

SCHOOL OF AGRICULTURE

# GALGOTIAS UNIVERSITY

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## COURSE BOOK SCHOOL OF AGRICULTURE -2020 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: 2020-2021**

**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
		<b>Total</b>	<b>17</b>	<b>0</b>	<b>18</b>	<b>26</b>				
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
		<b>Total</b>	<b>17</b>	<b>0</b>	<b>16</b>	<b>25</b>				
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
		<b>Total</b>	<b>15</b>	<b>0</b>	<b>18</b>	<b>24</b>				

#### 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
		<b>Total</b>	<b>13</b>	<b>0</b>	<b>16</b>	<b>21</b>				

#### 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
		<b>Total</b>	<b>16</b>	<b>0</b>	<b>18</b>	<b>25</b>				
<b>Semester VI</b>										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	Pr
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
		<b>Total</b>	<b>14</b>	<b>0</b>	<b>20</b>	<b>24</b>				
<b>Semester VII</b>										
Sl No	Course Code	Name of the Course					Assessment Pattern			
			L	T	P	C	IA	MTE	ETE	15
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
		<b>Total</b>	<b>0</b>	<b>0</b>	<b>40</b>	<b>20</b>				
<b>Semester VIII</b>										
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
		<b>Total</b>				<b>20</b>				

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
AGRI3010	Agricultural Journalism		2	0	2	3	5	30	50	15



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

### Course Objectives

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

### Course Outcomes

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

### Continuous Assessment Pattern

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

### Course Content:

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

<b>6 Hours</b>
<b>Unit V:</b> Juvenility and flower bud differentiation; Unfruitfulness; pollination, pollenizer and pollinators; fertilization and parthenocarpy. <b>6 Hours</b>

### 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

<b>Name of The Course</b>	Fundamentals Of Plant Biochemistry And Biotechnology			
<b>Course Code</b>	AGRI1002			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Bio-chemical aspects in the use of agricultural products for consumption of carbohydrates, protein, fat etc
<b>CO2</b>	Micro-propagation methods
<b>CO3</b>	Scope of organ culture, embryo culture, cell suspension culture etc
<b>CO4</b>	Breeding methods for crop improvement
<b>CO5</b>	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.
<b>CO6</b>	Advances technique of breeding methods for crop improvement

### 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. <b>5 Hours</b>
<b>Unit V:</b> 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. <b>6Hours</b>
<b>Unit-6</b> Advances technique of breeding methods for crop improvement

### Suggested Reading

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

<b>Name of The Course</b>	Fundamentals Of Plant Pathology			
<b>Course Code</b>	AGRI1003			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	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.
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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

<b>CO4</b>	Shifting cultivation, taungya, alley cropping etc
<b>CO5</b>	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.

<b>Name of The Course</b>	Comprehension And Communication Skills In English			
<b>Course Code</b>	AGRI1005			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Vocabulary - Synonyms, Antonyms, Homophones etc.
<b>CO2</b>	Grammar - Tenses - Active voice and passive voice.
<b>CO3</b>	Report writing and proposal writing etc
<b>CO4</b>	Importance of professional writing.
<b>CO5</b>	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. <b>5 Hours</b>
<b>Unit II:</b> Reading Comprehension, Vocabulary - Synonyms, Antonyms, Homophones, Homonyms, often confused words <b>4 Hours</b>
<b>Unit III:</b> 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. <b>7 Hours</b>
<b>Unit IV:</b> Written skills - Paragraph writing, precise writing, report writing and proposal writing. Importance of professional writing. <b>4 Hours</b>
<b>Unit V:</b> Preparation of Curriculum vitae and job applications, synopsis writing. Kinds, importance and process of interviews. <b>4 Hours</b>

### 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.

<b>Name of The Course</b>	Fundamentals Of Agronomy			
<b>Course Code</b>	AGRI1006			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Agronomy and its scope, growth and development of crops.
<b>CO2</b>	Seeds and sowing, tillage and tith etc.
<b>CO3</b>	Crop management technologies.
<b>CO4</b>	Herbicides and its application
<b>CO5</b>	Water use efficiency; irrigation methods, scheduling criteria etc.
<b>CO6</b>	Advancement of agronomical practices

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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. <b>7 Hours</b>
<b>Unit II:</b> Seeds and sowing, tillage and tith, crop density and geometry; Crop nutrition, manures and fertilizers, nutrient use efficiency. <b>5 Hours</b>
<b>Unit III:</b> Adaptation and distribution of crops, crop management technologies in problematic areas; Harvesting and threshing of crops. <b>7 Hours</b>
<b>Unit IV:</b> Weeds, importance, classification, crop weed competition, concepts of weed management, principles and methods; Herbicides, classification, selectivity, resistance, allelopathy. <b>5 Hours</b>
<b>Unit V:</b> Water resources, soil plant water relationship, crop water requirement, water use efficiency. <b>7 Hours</b>
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 - 5<sup>th</sup> edition.



2. Yellamanda Reddy, T. and SankaraReddi, 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.

<b>Name of The Course</b>	Introductory Biology			
<b>Course Code</b>	AGRI1007			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

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

### Course Content:

<b>Unit I:</b> Introduction to the living world. Diversity characteristics of life, Origin of life, Evolution and genetics. <b>4 Hours</b>
<b>Unit II:</b> Binomial nomenclature and classification, Cell and cell division. <b>4 Hours</b>

<b>Unit III:</b> Morphology of flowering plants. Seed and seed germination. <b>5 Hours</b>
<b>Unit IV:</b> Plant systematic - viz. Brassicaceae, Fabaceae and Poaceae. <b>4 Hours</b>
<b>Unit V:</b> Role of animals in agriculture. <b>2 Hours</b>

### Suggested Reading

1. *Biology* - Raven P, Mason Johnson G B, Losos J. B, Singer. S.S, 10<sup>th</sup> edition, 2014. McGraw Hill Publications.
2. M.G. Simpson, 2006. *Plant systematics*. Elsevier Publications.
3. H. C. Gangulee 1972 *College Botany* 4<sup>th</sup> 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*. 2<sup>nd</sup> edition

<b>Name of The Course</b>	Elementary Mathematics			
<b>Course Code</b>	AGRI1008			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Addition- Subtraction - Multiplication methods
<b>CO2</b>	Differentiation of functions
<b>CO3</b>	Differentiation of inverse trigonometric functions.
<b>CO4</b>	Standard and General Equation of circle etc.
<b>CO5</b>	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 <sup>rd</sup> order, Properties of determinants up to 3 <sup>rd</sup> order and their evaluation. Cramer's rule and simple problems based on it. 6 Hours
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

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

### Course Objectives

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

### Course Outcomes

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





<b>CO4</b>	Genetic disorders. Nature, structure & replication of genetic material.
<b>CO5</b>	Gene structure, function and regulation

### 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>
<p>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</p>
<p>Unit IV: Mutation, classification, Methods of inducing mutations, mutagenic agents and induction of mutation. Qualitative &amp; Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. 7 Hours</p>
<p>Unit V: Genetic disorders. Nature, structure &amp; replication of genetic material. 5Hours</p>
<p>Unit VI: Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.</p>

#### Suggested Reading

1. Pundhan 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

<b>Name of The Course</b>	Agricultural Microbiology			
<b>Course Code</b>	AGRI1013			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Prokaryotic and eukaryotic microbes
<b>CO2</b>	Genetic recombination-transformation, conjugation and transduction etc
<b>CO3</b>	Role of microbes in soil fertility
<b>CO4</b>	Different cycle's viz., Carbon, Nitrogen, Phosphorus etc
<b>CO5</b>	Rhizosphere and phyllosphere
<b>CO6</b>	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:

<p>Unit I: Introduction - Scope of microbiology &amp; 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</p>
<p>Unit II: Bacterial genetics: Genetic recombination-transformation, conjugation and</p>

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. (5<sup>th</sup> Ed.)2015. McGraw Hill Publishers, New York.
2. *Microbiology*. Prescott, L.M., Harley, J.P. and Klein, D.A. (9<sup>th</sup> 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. (4<sup>th</sup> Ed.) 2014. Oxford and IBH Publishing Company Pvt. Ltd., New Delhi.

<b>Name of The Course</b>	Soil And Water Conservation Engineering			
<b>Course Code</b>	AGRI1014			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

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

### Course Content:

<p><b>Unit I:</b> 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. <b>4 Hours</b></p>
<p><b>Unit II:</b> Gullies - Classification, stages of development. Soil loss estimation – Universal soil loss equation (USLE) and modified USLE. Rainfall erosivity - estimation by KE&gt;25 and EI<sub>30</sub> methods. Soilerodibility - topography, crop management and conservation practice factors. <b>5 Hours</b></p>
<p><b>Unit III:</b> 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. <b>4 Hours</b></p>
<p><b>Unit IV:</b> 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. <b>4 Hours</b></p>
<p><b>Unit V:</b> 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</p>

sedimentation, silt monitoring and storage loss in tanks.	4 Hours
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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

### 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

### 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

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

### Suggested Reading

1. Taiz, L. and Zeiger, E. 2010. *Plant Physiology* 5<sup>th</sup> 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*. 2<sup>nd</sup> Edition. Prentice Hall Publishers, New Jersey, USA

<b>Name of The Course</b>	Fundamentals Of Agricultural Economics			
<b>Course Code</b>	AGRI1016			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Economic activity and concept of economy
<b>CO2</b>	Consumer's equilibrium and derivation of demand curve, concept of consumer surplus
<b>CO3</b>	Market dynamics- changes in demand and supply and prices
<b>CO4</b>	Natural and socio-economic determinants
<b>CO5</b>	Role in modern economy, borrowing and lending etc

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Total Marks</b>
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*. 19<sup>th</sup> 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.

<b>Name of The Course</b>	Fundamentals Of Soil Science			
<b>Course Code</b>	AGRI1017			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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 5 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

### Suggested Reading

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

<b>Name of The Course</b>	Fundamentals Of Entomology
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<b>Course Code</b>	AGRI1018			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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 .

### 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

<b>Name of The Course</b>	Fundamentals Of Agricultural Extension			
<b>Course Code</b>	AGRS1019			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Extension Education- meaning, definition, scope and process
<b>CO2</b>	Different extension systems in India
<b>CO3</b>	Details about various rural development programmes
<b>CO4</b>	Extension teaching methods
<b>CO5</b>	Rural Leadership
<b>CO6</b>	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:

<p>Unit I: Meaning, definition &amp; 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</p>
<p>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</p>
<p>Unit III: Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Development - meaning, definition, concept &amp; principles, Philosophy of C.D. 7 Hours</p>
<p>Unit IV: Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. 7 Hours</p>

<p>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</p>
<p>Unit VI: Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models</p>

### 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.

<b>Name of The Course</b>	Communication Skills And Personality Development			
<b>Course Code</b>	AGRI1020			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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



<b>CO1</b>	Details about Communication Skills
<b>CO2</b>	Structural and functional grammar
<b>CO3</b>	Verbal and nonverbal communication
<b>CO4</b>	Reading and comprehension of general and technical articles
<b>CO5</b>	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

<b>Name of The Course</b>	Agriculture Heritage
<b>Course Code</b>	AGRI1021

<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	1	0	0	1

#### Course Objectives

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

#### Course Outcomes

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

#### Continuous Assessment Pattern

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

#### Course Content:

<b>Unit I:</b> 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
Unit V: Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects. 2 Hours

#### 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 21<sup>st</sup> 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

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

### 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 Outcomes

<b>CO1</b>	<i>Kharif</i> crops and their classification
<b>CO2</b>	Pop of pulses - pigeonpea, mungbean and urdbean
<b>CO3</b>	Pop of oilseeds- groundnut, and soybean
<b>CO4</b>	Sowing methods of fibre crops- cotton & Jute
<b>CO5</b>	Economic importance, soil and climatic requirements, varieties, cultural practices forage crops-sorghum, cowpea,
<b>CO6</b>	Economic importance, soil and climatic requirements, varieties, cultural practices cluster bean and napier

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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5	30	50	15	100
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### 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 ReddiRamu. 5<sup>th</sup> 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.

<b>Name of The Course</b>	Fundamentals Of Plant Breeding			
<b>Course Code</b>	AGRI2002			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	2	0	2	3

### Course Objectives

1.To import 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.

Unit VI: Biotechnological tools-DNA markers and marker assisted selection. Participatory plant breeding.

### 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

### 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 Orobanchae; 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;  
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.

### 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
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**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, FaithWempen, Microsoft Office 2010 Bible.

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

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

**Course Objectives**

1.To impart knowledge about farm power in India, i.e. Tillage implements, Seed drills, Paddy Tran 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**

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

**Continuous Assessment Pattern**

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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 transplanters, 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

<b>Name of The Course</b>	Production Technology For Vegetables And Spices			
<b>Course Code</b>	AGRI2006			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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
<b>Unit III:</b> 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. <b>4 Hours</b>
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
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### 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.

<b>Name of The Course</b>	Environmental Studies And Disaster Management			
<b>Course Code</b>	AGRI2007			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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. 6Hours

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.

### 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

<b>Name of The Course</b>	Statistical Methods			
<b>Course Code</b>	AGRI2008			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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
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### 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

<b>Name of The Course</b>	Agricultural Finance And Co-Operation			
<b>Course Code</b>	AGRI2009			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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.	

### 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. Hamprton.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.

<b>Name of The Course</b>	Crop Production Technology - Ii (Rabi Crops)
<b>Course Code</b>	AGRI2010
<b>Prerequisite</b>	

<b>Co-requisite</b>					
<b>Anti-requisite</b>					
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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
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### Suggested Reading

1. Reddy, S.R. and Reddi Ramu. 5<sup>th</sup> 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

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

### Course Objectives

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

### Course Outcomes

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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

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

### Course Objectives

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

### Course Outcomes

<b>CO1</b>	Importance and scope of energy sources
<b>CO2</b>	Learning about types of biogas plants
<b>CO3</b>	Introduction of solar energy
<b>CO4</b>	Solar photovoltaic system and its application
<b>CO5</b>	Introduction of wind energy

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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.

<b>Name of The Course</b>	Problematic Soils And Their Management			
<b>Course Code</b>	AGRI2013			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Importance of soil quality and health
<b>CO2</b>	Reclamation and management of soil
<b>CO3</b>	Introduction of remote sensing and GIS
<b>CO4</b>	Bio remediation
<b>CO5</b>	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:

<p>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</p>
<p>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</p>

<p>Unit III: Remote sensing and GIS in diagnosis and management of problem soils 3 Hours</p>
<p>Unit IV: Bio remediation through multipurpose tree species of soils, land capability and classification, land suitability, classification. 3 Hours</p>
<p>Unit V: Problematic soils under different Agro-eco systems 3 Hours</p>

### 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.

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

### Course Objectives

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

### Course Outcomes

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

### Continuous Assessment Pattern

Internal Assessment (IA)	Mid Term	End Term	Pr	Total Marks
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	<b>Exam (MTE)</b>	<b>Exam (ETE)</b>		
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. Dhirendra 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.

<b>Name of The Course</b>	Farming System & Sustainable Agriculture			
<b>Course Code</b>	AGRI2016			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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**

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

**Continuous Assessment Pattern**

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Total Marks</b>
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.
2. Jayanthi C, Devasenapathy P and Vinnila, C. 2008. Farming systems principles and practice. Satish serial publishing house, Delhi.
3. Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur.
4. Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university press

<b>Name of The Course</b>	Agricultural Marketing Trade & Prices			
<b>Course Code</b>	AGRI2017			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

<b>CO6</b>	Awareness about WTO
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### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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 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.

<b>Name of The Course</b>	Introductory Agro-Meteorology & Climate Change
<b>Course Code</b>	AGRI2018
<b>Prerequisite</b>	
<b>Co-requisite</b>	

<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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**

<b>CO1</b>	Learning about spheres of the earth
<b>CO2</b>	Atmospheric weather variables
<b>CO3</b>	Nature and properties of solar radiation
<b>CO4</b>	Monsoon, mechanism and importance in Indian agriculture
<b>CO5</b>	Agriculture and weather relations

**Continuous Assessment Pattern**

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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

<p>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</p> <p style="text-align: center;">3 Hours</p>
<p>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</p> <p style="text-align: center;">3 Hours</p>

### Suggested Reading

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

<b>Name of The Course</b>	Agribusiness management			
<b>Course Code</b>	AGRI2019			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	<b>Importance of Agribusiness in the Indian Economy</b>
<b>CO2</b>	<b>Management Functions and Planning in Agribusiness management</b>

<b>CO3</b>	<b>Financial Management of Agribusiness</b>
<b>CO4</b>	<b>Details about Marketing Management</b>
<b>CO5</b>	<b>Details about agricultural projects</b>
<b>CO6</b>	<b>Writing of agricultural projects</b>

### Continuous Assessment Pattern

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

### Course Content:

<p>Unit I: Agribusiness: Meaning, Definition, Structure of Agribusiness, Importance of Agribusiness in the Indian Economy, Agricultural Policy. Agribusiness Management, Distinctive features, Importance of Good Management, Definitions of Management</p> <p style="text-align: center;">4 Hours</p>
<p>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.</p> <p style="text-align: center;">5 Hours</p>
<p>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.</p> <p style="text-align: center;">6 Hours</p>
<p>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.</p> <p style="text-align: center;">5 Hours</p>
<p>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.</p> <p style="text-align: center;">5 Hours</p>



Unit VI: Characteristics of agricultural projects: preparation of project reports for various activities in agriculture and allied sectors: Dairying, poultry, fisheries, agro-industries etc.

### Suggested Reading

1. 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

<b>Name of The Course</b>	Principles Of Integrated Pest And Disease Management			
<b>Course Code</b>	AGRI3001			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term</b>	<b>End Term</b>	<b>Pr</b>	<b>Total Marks</b>
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	<b>Exam (MTE)</b>	<b>Exam (ETE)</b>		
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 inter science 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.

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

### Course Objectives

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

### Course Outcomes

<b>CO1</b>	Understanding the importance of organic manures
<b>CO2</b>	Different types of Chemical fertilizers
<b>CO3</b>	Learning about plant nutrition
<b>CO4</b>	Learning about Soil testing
<b>CO5</b>	Implementation and methods of fertilizer recommendations
<b>CO6</b>	Factor influencing nutrient use efficiency

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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
<b>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</b>

<b>availability to plants.</b> <b>4 Hours</b>
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*, Macmillan Publishing Co., New York.
4. D. K .Das 2014. *Introductory Soil Science*. Kalyani Publishers, New Delhi

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

### Course Objectives

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

### Course Outcomes

<b>CO1</b>	Understanding about different arthropod pests
<b>CO2</b>	Distribution, nature of damage and control practices pests
<b>CO3</b>	Factors affecting losses of stored grain
<b>CO4</b>	Learning about management of insect pests

<b>CO5</b>	Storage structures for grain
<b>CO6</b>	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.

<b>Name of The Course</b>	Livestock And Poultry Management			
<b>Course Code</b>	AGRI3004			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### 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
<b>Unit III:</b> 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
<b>Unit IV:</b> 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

<b>Name of The Course</b>	Crop Improvement - I (Kharif Crops)			
<b>Course Code</b>	AGRI3005			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

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

### Course Content:

<b>Unit I:</b> 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 futur 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. Kallou, G. 1994. *Vegetable Breeding*. Panima Educational Book Agency, New Delhi.

<b>Name of The Course</b>	Entrepreneurship Development And Business Communication
<b>Course Code</b>	AGRI3006
<b>Prerequisite</b>	
<b>Co-requisite</b>	
<b>Anti-requisite</b>	

	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	1	0	2	2

### Course Objectives

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

### Course Outcomes

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

### Continuous Assessment Pattern

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

### Course Content:

<p>Unit I: Concept of Entrepreneur, Entrepreneurship, Distinction between an Entrepreneur and a Manager ; Management - Levels &amp; 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.</p> <p>Hours</p>
<p>Unit II: Agri - Entrepreneurship - Concept, Need and Scope. Assessing overall business environment in Indian economy; Globalization and the emerging business entrepreneurial Environment.</p> <p>8 Hours</p>
<p>Unit III: Objectives, Phases, Problems of EDPs, Entrepreneurial behavior and Role of Achievement Motivation, Factors Affecting Entrepreneurship Development; Generation, Incubation and Commercialization of Business</p>

Ideas. Environment scanning and opportunity identification, Researching / Managing Competition - Entrepreneurship Development Programmes (EDPs) Ways to define possible Competitors.

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



<b>Name of The Course</b>	Geoinformatics And Nano Technology For Precision Farming			
<b>Course Code</b>	AGRI3007			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Concepts and techniques of Precision agriculture.
<b>CO2</b>	Crop discrimination and yield monitoring
<b>CO3</b>	Remote sensing concepts and application in agriculture
<b>CO4</b>	Application of crop simulation models
<b>CO5</b>	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:UnderstandingNanoscienceandNanotechnology.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.

<b>Name of The Course</b>	Practical Crop Production - I (Kharif Crops) - Lab			
<b>Course Code</b>	AGRI3008			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>Name of The Course</b>	Intellectual Property Rights			
<b>Course Code</b>	AGRI3009			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

## Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Total Marks</b>
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
<b>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</b> <b>3 Hours</b>

## 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

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

<b>Name of The Course</b>	Rain-Fed Agriculture & Watershed Management
<b>Course Code</b>	AGRI3011

<b>Prerequisite</b>	
<b>Co-requisite</b>	
<b>Anti-requisite</b>	
	<b>L T P C</b>
	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

<b>CO1</b>	Learning about rain fed agriculture
<b>CO2</b>	Types of drought
<b>CO3</b>	Water harvesting
<b>CO4</b>	Utilization of water by soil and crop management practices
<b>CO5</b>	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
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
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### 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 agro-meteorological perspective. B.S. publications.

<b>Name of The Course</b>	Protected Cultivation And Secondary Agriculture
<b>Course Code</b>	AGRI3012
<b>Prerequisite</b>	
<b>Co-requisite</b>	
<b>Anti-requisite</b>	
	<b>L T P C</b>
	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

<b>CO1</b>	Learning about green houses
<b>CO2</b>	Types of green houses
<b>CO3</b>	Irrigation systems used in greenhouses
<b>CO4</b>	Important engineering work in greenhouses
<b>CO5</b>	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:

Unit I: Introduction to green-houses - History, definition, greenhouse effect, advantages of green houses. Types of greenhouses. 4 Hours
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. 4 Hours
Unit III: Irrigation systems used in greenhouses - Typical applications - Passive solar greenhouse - Hot air greenhouse heating systems - Greenhouse drying - Cost estimation and economic analysis 4 Hours
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. 3 Hours
Unit V: Drying theory- Various drying methods - Commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, recirculatory 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. 3 Hours

### Suggested Reading

1. Radha Manohar, K and Igathinathane. C. *Greenhouse Technology and Management*, 2<sup>nd</sup> 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.

<b>Name of The Course</b>	Diseases Of Field And Horticultural Crops And Their Management - Ii
<b>Course Code</b>	AGRI3013

<b>Prerequisite</b>	
<b>Co-requisite</b>	
<b>Anti-requisite</b>	
	<b>L</b> <b>T</b> <b>P</b> <b>C</b>
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### 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

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

### Continuous Assessment Pattern

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

### Course Content:

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,
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Erwinia rhizome rot, Sigatoka, bunchy top, banana mosaic and banana bract mosaic; Pomegranate: Anthracnose and bacterial blight.  
8 Hours

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  
7 Hours

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.  
7 Hours

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  
6 Hours

Unit V: Symptoms, etiology, disease cycle and management of following diseases: Ginger: rhizome rot/soft rot, leaf spot; Mulberry: powdery mildew; Rose: dieback, powdery mildew and black leaf spot; Marigold: Botrytis blight; Chrysanthemum: wilt, stunt, septoriablotch; Jasmine: rust; Crossandra wilt.  
6 Hours

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

### 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

<b>Name of The Course</b>	Post-Harvest Management And Value Addition Of Fruits And Vegetables			
<b>Course Code</b>	AGRI3014			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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

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

<b>Name of The Course</b>	Management Of Beneficial Insect			
<b>Course Code</b>	AGRI3015			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	1	0	2	2

### Course Objectives

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

### Course Outcomes

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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.

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

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

### Continuous Assessment Pattern

<b>Internal Assessment (IA)</b>	<b>Mid Term Exam (MTE)</b>	<b>End Term Exam (ETE)</b>	<b>Pr</b>	<b>Total Marks</b>
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
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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
<b>Unit IV:</b> Floral biology, emasculation, pollination, Centers of origin, distribution of species, wild relatives of different starches and narcotics crops. 3 Hours
<b>Unit V:</b> 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.

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

<b>Name of The Course</b>	Principles Of Organic Farming			
<b>Course Code</b>	AGRI3018			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Principles and its scope of organic farming in India
<b>CO2</b>	Understanding the role of Government (central/state) and NGOs in the field of organic farming
<b>CO3</b>	Organic ecosystem and their concepts
<b>CO4</b>	Restrictions to nutrient use in organic farming
<b>CO5</b>	Certification process in organic farming
<b>CO6</b>	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.

<b>Name of The Course</b>	Farm Management, Production & Resource Economics			
<b>Course Code</b>	AGRI3019			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

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

<b>CO6</b>	Understanding about farm management of forest resources.
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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:

<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. <b>4 Hours</b></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. <b>4 Hours</b></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 <b>4 Hours</b></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 production, nature and sources of risks and its management strategies- Crop/livestock/machinery insurance, weather based crop insurance, features, and determinants of compensation <b>Hours</b></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. <b>3 Hours</b></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.

<b>Name of The Course</b>	Principles Of Food Science And Nutrition			
<b>Course Code</b>	AGRI3020			
<b>Prerequisite</b>				
<b>Co-requisite</b>				
<b>Anti-requisite</b>				
	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	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

<b>CO1</b>	Principles and concepts of food science
<b>CO2</b>	Understanding about composition of foods
<b>CO3</b>	Food microbiology
<b>CO4</b>	Understanding about malnutrition
<b>CO5</b>	Concepts of balanced diets
<b>CO6</b>	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 -
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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*, 2<sup>nd</sup> Ed. New Age International (P) Limited, New Delhi.
2. Martin Eastwood. 2003. *Principles of Human Nutrition*. Blackwell Science Ltd., Oxford.
3. Norman N. Potter. 1998. *Food Science*, 5th Ed. Springer Science + Business Media, New York.
4. Michael J. Pelczar Jr., E.C.S. Chan and Noel R. Krieg. 1998. *Microbiology*, 5th Ed. Tata, McGraw-Hill Education, New Delhi.