of pollinators in cross pollinated plants. 4 Hours
Unit II: Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. 4 Hours
Unit III: Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection. 4 Hours
Unit IV: Species of lac insect, morphology, biology, host plant, lac production - seed lac, button lac, shellac, lac- products. Identification of

major parasitoids and predators commonly being used in biological control. 3 Hours
Unit V: Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance. 3 Hours

Suggested Reading

1. Vasantharaj David, B. and V.V. Rama Murthy (2016). *Elements of Economic Entomology*, Popular Book Depot, Coimbatore.
2. Butani, D.K. and Jotwani, M.G. 1984. *Insects in Vegetables*. Periodical Export Book Agency, Delhi.
3. Butani, D. K. 1984. *Insects and Fruits*. Periodical Export Book Agency, New Delhi.

Name of The Course	Crop Improvement - Ii (<i>Rabi</i> Crops)			
Course Code	AGRI3016			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To impart education and training to the students regarding germplasm, breeding concepts, breeding objectives and breeding methods of fibres, sugars, starches, narcotics, vegetables, fruits and flowers.

Course Outcomes

CO1	Plant genetic resources, its utilization and conservation.
CO2	Understanding about Important concepts of breeding self pollinated, cross pollinated crops
CO3	Floral biology, emasculation, pollination
CO4	Understanding about Centers of origin of crops
CO5	Concepts of major breeding objectives and procedures

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Plant genetic resources, its utilization and conservation. Study of genetics of qualitative and quantitative characters. Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different fibres and sugars. 4 Hours
Unit II: Important concepts of breeding self pollinated, cross pollinated and vegetative propagated crops. Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different fruits and vegetables. 4 Hours
Unit III: Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different starches and narcotics crops. 4 Hours
Unit IV: Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different starches and narcotics crops. 3 Hours
Unit V: Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, a biotic and biotic stress tolerance and quality (physical, chemical, nutritional). 3 Hours

Suggested Reading

1. Allard, R.W. 1960. *Principles of Plant Breeding*. John Wiley & Sons, New York.
2. Phundan Singh. 2006. *Essential of Plant Breeding*. Kalyani Publishers, Ludhiana.
3. Poehlman, J.M. and Borthakur, D. 1995. *Breeding of Asian Field Crops*. Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.
4. Sharma, J.R. 1994. *Principles and Practice of Plant Breeding*. Tata McGraw-Hill, Publishing Co. Ltd., New Delhi.
5. Kalloo, G. 1994. *Vegetable Breeding*. Panima Educational Book Agency, New Delhi.

Name of The Course	Practical Crop Production - Ii (<i>Rabi</i> Crops)
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Course Code	AGRI3017			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	0	0	4	2

Course Objectives

1. To educate undergraduate students about technology and practices by cultivating various cropping system in the field.

Course Outcomes

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
-	-	-	100

Course Content:

Suggested Reading

1. Textbook of Field Crops by Mukund Joshi.

Name of The Course	Principles Of Organic Farming			
Course Code	AGRI3018			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. To tell the students the relevance of organic farming in present context and imparting training about biological intensive nutrient management vermi-composting, green manuring etc.

Course Outcomes

CO1	Principles and its scope of organic farming in India
CO2	Understanding the role of Government (central/state) and NGOs in the field of organic farming
CO3	Organic ecosystem and their concepts

CO4	Restrictions to nutrient use in organic farming
CO5	Certification process in organic farming
CO6	Understanding the role of organic farming

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

Unit I: Organic farming, principles and its scope in India 4 Hours
Unit II: Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture 4 Hours
Unit III: Organic ecosystem and their concepts; Organic nutrient resources and its fortification 4 Hours
Unit IV: Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP. 3 Hours
Unit V: Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products 3 Hours

Suggested Reading

1. Arun K. Sharma. 2002. A Hand book of organic farming. Agrobios, India. 627p.

Name of The Course	Farm Management, Production & Resource Economics			
Course Code	AGRI3019			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	1	0	2	2

Course Objectives

1. Imparting education about production economics and farm management to deal with the production functions, determining optimum input-output, farm planning and budgeting system.

Course Outcomes

CO1	Principles and its scope of production economics and farm management
CO2	Understanding about farm management problems in India
CO3	Meaning and concept of cost, types of costs and their interrelationship
CO4	Farm planning and budgeting
CO5	Concepts of Natural resource economics
CO6	Understanding about farm management of forest resources.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Pr	Total Marks
5	30	50	15	100

Course Content:

<p>Unit I: Imparting education about production economics and farm management to deal with the production functions, determining optimum input-output, farm planning and budgeting system. 4 Hours</p>
<p>Unit II: Farm management problems in India. Principles of farm management: concept of production function and its type, use of production function in decision-making on a farm, factor-product, factor-factor and product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage, time comparison principle. 4 Hours</p>
<p>Unit III: Meaning and concept of cost, types of costs and their interrelationship, cost function /cost-output relationship, importance of costs in managing farm business and Cost Principle. Farm inventory, appraisal and valuation of farm resources and products 4 Hours</p>
<p>Unit IV: Meaning and importance of farm planning and budgeting, Partial budget, enterprise budget and complete budgeting, steps in farm planning and budgeting-linear programming, Concept of risk and uncertainty in agriculture</p>

<p>production, nature and sources of risks and its management strategies- Crop/livestock/machinery insurance, weather based crop insurance, features, and determinants of compensation</p> <p style="text-align: right;">Hours</p>
<p>Unit V: Concepts of Natural resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc. 3 Hours</p>

Suggested Reading

1. Bishop, C.E. and W. D. Tousaint. 1958. *Introduction to Agricultural Economic Analysis*. John Wiley and Sons, London.
2. Heady, Earl O. 1964. *Economics of Agricultural Production and Resource Use*. Prentice Hall of India, Private Limited, New Delhi
- 3 S.S. Johl, J.R. Kapur. 2006. *Fundamentals of Farm Business Management*.
- 4 Kalyani Publishers, New Delhi.

Name of The Course	Principles Of Food Science And Nutrition			
Course Code	AGRI3020			
Prerequisite				
Co-requisite				
Anti-requisite				
	L	T	P	C
	2	0	0	2

Course Objectives

1. To develop the basic understanding about nutrition, its effect on human health and to understand the fundamentals of food science.

Course Outcomes

CO1	Principles and concepts of food science
CO2	Understanding about composition of foods
CO3	Food microbiology
CO4	Understanding about malnutrition
CO5	Concepts of balanced diets
CO6	Understanding about composition of balance diets.

Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term Exam (MTE)	End Term Exam (ETE)	Total Marks
10	40	50	100

Course Content:

Unit I: Concepts of food science - Definitions of food, specific nutrients in foods and their functions - Physical characteristics of foods - Importance Food physical characteristics - Density - Phase change, pH, osmosis, surface tension, colloidal systems. 6 Hours
Unit II: Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactive, important reactions). 5 Hours
Unit III: Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods); Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.). 6 Hours
Unit IV: Food and nutrition, Malnutrition (over and under nutrition), nutritional Disorders, Energy metabolism (carbohydrate, fat, proteins). 6 Hours
Unit V: Balanced/ modified diets, Menu planning, new trends in food science and nutrition. 6 Hours

Suggested Reading

1. Sumati R. Mudambi, Shalini M. Rao and M.V. Rajagopal. 2006. *Food Science*, 2nd Ed. New Age International (P) Limited, New Delhi.
2. Martin Eastwood. 2003. *Principles of Human Nutrition*. Blackwell Science Ltd., Oxford.
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