MOHAN BABU UNIVERSITY

Sree Sainath Nagar, Tirupati – 517 102

MBU
MOHAN BABU
UNIVERSITY
DREAM. BELIEVE. ACHIEVE

SCHOOL OF AGRICULTURE

B.Sc. (Hons) Agriculture

CURRICULUM AND SYLLABUS

(For 2022-23 Admitted Students)

MBU MOHAN BABU UNIVERSITY

Vision

To be a globally respected institution with an innovative and entrepreneurial culture that offers transformative education to advance sustainability and societal good.

Mission

- Develop industry-focused professionals with a global perspective.
- Offer academic programs that provide transformative learning experience founded on the spirit of curiosity, innovation, and integrity.
- Create confluence of research, innovation, and ideation to bring about sustainable and socially relevant enterprises.
- Uphold high standards of professional ethics leading to harmonious relationship with environment and society.

SCHOOL OF AGRICULTURE

Vision

To be a globally reputed institution producing agricultural graduates with high knowledge, skills, employability, and competence by imparting focused practical technical education through innovative and analytical approaches with a core objective of creating desirable manpower for agriculture and all allied agri-related business besides contributing to the rural society and the nation.

Mission

- To provide the best possible infrastructure and facilities for innovative teaching and learning of agricultural and all allied subjects like horticulture, agricultural engineering, food science and technology, animal husbandry etc.
- To create an interface with internationally reputed research and education institutions for benefitting students with knowledge-sharing and work opportunities
- To establish a centre of excellence and innovation incubator for creating industry interfaces and partnerships for enhancing the technical competencies of students as per the needs of the industry
- To empower students with the latest agricultural and horticultural techniques and skills for promoting employability as well as encouraging developing of agripreneurs
- Inculcating basic human values and work ethics in the process of making good Samaritans for the society and nation

B.Sc. (Hons) Agriculture

PROGRAM EDUCATIONAL OBJECTIVES

After few years of graduation, the graduates of B.Sc. (Hons) Agriculture will:

PEO1. Exhibit the core concepts in agriculture to solve the common problems in management of crop cultivation through lifelong learning to develop scientific, economic and environmental principles underpinning agricultural production.

PEO2. Evolve as entrepreneur or be employed by acquiring skills in areas of agricultural sciences such as agronomy, soil science, genetics and plant breeding, agricultural extension, plant protection, microbiology and livestock.

PEO3. Extensive knowledge on latest technologies, tools utilized in the area of crop improvement, production and protection for pursuing advanced studies in agriculture and allied sciences.

PROGRAM OUTCOMES

On successful completion of the Program, the graduates of B.Sc (Hons) Agriculture Program will be able to:

PO1. **Knowledge:** Study and apply concepts, theories, and practices of agricultural sciences to gain fundamental knowledge.

PO2. **Analysis:** To identify, analyze and evaluate various experiences and perspectives using knowledge of agriculture sciences for substantiated conclusions.

PO3. **Develop:** Develop solutions to increase the productivity of agricultural crops with appropriate consideration of soil health, water, pests and diseases, public health, safety, society, and environment.

PO4. **Tools and Techniques:** To create, select, and apply appropriate techniques, resources, and modern tools with an understanding of the limitations.

PO5. **Environment and Sustainability:** Understand the impact of agricultural solutions in environmental contexts and demonstrate the knowledge for sustainable development.

PO6. **Ethics and Society:** Apply the ethical principles of agricultural practices for the sustainable development of society

PO7. **Individual and teamwork:** Function effectively as an individual, and as a member or leader in diverse teams, to manage projects and finance in multidisciplinary settings.

PO8. **Effective Communication:** Communicate effectively on agricultural activities with the farming community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO9. **Life-long learning:** Adapt to the changes and advancements in technology and engage in independent and lifelong learning

PROGRAM SPECIFIC OUTCOMES

On successful completion of the Program, the graduates of B.Sc (Hons) Agriculture program will be able to:

PSO1. Develop Scientific and standardize package of practices for various crops viz., land preparation, irrigation, nutrient and weed management, and harvesting at appropriate maturity stages without compromising the environment to be grown in different types of soils and seasons across agroclimatic zones.

PSO2. Understand the genetic composition of various plants and species to identify suitable breeding procedures for developing new cultivars (varieties, hybrids and genetically edited/modified varieties) with economic value as compared to existing varieties.

PSO3. Identify various abiotic (nutrient deficiencies, heat, water, etc.) and biotic (insects, diseases, and nematodes) stress affecting the potential yields of crops, and standardizing suitable pest control methods which are either organic or inorganic in nature without actually compromising the environment.

PSO4. Create awareness and train the farmers, rural youth, and women to become agripreneurs and social entrepreneurs, which is aimed at increasing productivity and profitability through appropriate transfer of technologies from laboratory to land

PSO5. Innovate and adopt suitable technologies for better soil water conservation, farm operations, cultivation under controlled conditions, climate smart agriculture, appropriate storage, and post-harvesting, etc.

B.Sc. Hons. (Agri) – I Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Credits
1.	AGRO101	Fundamentals of Agronomy	3	-	1	4
2.	AGRO102	Introductory Agro-meteorology and Climate Change	1	-	1	2
3.	GPB111	Fundamentals of Genetics	2	-	1	3
4.	SSAC121	Fundamentals of Soil Science	2	-	1	3
5.	HORT181	Fundamentals of Horticulture	1	-	1	2
6.	EXTN191	Rural Sociology and Educational Psychology	2	-	-	2
7.	CS101	Comprehension and Communication Skills in English	1	-	1	2
8.	MATH101	Elementary Mathematics*	2	-	-	2
9.	AGR0103	Agricultural Heritage*	1	-	-	1
10.	CS102	Human Values and Ethics (non gradial)**	1	-	-	1
11.	NSS101	NATIONAL SERVICE SCHEME	0	-	2	2
Total			**16**	**-**	**08**	**24**

B.Sc. Hons. (Agri) – II Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO104	Environmental studies and disaster management	2	-	1	3
2.	GPB112	Fundamentals of Plant Breeding and Biotechnology	2	-	1	3
3.	ENTO131	Fundamentals of Entomology	3	-	1	4
4.	AECO141	Fundamentals of Agricultural Economics	3	-	0	3
5.	AENG151	Soil and Water Conservation Engineering	1	-	1	2
6.	PPHY161	Fundamentals of crop Physiology and Plant Biochemistry	2	-	1	3
7.	HORT182	Production Technology for Vegetables, Spices and Condiments Part-1	1	-	1	2
8.	PATH171	Fundamental of Plant Pathology	2	-	1	3
9.	SSAC122	Problematic Soils and their management	2	-	0	2
10.	MATH102	Statistical Methods	1	-	1	2
Total			**16**	**-**	**08**	**26**

B.Sc. Hons. (Agri) – III Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO201	Crop Production Technology – I (Kharif Crops)	1	-	1	2
2.	AGRO202	Introduction to Forestry 2(1+1)	1	-	1	2
3.	GPB211	Crop Improvement-I (Kharif crops) 3(2+1)	2	-	1	3
4.	AECO241	Agricultural Finance and Cooperation 3(2+1)	2	-	1	3
5.	AENG251	Farm Machinery and Power 2(1+1)	1	-	1	2
6.	PATH271	Agricultural Microbiology	1	-	1	2
7.	HORT281	Production Technology for vegetables and spices and condiments Part-2 2(1+1)	1	-	1	2
8.	EXTN291	Fundamentals of Agricultural Extension Education	1	-	1	2
9.	MATH201	Agri-Informatics (Fundamentals of computer application in Agriculture) 2(1+1)	1	-	1	2
10.	SSAC221	Manures, Fertilizers and Soil Fertility Management 3(2+1)	2	-	1	3
		Total	**13**	**-**	**10**	**23**

B.Sc. Hons. (Agri) – IV Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO203	Crop Production Technology –II (Rabi Crops)	1	-	1	2
2.	AGRO205	Farming System and Sustainable Agriculture 1(1+0)	1	-	0	1
3.	GPB212	Crop Improvement-II (Rabi crops) 2(1+1)	1	-	1	2
4.	ENTO231	Management of Beneficial Insects 3(2+1)	2	-	1	3
5.	AECO242	Agricultural Marketing Trade and Prices 3(2+1)	2	-	1	3
6.	AGRO204	Renewable Energy and Green Technology 2(1+1)	1	-	1	2
7.	PATH272	Diseases of Field and Horticultural Crops and their Management -I 3(2+1)	2	-	1	3
8.	HORT282	Production Technology for Fruit and Plantation Crops	1	-	1	2
9.	EC201	Fundamentals of Stress Physiology	2	-	1	3
		Total	**13**	**-**	**8**	**21**

B.Sc. Hons. (Agri) – V Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO301	Geoinformatics and Nano-technology and Precision Farming	1	-	1	2
2.	AGRO302	Practical Crop Production – I (Kharif crops)	0	-	2	2
3.	GPB311	Principles of Seed Technology 3(1+2)	1	-	2	3
4.	ENTO331	Pests of crops & Stored grain and their management	1	-	1	2
5.	EXTN391	Intellectual Property Rights 1(1+0)	1	-	0	1
6.	AH301	Livestock and Poultry Management	3	-	1	4
7.	PATH371	Principles of Integrated Pest and Disease Management 3(2+1)	2	-	1	3
8.	HORT381	Production Technology for Ornamental Crops, MAP and Landscaping 2(1+1)	1	-	1	2
9.	AECO341	Entrepreneurship Development and Business Communication 2(1+1)	1	-	1	2
10.	EC301	Fundamentals of Food Technology & Processing	1	-	1	2
Total			**14**	**-**	**11**	**23**

B.Sc. Hons. (Agri) – VI Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO304	Rainfed Agriculture and Watershed Management	1	-	1	2
2.	AGRO305	Practical Crop Production –II (Rabi crops)	0	-	2	2
3.	AGRO306	Principles of Organic Farming	1	-	1	2
4.	EXTN392	Communications Skills and Personality Development	1	-	1	2
5.	AECO342	Farm Management, Production and Resource Economics 2(1+1)	1	-	1	2
6.	AENG351	Protected Cultivation and Secondary Agriculture	1	-	1	2
7.	PATH372	Diseases of Field and Horticultural Crops and Their Management - II 3(2+1)	2	-	1	3
8.	HORT382	Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)	1	-	1	2
9.	FN301	Principles of Food Science and Nutrition 2(2+0)	2	-	-	2
10.	EC302	Fundamentals of Animal Product Technology	2	-	1	3
Total			**12**	**-**	**10**	**22**

B.Sc. Hons. (Agri) – VII Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	RAWE	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE and AIA)	-	-	20	20
		Total	**-**	**-**	**20**	**20**

B.Sc. Hons. (Agri) – VIII Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.		Experiential Learning Programme - Elective Course #1 10(0+10)	-	-	10	10
2.		Experiential Learning Programme - Elective Course #2 10(0+10)	-	-	10	10
		Total	**-**	**-**	**20**	**20**

B.Sc. Hons. (Agri) – ELECTIVE COURSES

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.		Agribusiness management	2	-	1	**3**
2.		Agrochemicals 3(2+1)	2	-	1	**3**
3.		Commercial Plant Breeding 3(1+2)	2	-	1	**3**
4.		Landscaping 3(2+1)	2	-	1	**3**
5.		Food Safety and Standards 3(2+1)	2	-	1	**3**
6.		Biopesticides and Biofertilizers 3(2+1)	2	-	1	**3**
7.		Protected Cultivation 3(2+1)	2	-	1	**3**
8.		Micro propagation Technologies 3(1+2)	2	-	1	**3**
9.		Hi-tech. Horticulture 3(2+1)	2	-	1	**3**
10		Weed Management 3(2+1)	2	-	1	**3**
11		System Simulation and Agro-advisory 3(2+1)	2	-	1	**3**
12		Agricultural Journalism 3(2+1)	2	-	1	**3**

B.Sc. Hons. (Agri) – ELP's

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.		Production Technology for Bioagents and Biofertilizer	-	-	10	10
2.		Seed Production and Technology	-	-	10	10
3.		Mushroom Cultivation Technology	-	-	10	10
4.		Soil, Plant, Water and Seed Testing	-	-	10	10
5.		Commercial Beekeeping	-	-	10	10
6.		Poultry Production Technology	-	-	10	10
7.		Commercial Horticulture	-	-	10	10
8.		Floriculture and Landscaping	-	-	10	10
9.		Food Processing	-	-	10	10
10		Agriculture Waste Management	-	-	10	10
11		Organic Production Technology	-	-	10	10
12		Commercial Sericulture	-	-	10	10

B.Sc. Hons. (Agri) – I Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Credits
1	AGRO101	Fundamentals of Agronomy	3	-	1	4
2.	AGRO102	Introductory Agro-meteorology and Climate Change	1	-	1	2
3.	GPB111	Fundamentals of Genetics	2	-	1	3
4.	SSAC121	Fundamentals of Soil Science	2	-	1	3
5.	HORT181	Fundamentals of Horticulture	1	-	1	2
6.	EXTN191	Rural Sociology and Educational Psychology	2	-	-	2
7.	CS101	Comprehension and Communication Skills in English	1	-	1	2
8.	MATH101	Elementary Mathematics*	2	-	-	2
9.	AGR0103	Agricultural Heritage*	1	-	-	1
10.	CS102	Human Values and Ethics (non gradial)**	1	-	-	1
11.	NSS101	NATIONAL SERVICE SCHEME	0	-	2	2
Total			**16**	**-**	**08**	**24**

Course Code	Course Title	L	T	P	S	C
AGRO101	**FUNDAMENTALS OF AGRONOMY**	**3**	**-**	**1**	**-**	**4**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the fundamentals of Agronomy. The course provides deep insight into various concepts of crop production technology viz., seeds and sowing methods, weed management, irrigation management, and growth and development of plants and their harvesting methods.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts and components of agronomy and its relation with other sciences.

CO2. Analyze the methods of tillage, seeds sowing, crop geometry, manures and fertilizers for crop management.

CO3. Estimation of crop water requirement by applying various irrigation techniques.

CO4. Understand the weed biology and application of herbicides for effective weed management.

CO5. Understand various factors involved in growth and development of plant and its harvesting techniques.

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: Agronomy – Introduction ***(06 Periods)***

Agronomy and its scope.

Module 2: Seeds, Sowing, Manures And Fertilizers ***(10 Periods)***

Seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency.

Module 3: Irrigation Management ***(10 Periods)***

Water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, logging.

Module 4: Weed Management ***(12 Periods)***

Weeds- importance, classification, crop weed competition, concepts of weed management principles and methods, herbicides- classification, selectivity and resistance, allelopathy.

Module 5: Growth and Development ***(10 Periods)***

Growth and development of crops, factors affecting growth and development, plant ideotypes, Crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

***Total Periods:* 48**

Practical's

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit to college farm and identification of major crops and varieties
2. Practice of primary tillage implements and puddling
3. Practice of secondary tillage implements
4. Practice of seeding equipment , inter cultivation implements
5. Seed germination and viability test - Study of sowing depth on germination and seedling vigour
6. Identification of manures, fertilizers and green manure crops/seeds.
7. Practice of manure and fertilizer application
8. Participation in ongoing field operations
9. Participation in ongoing field operations
10. Identification of weeds in field crops and other habitats
11. Study of weed flora in different weed management practices and calculation of herbicide efficiencies (WI and WCE)
12. Herbicide label information and computation of herbicide doses
13. Study of herbicide application equipment and calibration
14. Herbicide application and precautionary measurements
15. Study of herbicide phytotoxicity symptoms in different crops
16. Identification of maturity symptoms of different crops

RESOURCES

TEXT BOOKS:

1. Principles of Agronomy by T. Yellamanda Reddy and G.H. Sankara Reddy, Kalyani Publishers, 2016.
2. Principles of Agronomy by SR Reddy, Kalyani Publishers, 2018.

REFERENCE BOOKS:

1. Weed management- Principles and practices by O. P. Gupta, Agrobios publishers, 2019.
2. Irrigation Agronomy by S. R. Reddy and G. K. Reddy, Kalyani Publishers, 2016
3. Farming system and sustainable agriculture, S. R. Reddy, Kalyani Publishers, 2017

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=echf4TCgR5gandlist=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1
2. https://www.youtube.com/watch?v=JYVIInPt9e8andlist=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1andindex=2
3. https://www.youtube.com/watch?v=xgkHuEra3Hsandlist=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1andindex=3
4. https://www.youtube.com/watch?v=r5qbr4SYRwUandlist=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1andindex=6

WEB RESOURCES:

1. https://agrimoon.com/wp-content/uploads/Principles-of-Agronomy-Agricultural-Meteorology.pdf
2. efaidnbmnnnibpcajpcglclefindmkaj/https://nishat2013.files.wordpress.com/2013/11/agronomy-book.pdf

Course Code	Course Title	L	T	P	S	C
AGRO102	**INTRODUCTORY AGRO-METEOROLOGY AND CLIMATE CHANGE**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical and practical knowledge on acquaint the students with Agro-Climatic zone, different climatic conditions and its effect on crop yield. Impact of weather and climate on agricultural Monsoon mechanism and its effect on India Agriculture, Remote sensing, weather forecasting tools, climate change and it's cause and impacts.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts and role of Agro-meteorology in Agriculture.

CO2. Understand the Nature and property of weather variables like solar radiation, relative humidity, wind and the effect on crops.

CO3. Understand the Nature and property of pressure, precipitation, cloud classification, Monsoon, mechanism and its Importance in Indian Agriculture

CO4. Understand the agro climatic zones of India, weather forecasting tools and remote sensing in agriculture.

CO5. Understand the importance of Climate change and its impact on Agriculture

CO6. Work independently and/or in teams to understand and suggest solutions to any practical problems.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	-	-	-	-	1	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**-**	**-**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: Climate and weather Meteorology ***(03 periods)***

Agricultural Meteorology -Importance and scope in crop production -Co-ordinates of India and Andhra Pradesh - Atmosphere - Composition and vertical layers of atmosphere (stratification) - Climate - Weather- Factors affecting climate and weather-Climatic types

-Different agricultural seasons of India and Andhra Pradesh and climatic characteristics of India.

Module 2: Solar radiation, RH and Wind ***(04 periods)***

Solar radiation –Light intensity, quality, direction and duration - Air and Soil temperature -Diurnal variation -importance in crop production. Heat unit and its importance in agriculture. Relative Humidity and its importance –vapor pressure deficit and its importance –Wind and its effect on crops

Module 3: Agro climatic zones and remote sensing (03 periods)

Agro climatic Zones of India and Andhra Pradesh -Agro climatic normal –Weather forecasting -synoptic chart- crop weather calendar- Remote sensing - Impact of climate and weather on crop production and pest and diseases.

Module 4: Atmospheric pressure , precipitation and temperature ***(03 periods)***

Atmospheric pressure - cyclones, anticyclones, tornado, hurricane and storms - Wind systems of the world -. Clouds -types and their classification. Precipitation -forms - monsoon - Seasons of India-rainfall variability drought, flood and their effect - Cloud seeding - Evaporation - transpiration - Evapotranspiration -PET. Atmospheric temperature, temperature inversion, lapse rate, adiobiotic lapse rate, daily and seasonal variations of temperatures.

Module 5: Climate Change ***(03 periods)***

Climate change- climate variability - definition and causes of climate change - Impact of climate change on Agriculture.

Total Periods -16

PRACTICALS

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit to Agro meteorological Observatory, site selection and layout plan for observatory.
2. Exposure to agro meteorological instruments and weather data recording.
3. Measurement of total, shortwave and long wave radiation and its estimation by using Planck's intensity law.
4. Measurement of albedo and sunshine duration.
5. Computation of radiation Intensity using bright sun shine hours.
6. Measurement of maximum and minimum air temperatures and interpretation of decennial temperature data.
7. Tabulation of maximum and minimum air temperatures, trend and variation analysis for climate change of the region.
8. Measurement of soil temperature and computation of soil heat flux.
9. Determination of atmospheric pressure and vapour pressure.
10. Determination of relative humidity.
11. Determination of dew point temperature- Measurement of atmospheric pressure and analysis of atmospheric conditions.
12. Measurement of wind speed and wind direction, preparation of windroses- Measurement, tabulation and analysis of rainfall data.
13. Measurement of open pan evaporation and evapotranspiration. Computation of

PET and AET-Preparation of synoptic chart and report

14 Computation of climate change and variability

15 Crop planning for climate change

16 GDD, HTU and PTU calculations and their interpretation using their efficiencies

RESOURCES

TEXT BOOKS:

1. Fundamentals of Agrometeorology Mahi, G.S. and Kingra, P.K. 2015 Publisher: Kalyani Publishers, New Delhi.
2. Agrometeorology Reddy, S. R. and Reddy, D.S. 2014 Publisher: Kalyani Publishers New Delhi.

REFERENCE BOOKS:

1. Comprehensive Agrometeorology Mahi, G.S. and Kingra, P.K.
2. Introduction to Agriculture and Agrometeorology Reddy, S. R. 2014 Publisher: Kalyani Publishers New Delhi

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=yafA8sHJPCkandlist=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLL
2. https://www.youtube.com/watch?v=ZNIZ4W5sFTQandlist=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLLandindex=2
3. https://www.youtube.com/watch?v=cXJW6LnQvC0andlist=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLLandindex=3
4. https://www.youtube.com/watch?v=UAdeeCGBpyMandlist=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLLandindex=4

WEB RESOURCES:

1. https://agrimoon.com/wp-content/uploads/Principles-of-Agronomy-Agricultural-Meteorology.pdf

Course Code	Course Title	L	T	P	S	C
GPB111	**FUNDAMENTALS OF GENETICS**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion and hands-on experience on the principles of genetics, cytology, cytogenetics and polyploid. This course also provides mendelian laws and modifications of Mendelian laws, Quantitative inheritance, Linkage and crossing over, sex determination, sex linkage and cytoplasmic inheritance, Modern concept of genetics and mutation.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the principles of genetics and its branches, structure and function of cell, cell division, structure, types and composition of chromosomes, chromosomal aberrations and polyploid.

CO2. Analyse the pre mendelian, mendelian law of inheritance and its deviation from Mendelian inheritance and concepts of alleles.

CO3. Analyse Quantitative inheritance, linkage and crossing over in chromosomes.

CO4. Demonstrate Sex determination, sex linkage, cytoplasmic inheritance and cytoplasmic male sterility in plants.

CO5. Demonstrate the modern concepts of DNA, Gene regulation and mutation in plants.

CO6. Develops independent working ability, through problem solving and effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	1	-	2	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: Cytology ***(10 Periods)***

Definition of genetics, heredity, inheritance, cytology, cytogenetics; Brief history of developments in genetics and cytogenetics. Physical basis of heredity. Structure and function of cell and cell organelles – Differences between Prokaryotes and Eukaryotes. Cell division – mitosis- meiosis and their significance - Gametogenesis and syngamy in Plants- identical and fraternal twins. Chromosome structure, chemical composition, nucleosome, centromere, telomere, euchromatin, heterochromatin, NOR, satellite chromosome, karyotype, ideogram. Types of chromosomes based on position of centromere, based on structure and function: normal and special chromosomes - polytene, lampbrush, B chromosomes, ring and isochromosomes. Chromosomal aberration: Variation in chromosome structure – deletion, duplication, inversion and translocation – genetic and cytological implications. Chromosomal aberration: Variation in chromosome number – euploid, aneuploid, types of aneuploids and their origin; Klinefelter syndrome and Turner syndrome; Polyploid - auto and allopolyploids, their characters; meaning of genome; evolution of wheat, triticale, cotton, tobacco, *Brassica.*

Module 2: Mendelian laws and modifications of Mendelian laws ***(07 Periods)***

Pre-Mendelian ideas about heredity – Vapour and fluid theory, Magnetic power theory, Preformation theory, Lamarck's theory, Darwin's theory, Germplasm theory and Mutation theory. Mendel's experiments and laws of inheritance. Rediscovery of Mendel's work. Terminologies: gene, allele, locus, homozygous, heterozygous, hemizygous, genotype, phenotype, monohybrid, dihybrid, trihybrid, polyhybrid. Chromosomal theory of inheritance. Allelic interactions – Dominance vs recessive, complete dominance, codominance, incomplete dominance, threshold characters. Deviation from Mendelian inheritance – Non allelic interaction without modification in Mendelian ratio – Bateson and Punnett's experiment on fowl comb shape. Non allelic interaction with modification in Mendelian ratio– i.) Dominant epistasis (12:3:1). ii.) Recessive epistasis (9:3:4) iii.) Duplicate and additive epistasis (9:6:1). iv.) Duplicate dominant epistasis (15:1). v) Duplicate recessive epistasis (9:7) vi.) Dominant and recessive epistasis (13:3); Summary of epistatic ratios (i) to (vi) Lethal genes, Pleiotropy, penetrance and expressivity, Multiple alleles, blood group in human, coat colour in rabbits, self-incompatibility in plants; pseudo alleles, isoalleles.

Module 3: Quantitative inheritance, Linkage and Crossing over ***(07 Periods)***

Quantitative inheritance – Multiple factor hypothesis – Nilsson Ehle experiment on wheat kernel colour. Polygenes – transgressive segregation, comparison of quantitatively and qualitatively inherited characters; modifiers; Linkage - coupling and repulsion; Experiment on Bateson and Punnet. Chromosomal theory of linkage of Morgan – Complete and incomplete linkage- Linkage group. Crossing over – significance of crossing over; cytological proof for crossing over - Stern's experiment - Factors controlling crossing over. Strength of linkage and recombination; Two point and three-point test cross. Double cross over, interference and coincidence; genetic map, physical map.

Module 4: Sex determination, sex linkage and cytoplasmic inheritance ***(04 Periods)***

Sex determination: Autosomes and sex chromosomes - chromosomal theory of sex determination - different types – sex determination in human, fowl, butterfly, grasshopper, honey bee; Sex determination in plants – *Melandrium*, papaya, maize. Genic balance theory of Bridges – Gynandromorphs. Sex linked inheritance – criss cross inheritance – reciprocal difference; holandric genes; sex influenced and sex-limited inheritance - Genetic disorders. Cytoplasmic inheritance and maternal effects – feature of cytoplasmic inheritance, chloroplast, mitochondrial - plastid colour in *Mirabilis jalapa*- cytoplasmic male sterility in maize.

Module 5: Modern concept of genetics and mutation ***(04 Periods)***

DNA, the genetic material – Griffith's experiment, Avery, McCleod and McCarthy Experiment

– confirmation by Hershey and Chase; RNA as genetic material–Frankel, Conrat and Singer experiment. Structure of DNA– Watson and Crick model. Models of DNA replication; Proof for semi conservative method of DNA replication; steps involved in DNA replication. RNA types - mRNA, tRNA, rRNA. Protein synthesis - Regulation of gene expression–Operon model of Jacob and Monad – Lac and Trp operons. Cistron, muton and recon. Mutation – characteristics of mutation – micro and macro mutation – ClB technique - molecular basis of mutation- Transition and transversion; major physical and chemical mutagens.

Total Periods: 32

PRACTICALS

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of microscope.
2. Study of cell structure.
3. Preparation of temporary and permanent slides.
4. Practice on mitotic cell division.
5. Practice on meiotic cell division.
6. Probability and Chi-square test.
7. Monohybrid and its modifications.
8. Dihybrid.
9. Trihybrid.
10. Test cross and back cross.
11. Epistatic interactions including test cross and back cross.
12. Epistatic interactions including test cross and back cross.
13. Epistatic interactions including test cross and back cross.
14. Determination of linkage and cross over analysis (through two point test cross data).
15. Determination of linkage and cross over analysis (through three point test cross data).
16. Study of models on DNA and RNA structure.

RESOURCES

TEXT BOOKS:

1. Singh, B.D. 2004. Fundamentals of Genetics, Kalyani Publishers, Chennai.
2. Pundhansingh. 2014. Elements of Genetics. Kalyani Publishers.
3. Russel, P.J. 2000. Fundamentals of genetics. Addition Wesley Longman Publishers, USA.

REFERENCE BOOKS:

1. Gupta P.K., 1997. Cytogenetics. Rastogi Publications, Meerut.
2. Verma, P.S. and V. K. Agarwal. 2007. Genetics. S. Chand and Company Ltd./ New Delhi.
3. Stansfield, W.D.1990. Theory and problems of genetics. Mc-Graw Hill Book Co., New York.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=-rZ_A2cZ_WU
2. https://www.youtube.com/watch?v=fV6Y2ZoIuKc
3. https://www.youtube.com/watch?v=YgxYXuPuYHw
4. https://www.youtube.com/watch?v=NGcPymQAxDE

WEB RESOURCES:

1. https://www.nmsu.edu
2. www.biology200.gsu.edu
3. https://www.nature.com/subjects/plant-genetics
4. https://onlinelibrary.wiley.com/journal/14390523

Course Code	Course Title	L	T	P	S	C
SSAC121	**FUNDAMENTALS OF SOIL SCIENCE**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical and practical knowledge on understanding the origin of soils, their physical, chemical, physico-chemical and biological composition and understanding and management of soil pollution.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand Soil as a natural body; Pedological and edaphological concepts of soil; Components of soil; Soil genesis; Composition of Earth's crust; Soil forming rocks and minerals, primary and secondary minerals. Weathering of rocks and minerals. Factors of soil formation. Soil forming processes. Soil Profile.

CO2. Soil physical properties… Soil texture, structure, density and porosity, soil colour, consistence and plasticity; Soil water retention, movement and availability; Soil air, composition, gaseous exchange- problem and its effect on crop growth; Source, amount and flow of heat in soil, Soil temperature and crop growth.

CO3. Soil physico chemical and chemical properties… Soil reaction/pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; Electrical conductivity; Soil colloids - inorganic and organic; Silicate clays… constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation.

CO4. Soil organic matter… composition, properties and its influence on soil properties; Humic substances - nature and properties; Soil Biology… Soil organisms: macro and microorganisms, their beneficial and harmful effects; Soil enzymes; Soil pollution – Types and behaviour of pesticides; Inorganic contaminants. Prevention and mitigation of soil pollution.

CO5. Work independently and/or in teams to understand and suggest solutions to any practical problems.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	-	3	-	-	-	-	3	-	-	-	-
CO2	3	2	-	-	3	-	-	-	-	3	-	-	-	-
CO3	3	3	-	-	3	-	-	-	-	3	-	-	-	-
CO4	3	2	-	-	3	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**2**	**-**	**-**	**3**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: ***(10 periods)***

Soil as a natural body, Pedological and edaphological concepts of soil. Components of

soil. Soil genesis: Composition of Earth's crust- soil forming rocks and minerals – Primary and secondary minerals. Weathering of rocks and minerals. Factors of soil formation. Soil forming processes. Soil Profile.

Module 2: ***(10 periods)***

Soil physical properties: Soil texture, structure, density and porosity, soil colour, consistence and plasticity. Soil water retention, movement and availability. Soil air, composition, gaseous exchange- problem and its effect on crop growth. Source, amount and flow of heat in soil, Soil temperature and crop growth.

Module 3: ***(06 periods)***

Soil physico chemical and chemical properties: Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability. Electrical conductivity. Soil colloids - inorganic and organic. Silicate clays: constitution and properties, sources of charge, ion exchange, cation and anion exchange capacity and base saturation.

Module 4: ***(06 periods)***

Soil organic matter: composition, properties and its influence on soil properties. Humic substances - nature and properties. Soil Biology: Soil organisms: macro and microorganisms, their beneficial and harmful effects. Soil enzymes. Soil pollution – Types and behaviour of pesticides. Inorganic contaminants. Prevention and mitigation of soil pollution.

Total Periods: 32

PRACTICALS

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of glassware and equipment in soil science laboratory and knowing about goodlaboratory practices (GLPs)
2. Soil Sampling and Preparation of Samples for Laboratory Analysis
3. Study of a soil profile
4. Study of soil forming minerals and rocks
5. Determination of Soil Texture by Feel Method
6. Determination of Particle Size by Hydrometer Method
7. Soil Aggregate Analysis by Yoder’s Sieve Method
8. Determination of Bulk Density, Particle Density and Porosity of Soils
9. Determination of Soil Moisture by Gravimetric Method
10. Determination of Soil Moisture by Pressure Plate/Membrane Apparatus
11. Determination of Infiltration Rate of Soil by Double Ring Infiltrometer Method
12. Determination of pH (Soil Reaction) and Electrical Conductivity (EC) of Soil
13. Estimation of Organic Carbon and Organic Matter Content of Soil.
14. Determination of COLE value /swell index/ potential volume change of soils
15. Determination of soil Colour

RESOURCES

B.Sc. (Hons) Agriculture

TEXT BOOKS:

1. Introductory soil science - D.K. Das.
2. Textbook of soil science - T.D. Biswas and Mukherjee. S.K.
3. A text book of pedology – concepts and applications J. Sehgal,

REFERENCE BOOKS:

1. Text book of soil physics - A.K. Saha.
2. The nature and properties of soils - Brady Nyle C and Ray R Weil.
3. Fundamentals of Soil Science, Indian society of soil science, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=-ZN1xaCxNkgandlist=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Yko
2. https://www.youtube.com/watch?v=-_qdLgPYP0candlist=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Ykoandindex=3
3. https://www.youtube.com/watch?v=xbDgJznPxCsandlist=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Ykoandindex=4
4. https://www.youtube.com/watch?v=Z5ofyRN6lboandlist=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Ykoandindex=5

WEB RESOURCES:

1. efaidnbmnnnibpcajpcglclefindmkaj/https://www.agrimoon.com/wp-content/uploads/Introduction-to-Soil-Science.pdf
2. https://agrimoon.com/introduction-to-soil-science-icar-ecourse-pdf-book/

Course Code	Course Title	L	T	P	S	C
HORT181	**FUNDAMENTALS OF HORTICULTURE**	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: Horticulture-its definition and branches, Importance and scope of Horticulture, Horticultural and botanical classification, climate and soil for horticultural crops, plant propagation methods(sexual and asexual), Propagating structures (separation, division, grafting, budding, layering), High density planting, use of rootstocks, Orchard establishment, (Principle and Layout) Principles and methods of training and pruning, juvenility and flower bud differentiation, unfruitfulness, pollination, pollinizers and pollinations, fertilization and parthenocarpy, vegetable gardens and ornamental garden types and parts, Lawn making, use of plant bio-regulators in horticulture, irrigation methods in horticulture crops, fertilizers application methods.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the fundamental concepts of horticulture and its classification.

CO2. Apply various plant propagation methods used in horticultural crops.

CO3. Demonstrate different planting systems and pollination techniques used in horticultural crops.

CO4. Apply the principles for the establishment of different types of gardens.

CO5. Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	1	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	1	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	1	-	3	-	-	-	-	-	3	-	-	-	-
CO5	-	1	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**1**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: HISTORY, EVOLUTION AND SCOPE OF HORTICULTURE ***(04Periods)***

Originofhorticulture–history–evolution–definitions–scopeandimportanceofhorticulture division and classification of horticultural crops fruits, vegetables, spices and plantation crops, floriculture, landscaping, ornamental gardening, medicinal and aromatic crops– nutritive value and global and national scenario of horticultural crops.

Module 2: PLANT PROPAGATION METHOD (SEXUAL, ASEXUAL AND MICRO PROPAGATION) **(04 Periods)**

Sexual propagation – importance, advantages, and disadvantages – methods of enhancement of seed viability–types of dormancies –seed invigoration–seed treatments. Asexual propagation, importance, advantages, and disadvantages - Asexual propagation types *viz*., Types of cutting, layering, grafting, and budding. Use of specialized plant parts in propagation. Propagation structures and their role. Rootstock influence–stock/scion relationship in fruit crops. Scope and importance of micro propagation in horticultural crops. Direct and indirect organogenesis – media for micro propagation and hardening.

Module 3: PLANTING SYSTEMS AND POLLINATION **(04 Periods)**

Principles of orchard establishment - Methods of planting systems including HDP and UHDP inhorticulturalcrops–cropregulatorypracticesforhorticulturalcrops–training, pruning, special operations in horticultural crops – off-season production of horticultural crops. Flowering, pollination, fruit set, fruit drop, parthenocarpy, fruit ripening, and senescence–Unfruitfulness and its causes.

Module 4: PRINCIPLESANDTYPESOFGARDENS **(04 Periods)**

Principles and types of the garden–principles and types of parks–principles of herbal garden

Total Periods:16

PRACTICALS

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification of garden tools.
2. Identification of horticultural crops.
3. Layout of different planting system.
4. Layout of kitchen garden.
5. Preparation of nursery beds (raised and flat beds) and sowing of seeds.
6. Practice of different asexual methods by division.
7. Practice of different asexual methods by cuttings.
8. Practice of different asexual methods by grafting.
9. Practice of different asexual methods by budding.

10. Practice of different asexual methods by layering
11. Training and pruning of fruit trees.
12. Transplanting and care of vegetable seedlings.
13. Making of herbaceous and shrubbery borders.
14. Preparation of potting mixture, potting and repotting.
15. Fertilizer application in different crops.
16. Visit to commercial nurseries/orchard.

RESOURCES

TEXT BOOKS:

1. Handbook of Horticulture, ICAR, New Dehli – K. L Chadha.
2. Basic Horticulture, Kalyani publishers. New Dehli – Jitendra Singh.

REFERENCE BOOKS:

1. Floriculture in India. Allied publishers. Pvt. Ltd., New Dehli.
2. Introduction to Horticulture. Rajyalakshmi Publications - N. Kumar.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=s-VLvtirppwandlist=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK
2. https://www.youtube.com/watch?v=bWPBB-B2Sf0andlist=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfKandindex=2
3. https://www.youtube.com/watch?v=jYACmgbVoKQandlist=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfKandindex=4

WEB RESOURCES:

1. efaidnbmnnnibpcajpcglclefindmkaj/https://www.agrimoon.com/wp-content/uploads/Fundamentals-of-Horticulture.pdf
2. http://ecoursesonline.iasri.res.in/course/view.php?id=124

Course Code	Course Title	L	T	P	S	C
EXTN191	**RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY**	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an understanding of rural societies and farmer's situations. The course provides a deep insight into various aspects of social issues, class and cultural categories of farmers and villagers, which are to be understood by the agricultural students while understanding, assessing, analysing and solving problems of a farmer in particular and agricultural-related activities in general.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the significance of rural sociology, social groups, culture and social values in Agriculture extension.

CO2. Understand the importance of Social Structure, Social Stratification and Migration in rural society.

CO3. Demonstrate the concept of social controls and factors influencing social change.

CO4. Understand the scope and importance of Educational Psychology, Intelligence, Teaching-Learning Process in Agriculture Extension

CO5. Demonstrate the concepts of motivation and attitude in Agricultural extension

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	3	-	-	-	-	-	-	-	-	3	-
CO5	3	-	-	-	-	-	3	3	-	-	-	-	3	-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: INTRODUCTION TO SOCIOLOGY, SOCIAL GROUPS, CULTURE AND SOCIAL VALUES ***(06 Periods)***

Sociology and Rural Sociology – definitions; Society – rural and urban, characteristics, differences and relationships, important characteristics of Indian rural society; Social groups – definition, classification, role of social groups in extension; Culture – concept, cultural traits, characteristics, functions, Ethnocentrism, Acculturation, Cultural lag, Cultural diffusion, Marginal man, Ethos. Social Values – definition, values and norms, characteristics of values, functions.

Module 2: Social Structure, Social Stratification and Migration ***(06 Periods)***

Structure of Rural Society– patterns of rural settlement, social institutions, social organizations, ecological entities (Region, Community, Neighborhood, Family); Social Stratification – concept, functions, types, differences between class and caste system; Migration –concept, factors influencing migration.

Module 3: Social Control, Social Customs ***(06 Periods)***

Social Control – definition; Customs – conventions, folkways, mores, rituals, taboos; Social Interaction Process – definition, basic social processes; Social Change – concept, factors influencing social change, indicators of social change; Social development.

Module 4: Introduction to Educational Psychology, Intelligence, Teaching-Learning Process; ***(08 Periods)***

Education – Psychology – Educational Psychology – Social Psychology – definitions, importance in extension; Basic principles of Human behaviour – Sensation, Attention, Cognitive, affective, psychomotor domain Perception – meaning, characteristics; Intelligence – concept, types, measurement, factors affecting intelligence; Personality – concept, types, measurement, factors influencing personality; Teaching–Learning Process – Teaching – definition, meaning, principles of teaching, steps in extension teaching; Learning –definition, meaning, principles, types of learning, learning situation.

Module 5: Motivation, Attitude ***(06 Periods)***

Motivation – concept, Maslow's hierarchy of needs, intrinsic and extrinsic motivation, techniques of motivation, importance in extension; Attitude – concept, factors influencing the development of attitudes.

Total Periods: 32

RESOURCES

TEXT BOOKS:

1. Chitamber, J.B. 1997. Introductory Rural Sociology. Wiley Eastern Limited, New Delhi.
2. Adivi Reddy, A. 2001. Extension Education. Sri Lakshmi Press, Bapatla.

REFERENCE BOOKS:

1. Extension - G.L. ray 's
2. A.S. sandu's a textbook on communication

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Y9jpQkJXGKQandlist=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIH

2. https://www.youtube.com/watch?v=LyPCdnNhtvgandlist=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIHandindex=2
3. https://www.youtube.com/watch?v=2lps-AEmb_Iandlist=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIHandindex=3
4. https://www.youtube.com/watch?v=a1mkz4DyOhYandlist=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIHandindex=4

WEB RESOURCES:

1. efaidnbmnnnibpcajpcglclefindmkaj/https://agrimoon.com/wp-content/uploads/Dimensions-of-Agriculture-Extension.pdf
2. https://www.iaritoppers.com/2019/06/fundamentals-of-extension-education-icar-ecourse-pdf-download-e-krishi-shiksha.html

Course Code	Course Title	L	T	P	S	C
CS101	**COMPREHENSION AND COMMUNICATION SKILLS IN ENGLISH**	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical and practical knowledge to give the student confidence to interact with the outside World on a day-to-day basis.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basics of Reading, Writing, Listening, and Speaking skills.

CO2. Demonstrate knowledge of English pronunciation in speaking.

CO3. Analyse the rules of English grammar in speaking and writing.

CO4. Apply the knowledge of writing strategies in communication.

CO5. Apply the strategies of vocabulary in interviews.

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	3	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	2	2	-	-	-	-	-	-	-	-	3	-
CO4	3	3	2	2	-	-	-	-	-	-	-	-	3	-
CO5	3	1	2	2	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: War Minus Shooting- The sporting Spirit ***(04 Periods)***

Reading for Comprehension, Grammar, Speaking, Listening, Vocabulary, Writing, Verbal and Non-verbal communication.

Module 2: You and Your English ***(03 Periods)***

Reading for comprehension, Grammar, Vocabulary, Writing, Listening, and Channels of communication.

Module 3: Functional grammar ***(03 Periods)***

Reading comprehension, Listening, Writing, Grammar, Speaking, Pronunciation, and communication barriers.

Module 4: Written Skills ***(03 Periods)***

Reading comprehension, Listening, Speaking, Grammar,Writing, Pronunciation, and Modes of technology-based communication.

Module 5: Interviews Skills ***(03 Periods)***

Reading comprehension, Vocabulary, Listening, Grammar, Writing, and Technical Communication

Total Periods: 16

PRACTICALS

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Communication - Meaning and process of communication.
2. Overview of non-verbal communication skills, signs of body language.
3. Nonverbal communication skills - Practicing conscious body postures and movements
4. Overview of verbal communication skills.
5. Practicing listening and note taking and writing skills.
6. Practicing oral presentation skills.
7. Practicing writing of field diary and lab record - Indexing, footnote and bibliographic procedures.
8. Practicing reading and comprehension of general and technical articles.
9. Practicing precise writing, summarizing, abstracting.
10. Exercise on individual and group presentations.
11. Practicing of extempore, impromptu, impromptu presentation, public speaking.
12. Evaluative exercises on video recorded mock group discussions and interviews.
13. Practical exposure on organizing seminars and conferences.
14. Evaluative exercise on recorded video programme to build the confidence levels of students.
15. Practical exercise on importance of team work.
16. Practical exercise on importance of time management.

RESOURCES

B.Sc. (Hons) Agriculture

TEXT BOOK:

1. N.P. Sudharshana andC.Savitha, English for Technical Communication, Cambridge University Press. 2016.

REFERENCE BOOKS:

1. Kline J. A., *Speaking effectively: Achieving excellence in presentations. Upper Saddle River,* NJ: Pearson/Prentice Hall, 2004.
2. Kuiper,*S. Contemporary business report writing* Cincinnati, OH: Thomson/South, Western, 3rd Edition, 2007.
3. Locker, K. O. and Kaczmarek, *S. K. Business communication*: *Building critical skills,* McGraw Hill, 3rd Edition, 2007.
4. Mascull, *B. Business vocabulary in use: Advanced. Cambridge,* Cambridge University Press, 2004.
5. Matthews, C. B. and Matthews, and M. *Quicksteps to winning business presentations: Make the most of your PowerPoint presentations*, McGraw Hill, 2007.
6. Marsh, C. *Strategic writing: Multimedia writing for public relations, advertising, sales and marketing, and business communication*, Pearson, 2005.
7. Munter, M. and Russell, L. *Guide to presentations*, Pearson, 2nd Edition, 2008.
8. Reardon, K. K. *The skilled negotiator: Mastering the language of engagement*, Jossey, Bass, 2004.
9. Stiff, J. B. *Persuasive communication*, Jossey, Bass, 2nd Edition 2003.

VIDEO LECTURES:

1. https://learnenglish.britishcouncil.org/general,english/video,zone/the,day,elizabeth,became,queen
2. https://www.youtube.com/watch?v=CscHc8qSn1A

WEB RESOURCES:

1. https://galgotiacollege.edu/assets/pdfs/study,material/Notes,english.pdf
2. https://lecturenotes.in/subject/183
3. https://www.fluentu.com/blog/english/professional,english/
4. https://learnenglish.britishcouncil.org/business,english

Course Code	Course Title	L	T	P	S	C
MATH101	ELEMENTARY MATHEMATICS	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical and practical knowledge to understand the mathematics essential to successful application of knowledge in understanding numerical implications, to acquire a foundation in numeration systems, number theory and properties of the natural numbers, integers, rational, and the real number system, and to gain skill in problem solving and critical thinking.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Determine the equation of the straight line, angle between two straight lines, area of triangle and quadrilateral.

CO2. Determine the equation of a circle, tangent and normal to the circle at a given point.

CO3. Demonstrate limit, continuity, differentiation, maxima and minima of a function.

CO4. Evaluate indefinite and definite integrals of functions and addition, subtraction and determinants of a matrix.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	1	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	1	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	1	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	1	-	-	-	-	-	-	-	-	3	-
Course correlation mapping	**3**	**3**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1: **Straight lines** ***(08 Periods)***

Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallellines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral.

Module 2: Circle ***(08 Periods)***

Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x1, y1) and (x2, y2), Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line y = mx + c to the given circle x2 + y2 = a2.

Module 3: Differential Calculus ***(08 Periods)***

Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of xn , ex , sin x and cos x from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form y=f (x) (Simple problems based on it).

Module 4: Integral Calculus ***(08 Periods)***

Integration of simple 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). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Total Periods: 32

RESOURCES

TEXT BOOKS and REFERENCE BOOKS:

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 and IIB).
4. MVSL DN Raju and K.V. Ramana - Agricultural Mathematics.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=GVaffjRYWJg
2. https://www.youtube.com/watch?v=ztmBud2O9NA
3. https://www.youtube.com/watch?v=QZFT5jKnUw4

WEB RESOURCES:

1. http://www.efunda.com/math/math_home/math.cfm
2. http://www.sosmath.com/
3. http://www.mathworld.wolfram.com/

Course Code	Course Title	L	T	P	S	C
AGR0103	**AGRICULTURAL HERITAGE**	**1**	**-**	**0**	**-**	**1**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion on evaluation of agriculture, ancient farming systems and practices. It provides knowledge on premodern and modern concepts of soil classification and pre historic cropping systems and future challenges in agriculture

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of agricultural heritage, evolution of agriculture, ancient farming systems and practices.

CO2. Analyze the premodern and modern concepts of soil, ancient soil classification, heritage of crop and water management.

CO3. Apply heritage knowledge in crop protection and production, water management, medicinal plants and seed health.

CO4. Apply the pre historic cropping systems and green revolution patterns to meet future – Challenges in Agriculture.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	-	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	-	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	-	-	3	-	-	-	-	-	3	-	-	-	-
Course correlation mapping	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: Indian Heritage ***(04 Periods)***

Introduction of Indian agricultural heritage, status of farmers in society, advice by sages to kings on their duties towards farmers.

Module 2: Ancient Soil Management ***(04 Periods)***

Soil management in ancient, medieval and pre-modern India and its relevance in modern day sustainable agriculture, heritage of crop and water management.

Module 3: Indigenous Knowledge in Agriculture ***(04 Periods)***

Plant growth and development and plant protection through vrikshayurveda and traditional knowledge. Heritage of medicinal plants and their relevance today, seed health in ancient and medieval history and its relevance to present day agriculture.

Module 4: Indian Civilization and agriculture by travellers ***(04 Periods)***

Description of Indian civilization and agriculture by travelers from China, Europe and

United States, our journey in agriculture, green revolution and its impact and concerns, vision for the future.

Total Periods: 16

RESOURCES

TEXT BOOKS:

1. Agriculture Heritage by SR Reddy

REFERENCE BOOKS:

1. Text book on agricultural heritage of India, Dr. D. Kumari Manimuthu Veeral

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=2raJ2u0OX5Y
2. https://www.youtube.com/watch?v=leU03xclsOsandlist=PLLtcxq1-RGPsQAiHItPMv_JeZTgaT1Gm7

WEB RESOURCES:

1. https://agrimoon.com/introductory-agriculture-icar-ecourse-pdf-books/

Course Code	Course Title	L	T	P	S	C
CS102	**HUMAN VALUES AND ETHICS (NON GRADIAL) ****	**1**	**-**	**-**	**-**	**1**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview of

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Get knowledge on human aspirations

CO2. Get understand the fundamental values of the humans

CO3. Get knowledge on positive spirit

CO4. Understand the value of spirituality

CO5. Get knowledge social evils

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Human Aspirations **(02 Periods)**

Universal human aspirations: Happiness and prosperity; Human values and ethics: Concept, definition, significance and sources.

Module 2: Fundamentals Values **(03 Periods)**

Fundamental values: Right conduct, peace, truth, love and non-violence; Principles and Philosophy. Self Exploration. Self Awareness. Self Satisfaction. Decision Making. Motivation. Sensitivity. Success. Selfless Service. Case Study of Ethical Lives.

Module 3: Positive Spirit (03 Periods)

Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination. Ethics: professional, environmental, ICT; Sensitization towards others particularly senior citizens, developmentally challenged and gender.

Module 4: Spirituality (04 Periods)

Spirituality, positive attitude and scientific temper; Team work and volunteering; Rights and responsibilities; Road safety; Human relations and family harmony; Modern challenges and value conflict.

Module 5: Social evils (04 Periods)

Sensitization against drug abuse and other social evils; Developing personal code of conduct (SWOT Analysis); Management of anger and stress

Total Periods:16

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Gaur RR, Sanga lR and Bagaria GP. 2011. A Foundation Course in Human Values and Professional Ethics. Excel Books
2. Mathur SS. 2010. Education for Values, Environment and Human Rights. RSA International.

REFERENCE BOOKS:

1. Sharma RA. 2011. Human Values and Education – Axiology, Inculcation and Research. R. Lall Book Depot.
2. Sharma RP and Sharma M. 2011. Value Education and Professional Ethics. Kanishka Publishers.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=VtafwtI-7xcandlist=PL2MikKrtvk-memQJ4YgbDiwSxFOob6X7P
2. https://www.youtube.com/watch?v=na-zvYUP1Doandlist=PL2MikKrtvk-memQJ4YgbDiwSxFOob6X7Pandindex=2

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://buat.edu.in/wp-content/uploads/2022/09/Reading-Manual_ASS-114.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.marwadiuniversity.ac.in/wp-content/uploads/2018/04/hve.-1.1.pdf

Course Code	Course Title	L	T	P	S	C
NSS	NATIONAL SERVICE SCHEME	0	-	1	-	1

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course explores the significance of youth leadership, emphasizing its meaning, types, and essential leadership traits. It highlights the qualities of effective leaders and the vital roles young people play in driving change.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Demonstrate an understanding of NSS—its history, objectives, principles, structure, and programmes—and apply the code of conduct as a volunteer.

CO2. Analyze the role of youth in social change by participating in community mobilisation, national integration, and volunteerism initiatives.

CO3. Apply knowledge of constitutional values, human rights, family and societal structures to promote responsible citizenship and social harmony.

CO4. Develop youth leadership qualities, life competencies, and problem-solving skills through active participation in NSS activities and camps.

CO5. Integrate concepts of health, hygiene, sanitation, yoga, and lifestyle practices into NSS programmes for holistic youth and community development.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	3	3	-	-	-	-	-	1	3	-	-		-
CO2	2	2	3	1	-	-	-	-	-	3	-	-		-
CO3	3	2	2	-	-	-	-	-	2	3	-	-		-
CO4	2	1	2	-	-	-	-	-	-	3	-	-		-
CO5	1	2	3	-	-	-	3	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	3	2	-	1	-	-	3	3	-	3	-	-		-

Correlation Levels: ***3: High;*** ***2: Medium;*** ***1: Low***

COURSE CONTENT

Module 1: Introduction to NSS (03 Periods)

This module introduces students to the National Service Scheme (NSS), covering its history, objectives, guiding principles, and the significance of its symbol and badge. Learners will study the organizational structure of NSS, the code of conduct expected from volunteers, and the nature of regular programmes such as orientation, health awareness drives, surveys, day camps, and adoption of villages/slums. Emphasis will be placed on coordination with various government and community agencies, alongside understanding financial patterns and proper maintenance of diaries for programme documentation.

Module 2: Youth and Social Change (03 Periods)

This module focuses on the concept of youth as an agent of social transformation. It explores the definition, profile, categories, and challenges faced by youth, along with opportunities available for their development. Students will learn methods of community mobilisation, including mapping stakeholders, designing messages suitable to local culture, and building youth–adult partnerships. The module also emphasizes the importance of volunteerism and shramdan, tracing their Indian traditions, present-day needs, motivations, and challenges for youth participation in society.

Module 3: National Integration and Citizenship (03 Periods)

This module highlights the role of youth in promoting social harmony and national integration, with reference to Indian history, culture, and nation-building. It further explores techniques of conflict resolution and peace-building as tools for sustainable social development. Learners will also develop a deeper understanding of citizenship through the Constitution of India, including its basic features, fundamental rights and duties. Additionally, topics such as human rights, consumer awareness, and Right to Information (RTI) will be discussed to strengthen democratic participation and accountability.

Module 4: Youth Leadership and Development (03 Periods)

This module introduces students to the meaning, types, and traits of leadership, with a focus on the qualities of effective youth leaders and their role in social development. Learners will acquire important life competencies such as decision-making, problem-solving, and interpersonal communication. The module also includes an overview of youth programmes and policies at national, state, and voluntary sector levels, with emphasis on the significance of youth-led organisations. Through this, students will recognize the importance of leadership and capacity building for empowering communities.

Module 5: Health, Lifestyle and Yoga (04 Periods)

This module deals with the role of health and well-being in youth development. Students will learn about health, hygiene, and sanitation, with a focus on food, nutrition, safe drinking water, water-borne diseases, and the Swachh Bharat Abhiyan. The module covers national health programmes and reproductive health, along with issues related to youth lifestyle such as HIV/AIDS, substance abuse, and the importance of first aid and home nursing. In addition, it highlights the history, philosophy, and traditions of Yoga, dispelling myths and misconceptions, and presenting it as a preventive and curative practice for a healthy lifestyle.

RESOURCES

TEXT BOOKS:	
3.	Ministry of Youth Affairs & Sports (2020) – *NSS Manual* Government of India

4.	Dr. Jitendra Singh (2021) – *Textbook on National Service Scheme (NSS)* Century Publications
5.	Dr. D.P. Verma (2019) – *National Service Scheme: A Textbook* University Publications
6.	V.K. Sharma (2018) – *Youth Empowerment through NSS* Kanishka Publishers
REFERENCE BOOKS:	
4.	Goel, S.L. (2006) – *Encyclopaedia of Social Welfare and Administration*. Deep & Deep Publications Pvt. Ltd., New Delhi
5.	ohanty, G. (2005) – *Youth and Social Development* Anmol Publications Pvt. Ltd., New Delhi
6.	Kapur, Annesha (2011) – *Youth in Contemporary India: Images of Identity and Social Change* Sage Publications, India
7.	Batra, Promod K. (2002) – *Life Skills and Personality Development* Think Inc.
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=eWI2Ul1qz3E
2.	https://www.youtube.com/watch?v=yDiF2gc0kls
3.	https://www.youtube.com/watch?v=1pUmSK36rkA
4.	https://www.youtube.com/watch?v=etX8uXqLBok
WEB RESOURCEs:	
3.	https://nss.gov.in
4.	https://youth.gov.in

B.Sc. Hons. (Agri) – II Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
11.	AGRO104	Environmental studies and disaster management	2	-	1	3
12.	GPB112	Fundamentals of Plant Breeding and Biotechnology	2	-	1	3
13.	ENTO131	Fundamentals of Entomology	3	-	1	4
14.	AECO141	Fundamentals of Agricultural Economics	3	-	0	3
15.	AENG151	Soil and Water Conservation Engineering	1	-	1	2
16.	PPHY161	Fundamentals of crop Physiology and Plant Biochemistry	2	-	1	3
17.	HORT182	Production Technology for Vegetables, Spices and Condiments Part-1	1	-	1	2
18.	PATH171	Fundamental of Plant Pathology	2	-	1	3
19.	SSAC122	Problematic Soils and their management	2	-	0	2
20.	MATH102	Statistical Methods	1	-	1	2
Total			**16**	**-**	**08**	**26**

Course Code	Course Title	L	T	P	S	C
ENTO131	**FUNDAMENTALS OF ENTOMOLOGY**	3	-	1	-	4

Pre-Requisite **NA**
Anti-Requisite **-**
Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of Agricultural Entomology. The course provides a deep insight into various concepts suchimportance of Entomology; Insect morphology Anatomy and Physiology, Insect Ecology, Types of Pests, Integrated Pest Management, and Insect Taxonomy.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the History of Entomology in India,basic concepts and components of insect anatomy in relation to agricultural crops.
CO2 Understand the insect ecology with the environment to develop pest-resistant varieties/pest-free crops.
CO3 Identify the different types of pests and apply the concept of Integrated pest management for pest control in agricultural crops.
CO4 Understand the Taxonomy of different insects and pests to identify them for effective control of crop damage.
CO5 Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: History and importance of Entomology; Insect morphology Anatomy and Physiology. **(12 Periods)**

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. 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. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

Module 2: Insect Ecology (12 Periods)

Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors – food competition, natural and environmental resistance.

Module 3: Types of Pests and IPM (12 Periods)

Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical controlimportance, hazards and limitations. Recent methods of pest control, repellents, anti feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

Module 4: Insect Taxonomy (12 Periods)

Systematics: Taxonomy –importance, history and development and binomial nomenclature. 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: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera:Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papiloinidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturnidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthridinidae, Apidae. Trichogrammatidae, lchneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae,Muscidae, Tephritidae.

***Total Periods:*48**

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Methods of collection and preservation of insects including immature stages;
2. External features of Grasshopper/Blister beetle;
3. Types of insect antennae, mouthparts and legs; Wing venation, types of wings and wing coupling apparatus.
4. Types of insect larvae and pupae;
5. Dissection of digestive system in insects (Grasshopper);
6. Dissection of male and female reproductive systems in insects (Grasshopper);
7. Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.
8. Insecticides and their formulations.
9. Pesticide appliances and their maintenance.
10. Sampling techniques for estimation of insect population and damage.
11. Pest surveillance through light traps, pheromone traps and forecasting of pest incidence
12. Insecticides and their formulations
13. Acquaintance of mass multiplication techniques of important predators,*Cryptolaemus* sp., and parasitoids *Trichogramma*sp., *Apanteles* sp. and

Tetrastichus sp.

14. Acquaintance of mass multiplication techniques of the Entomopathogenic fungus, *Beauveria bassiana*and Entomopathogenic virus Ha NPV and Sl NPV.
15. Study of insect pollinators, weed killers, scavengers and
16. Identification of rodent different pests

RESOURCES

TEXT BOOKS:

1. Saxena, S.C. 1992. Biology of insects. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 366p.
2. Srivastava, P.D. and R.P.Singh. 1997. An introduction to entomology, Concept Publishing Company, New Delhi, 269p.
3. Tembhare, D.B. 1997. Modern Entomology. Himalaya Publishing House, Mumbai, 623p.

REFERENCE BOOKS:

1. Srivastava, P.D. and R.P.Singh. 1997. An introduction to entomology, Concept Publishing Company, New Delhi, 269p.
2. Chapman, R.F. 1981. The Insects: Structure and function. Edward Arnold (Publishers) Ltd, London, 919p.
3. Pant, N.C. and Ghai, S. 1981Insect physiology and anatomy, ICAR, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=qUvfPNevBBw&list=PLc4C-dJtfjlN5DeQMA9YdEJRUjOjJLjp
2. https://www.youtube.com/watch?v=qUvfPNevBBw&list=PLc4C-ydJtfjlN5DeQMA9YdEJRUjOjJLjp
3. https://www.youtube.com/watch?v=-9xjQySVnxM

WEB RESOURCES:

http://ecoursesonline.iasri.res.in/course/view.php?id=142

https://agri-bsc.kkwagh.edu.in/uploads/department_course/Theory_Notes_on_ENTO-121.pdf

https://www.davuniversity.org/images/files/study-material/ento%20(1).pdf

Course Code	Course Title	L	T	P	S	C
AECO141	**FUNDAMENTALS OF AGRICULTURAL ECONOMICS**	**3**	**-**	**-**	**-**	**3**

Pre-Requisite NA
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of Agricultural Economics i.e., elucidating the key concepts of micro-economics and macro-economics. The course provides deep insight into various concepts such as the scope of economics, demand, utility, production, returns, supply, market strength, distribution, wages, interest, profit, national income, banking, agricultural public finance, tax, and economic systems.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

- **CO1.** Understand the importance of economics, concepts & various types of economics, and the scope of agriculture development in the country.
- **CO2.** Understand the meaning, kinds of demand and utility; Indifference curve, budget line, consumer surplus elasticity, and elasticity of demand.
- **CO3.** Analyze the creation of utility, factors of Cost concepts, Stock versus supply, and supply schedule.
- **CO4.** Analyze the perfect and imperfect markets. Price determination under competition, Concepts of Rent and Quasi rent, Real wage and money wage, Pure interest and gross interest, and economic profit.
- **CO5.** Understand the concepts of National income, current policies on population control-Money, functions of Banks, credit creation policy-Agricultural and public finance, direct and indirect taxes, agricultural taxation, VAT, GST and Economic systems.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	-	-	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	1	-	1	-	-	-	-	-	-	3	-
CO4	3	3	-	2	-	1	-	-	-	-	-	-	3	-
CO5	3	-	-	2	-	1	-	-	-	-	-	-	3	-
Course correlation mapping	**3**	**2**	**-**	**2**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: **Nature and Scope of Economics** **(06 Periods)**

Meaning, the scope of micro and macroeconomics, the concept of equilibrium, economic laws Goods and services, importance and role in economic development. planning and Agricultural development in the country.

Module 2: **Theory of Consumption** **(06 Periods)**

Meaning, kinds of demand, cardinal and ordinal utility; law of diminishing marginal utility, equi-marginal utility, Indifference curve, budget line: Concept of consumer

surplus and its importance and measurement of price elasticity, income elasticity and cross elasticity. Standard of Living: Definition, Engel's Law of Family Expenditure.

Module 3: Theory of Production (06 Periods)

Process, creation of utility, factors of production definition and characteristics – Input, Law of variable proportions and Law of returns to scale, Cost concepts, short run and long run cost curves, Stock versus supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply.

Module 4: Theory of Exchange and Distribution (08 Periods)

Meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition, factor market and pricing of factors of production - Concepts of Rent and Quasi rent, Real wage and money wage, Pure interest and gross interest and economic profit.

Module 5: Macro-Economic Concepts (06 Periods)

National income: Meaning and importance- Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programs on population control-Money: Barter system of exchange and its problems, evolution, meaning, and functions of money-Banking: types of banks, functions and credit creation policy-Agricultural and public finance: micro versus macro finance-Tax: direct and indirect taxes, agricultural taxation, VAT and GST-Economic systems: functions, elements of economic planning.

Total Periods: 32

RESOURCES

TEXT BOOKS:

1. Subba Reddy, Raghuram, P., Neelakanta Sastry, T.V. and Bhavani Devi, 2005, Agricultural Economics, Oxford and IBH Pub Co. Pvt. Ltd., New Delhi (2nd Edition)
2. Subba Reddy and Raghuram, P., 2005, Agricultural Finance and Management, Oxford and IBH Publishing Co. Private Ltd., New Delhi.

REFERENCE BOOKS:

1. Amarjit Singh, A N Sadhu and Jasbir Singh, 2018, Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai (11th edition)
2. Ahuja, H. L., Advanced Economic Theory: Micro economic Theory, 2017, S Chand publications (21st edition).
3. Jingan, M.L., Principles of Economics, 2015, Vrinda Publications (P) Ltd (4th edition)

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=wlmifvc0tDA&list=PL62muJtTPK40OLjcn9e2r8SGUG0oTSNgw
2. https://www.youtube.com/watch?v=obmStIEWxh0&list=PL62muJtTPK40OLjcn9e2r8SGUG0oTSNgw&index=2
3. https://www.youtube.com/watch?v=rGhtMT9XgFw&list=PL62muJtTPK40OLjcn9e2r8SGUG0oTSNgw&index=3
4. https://www.youtube.com/watch?v=VXevBZyjhJA&list=PL62muJtTPK40OLjcn9e2r8SGUG0oTSNgw&index=4

WEB RESOURCES:

1. http://www.jnkvv.org/PDF/02042020171537Lecture-20(3%20files%20merged).pdf
2. http://www.jnkvv.org/PDF/050420201313523420073O.pdf
3. https://www.rvskvv.net/images/I-Year-II-Sem_Agricultural-Economics_TNAU_20.04.2020.pdf

Course Code	Course Title	L	T	P	S	C
AENG151	**SOIL AND WATER CONSERVATION ENGINEERING**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of Soil and Water Conservation Engineering. The course provides a deep insight into various concepts such as the Importance of Soil and Water Conservation, soil erosion & control measures, Methods of erosion control, and Water Harvesting Techniques.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the basic concepts of soil and water conservation.

CO2 Analyze the different types of erosions and apply control measures.

CO3 Demonstrate different methods to control soil erosion.

CO4 Apply water harvesting techniques to conserve soil and water.

CO5 Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-	-	-	-	-	-	-	-	-	3
CO2	3	3	-	2	-	-	-	-	-	-	-	-	-	3
CO3	3	3	-	2	-	-	-	-	-	-	-	-	-	3
CO4	3	2	-	3	-	1	-	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	3
Course correlation mapping	**3**	**3**	**-**	**2**	**-**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Introduction to Soil and Water Conservation (04 Periods)

Importance of Soil and Water Conservation

Module 2: soil erosion & control measures (04 Periods)

Soil erosion, water erosion and types, control measures. Soil loss estimation by universal Loss Soil Equation and measurement techniques.

Module 3: Methods of erosion control (04 Periods)

Soil erosion control by contouring, strip cropping. Contour bund. Graded bund and bench terracing and Grassed water ways and their design.

Module 4: Water Harvesting Techniques (04 Periods)

Water harvesting and its techniques, types of soil movement, Wind erosion and control measures.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. General status of soil conservation in India.
2. Calculation of erosion index.
3. Estimation & Measurement of soil loss.
4. Preparation of contour maps.
5. Design of grassed water ways
6. Design of contour bunds.
7. Design of graded bunds.
8. Design of bench terracing system.
9. Problem on wind erosion.
10. Exercises on computation of rainfall erosivity index
11. Study different types and forms of water erosion
12. Computation of soil Erodibility index in soil loss estimation
13. Determination of length of slope (LS) and cropping practice (CP) factors for soil loss Estimation by USLE and MUSLE
14. Exercises on soil loss estimation /measuring techniques.
15. Study of Rain falls simulate or for erosion assessment.
16. Estimation of sediment rate using Coshocton wheel sampler and multi-slot devise or

RESOURCES

TEXT BOOKS:

1. Applied Hydrology by Chow, V.T., D.R. Maidment and L.W. Mays, McGraw Hill Publishing New York, 2010.
2. A Text Book of Hydrology by Jaya Rami Reddy, University Science Press, New Delhi P., 2011.
3. Hydrology for Engineers by Linsley, R.K., M.A. Kohler, and J.L.H. Paulhus. McGraw-Hill Publishing Co Japan., 1984.

REFERENCE BOOKS:

1. Mutreja, K.N. Applied Hydrology. Tata McGraw-Hill Publishing Co., New Delhi., 1990.

2. Principles Analysis and Design by Raghunath, H.M. Hydrology Revised 2nd Edition, New Age International (P) Limited Publishers, New Delhi., 2006.
3. Engineering Hydrology by Subramanya.k 3rd Edition, Tata McGraw-Hill Publishing Co., New Delhi.2008.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=qNTOq1uEObc
2. https://www.youtube.com/watch?v=0Jti2r_vivQ
3. https://www.youtube.com/watch?v=exjFOk9enyg
4. https://www.youtube.com/watch?v=22yB5I6BAcA

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=54
2. https://www.extension.purdue.edu/extmedia/ae/ae-114.html#:~:text=What%20is%20terracing%3F,constructed%20across%2Dthe%2Dslope.
3. http://ecoursesonline.iasri.res.in/mod/page/view.php?id=2101
4. https://www.ramauniversity.ac.in/online-study-material/agriculture/agriculturec/iisemester/soilandwaterconservationengineering/lecture-10.pdf

Course Code	Course Title	L	T	P	S	C
PPHY161	**FUNDAMENTALS OF PLANT PHYSIOLOGY & PLANT BIOCHEMISTRY**	**2**	**-**	**1**	**-**	**3**
Pre-Requisite	**NA**					
Anti-Requisite	**-**					
Co-Requisite	**-**					

COURSE DESCRIPTION: Students will acquire basic knowledge on various functions and processes related to crop production, mineral nutrition, plant growth regulators and environmental stresses. In addition, hands on exposure to preparation of solutions, analysis of pigment composition, estimation of growth analytical parameters, diagnosis and correction of nutrient deficiencies, enzyme assays and demonstration of plant growth regulator applications

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1	Understand the physiological mechanisms underlying plant water uptake, transport, and loss and also evaluate the impact of water stress on plant growth, development, and productivity.
CO2	Comprehend the essential role of minerals in plant growth, metabolism, and overall health and also analyze the mechanisms of mineral uptake, translocation, and utilization within plants.
CO3	Understand the biochemical processes of photosynthesis and respiration and their significance in plant metabolism.
CO4	Comprehend the diverse roles and regulatory functions of plant growth hormones in various physiological processes.
CO5	Understand the physiological responses of plants to various environmental stressors, including drought, salinity, temperature extremes, and biotic factors.
CO6	Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	3	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	3	3	-	-	-	-	-	3	-	-	-	-
CO4	2	2	1	1	-	-	-	-	-	3	-	-	-	-
CO5	3	2	3	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

Module1.Introduction to crop physiology and its importance in agriculture andPlant Water Relationship (6 periods)

Introduction to Crop Physiology andimportance of Crop Physiology in Agriculture – Plantcell: an overview, organelles- plasma membrane, chloroplast, mitochondria, peroxisome and vacuole, Structure and role of water, water potential and its components, diffusion and osmosis; imbibition, plasmolysis, Field Capacity and Permanent Wilting Point, Absorption of water, Mechanisms of water absorption, Pathways of water movement, Apoplast and symplast, Translocation of water, ascent of sap and its mechanisms - Transpiration and Stomatal physiology: structure of stomatal pore, mechanisms of stomatal opening and closing, guttation, antitranspirants.

Module 2.Mineral Nutrition of Plants(8 periods)

Mineral nutrition of plants: Criteria of essentiality, classification of nutrients, macro, micro, mobile, immobile and beneficial elements, Physiological functions and deficiency symptoms of nutrients, nutrient uptake mechanism; Hidden hunger, Foliar nutrition, root feeding and fertigation, sand culture, hydroponics and aeroponics.

Module 3.Photosynthesis and Respiration(6 periods)

Photosynthesis: Light and dark reactions, Photosystems, red drop and Emerson enhancement effect, Photolysis of water and photophosphorylation, Z scheme, C_3, C_4 and CAM plants; Photosynthetic pathways of C_3, C_4 and CAM plants, difference between three pathways, Factors affecting photosynthesis, Photorespiration – pathway and its significance, Phloem transport, Munch hypothesis, Phloem loading and unloading, Source and sink strength and their manipulations. Respiration:Glycolysis, TCA cycle and electron transport chain; Oxidative phosphorylation – difference between photo and oxidative phosphorylation –- energy budgeting - respiratory quotient. Fat metabolism: fatty acid synthesis and breakdown.

Module 4.Growth and Growth Hormones(8 Periods)

Plant growth regulators: physiological roles and agricultural uses, Hormones-classifications - Biosynthetic pathway and role of auxins, gibberellins, cytokinins, ethylene and ABA, Novel and new generation PGRs, Brassinosteroids and salicylic acid, Growth retardants, Commercial uses of PGRs. Photoperiodism - short, long and day neutral plants, Chailakhyan's theory of flowering, Forms of phytochrome, Pr and Pfr, regulation of flowering, Vernalisation - Theories of vernalisation, Lysenko theories, Seed germination - physiological and biochemical changes, seed dormancy and breaking methods, Senescence and abscission,physiological and biochemical changes, Physiology of fruit ripening, climacteric and non-climacteric fruits, factors affecting ripening, Manipulations. Physiological aspects of growth and development of major crops: growth analysis, role of physiological growth parameters in crop productivity.

Module 5.Stress Physiology(4 periods)

Classification of stresses - Physiological changes and adaptations to drought, flooding, high and low temperature, salinity and UV radiation – compatible osmolytes – membrane properties - compartmentalization – stress alleviation - Global warming – green house gases – physiological effects on crops - Carbon Sequestration.

Total Periods: 32 periods

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Preparation of solutions
2. Study of leaf epidermal, xylem and phloem cells

3. Determination of stomatal index and stomatal frequency

4. Measurement of plant water potential

5. Measurement of water imbibition by seed mass test

6. Estimation of photosynthetic pigments

7. Determination of photosynthetic efficiency in crops

8. Measurement of transpiration and photosynthesis by IRGA

9. Diagnosis of nutritional and physiological disorders in crops

10. Rapid tissue test for mineral nutrients

11. Estimation of relative water content

12. Measurement of osmosis and plasmolysis

13. Growth Analysis

14. Bioassay for gibberellin and cytokinin

15. Estimation of chlorophyll stability index

16. Estimation of proline content

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Salisbury F.B. and C.W.Ross., 1992 (Fourth Edition). Plant Physiology. Publishers: Wadsworth Publishing Company, Belmont, California, USA.
2. Boominathan P., R. Sivakumar, A. Senthil, and D. Vijayalakshmi. 2014. Introduction to Plant Physiology, A.E. Publications. Coimbatore
3. Jain, V.K. 2007. Fundamentals of plant physiology, S.Chand & Company Ltd., New Delhi.
4. Taiz. L. and Zeiger. E., 2015 (Sixth edition). Plant Physiology and Development. Publishers: Sinauer Associates, Inc., Massachusetts, USA.

Reference Books

1. Ray Noggle, G. and Fritz, G. J., 1991. Introductory Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi.
2. Taiz. L. and Zeiger. E., 2006. Plant Physiology. Publishers: Sinauer Associates, Inc., Massachusetts, USA.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=66pQplA3bCQ&t=4s&ab_channel=TEACHINGPATHSHALA
2. https://www.youtube.com/watch?v=Rztffk3ZjCQ&t=5s&ab_channel=TEACHINGPATHSHALA
3. https://www.youtube.com/watch?v=YoNgSOIsk0A&t=3s&ab_channel=TEACHINGPATHSHALA
4. https://www.youtube.com/watch?v=iikdi_IGAtY&ab_channel=WorldofPlants

WEB RESOURCES:

- http://www.plantphys.org
- http://www. Biologie. Uni-hamburg. de/b-online
- http://6e.plantphys.net

Course Code	Course Title	L	T	P	S	C
HORT182	**Production Technology for Vegetables, Spices and Condiments Part-1**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**
Anti-Requisite **-**
Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of Production Technology for Vegetables, Spices, and Condiments. The course provides deep insight into various concepts such as cultivation Practices of Various Vegetables and Spices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. To understand the Scope, Importance and classification of vegetable & Spice crops
CO2. To gain knowledge about production technology of tropical and leafy vegetable crops and its cultivation practices
CO3. To construct idea regarding knowledge on growing of cole, legume, bulb, root & perennial vegetable crops
CO4. To create awareness about Production techniques of spice crops and their use
CO5. Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	1	-	2	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: **Scope, Importance and classification of vegetables& Spices** **(01 Periods)**

Importance of vegetable growing, nutritive value, human nutrition and classification of vegetables and spice crops.

Module 2: **Production technology of tropical, leafy & cucurbits crops** **(05 Periods)**

Cultivation practices of tropical crops- Tomato, brinjal, chilli, bhendi, Amaranthus, palak. Cucurbits- gourds (cucumber, pumpkin, bitter gourd, ridge gourd, bottle gourd, musk melon and watermelon)

Module 3: **Production technology of cole, legume, bulb, tuber, root & perennial vegetable crops** **(05 Periods)**

Cole crops- Cabbage & Cauliflower, Peas & beans (Cluster bean, French bean, Dolichos), Root crops (carrot & radish), potato& sweet potato, Perennialvegetables – drumstick & curry leaf, Bulb crops – onion & garlic,

Module 4: Production techniques of spice crops (05 Periods)

Cultivation practices of spices- Black pepper, Cardamom, Cloves, Turmeric, Ginger,Coriander, Cumin & Fenugreek

***Total Periods:*16**

EXPERIENTIAL LEARNING

LIST OF EXERCISES:	
1.	Identification of important vegetables and spice crops based on different Morphological traits
2.	Nursery management, seed treatment, sowing seeds and raising seedlings.
3.	Preparation of main field and planting of seedlings
4.	Layout of Kitchen Garden / Nutrition Garden
5.	Use of plant growth regulators in important vegetable crops
6.	Physiological disorders in important vegetable crops
7.	Study of maturity indices and harvesting of major vegetables& spices
8.	Identification and description of varieties/hybrids in Tomato and chilli.
9.	Identification and description of varieties/hybrids in Brinjal and Okra
10.	Identification and description of varieties/hybrids in watermelon and musk melon.
11.	Identification and description of varieties/hybrids in Pea and French bean
12.	Identification and description of varieties/hybrids in Amaranthus and palak.
13.	Identification and description of of varieties/hybrids in onion and Garlic
14.	Identification and description of varieties/hybrids in black potato and drumstick
15.	Identification and description of varieties/hybrids in black pepper and cardamom
16.	Visit to vegetable Farm/nursery.

RESOURCES

TEXT BOOKS:

1. Textbook of vegetable, tuber crops, and Spices. S. Thamburaj, ICAR, New Delhi,

2014.

2. A Textbook on the production technology of vegetables. B.R. Choudhary, Kalyani Publishers. Ludhiana, 2009.
3. Vegetable Crops. T.K. Bose, Nayaprakash. Kolkata, 2002.
4. Modern Technology in Vegetable Production. P. Hazra, New India Publishing Agency. New Delhi, 2011.
5. Shanmugavelu, K.G., N. Kumar and K.V. Peter 2005. Production Technology of Spices and Plantation Crops. Agrobios (India), Jodhpur.
6. Handbook of Vegetable Crops. M.S. Dhaliwal, Kalyani Publishers. Ludhiana, 2008.

REFERENCE BOOKS:

1. Vegetable crops: production technology. Dhaliwal M.S, Kalyani Publishers. Ludhiana
2. A Textbook on the production technology of vegetables. B.R. Choudhary, Kalyani Publishers. Ludhiana, 2009.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=nv4zp3p3D_I
2. https://www.youtube.com/watch?v=v5ElJHw7deY
3. https://www.youtube.com/watch?v=T6a2SWuTbH8

WEB RESOURCES:

1. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1776584
2. https://vigyanvarta.com/adminpanel/upload_doc/VV_1220_11.pdf
3. https://www.allthatgrows.in/blogs/posts/vegetables-kitchen-garden
4. https://content.kopykitab.com/ebooks/2013/11/2288/sample/sample_2288.pdf

Course Code	Course Title	L	T	P	S	C
PATH271	AGRICULTURAL MICROBIOLOGY	1	-	1	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course is designed to provide insights to students about various microscopic living organisms viz., bacteria, viruses, fungi, and protozoa that have a profound influence on our daily lives, including our health, food, fuel, and environment. It also provides information about various microorganisms which have the ability to cause diseases besides those utilities of such microorganisms vital to agriculture, industry and ecology.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1.	To enable better understanding of students about the microscopic world around them
CO2.	To acquaint students with the basic laboratory techniques and tools of microbiology
CO3.	To introduce the fundamentals characteristics of various microorganisms
CO4.	To develop experimental skills, such as handling, various microorganisms, culturing & maintenance of Microorganisms
CO5.	To acquaint students with the basic knowledge on virus, bacterial genetics and immunology

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: History of Microbiology (4 Periods)

Introduction tomicrobial world: Prokaryotic and eukaryotic microbes

Module 2: Bacteria and Bacterial genetics (3 Periods)

Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination transformation, conjugation and transduction, plasmids, transposon.

Module 3: Role of microbes in soil fertility (3 Periods)

Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and a symbiotic.

Module 4: Role of azolla, BGA and mycorrhiza (3 Periods)

Azolla, bluegreen algae and mycorrhiza. Rhizosphere and phyllo sphere

Module 5: Microbes in Human welfare (3 Periods)

Microbes in human welfare: silageproduction, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Total Periods: 16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

13. Introduction to microbiology laboratory and its equipment's
14. Microscope- parts, principles of microscopy, resolving power and numerical aperture
15. Methods of sterilization
16. Nutritional media and their preparations.
17. Enumeration of microbial population in soil- bacteria.
18. Enumeration of microbial population in soil- fungi.
19. Enumeration of microbial population in soil- actinomycetes.
20. Methods of isolation and purification of microbial cultures
21. Isolation of Rhizobium from legume root nodule.

22. Isolation of Azotobacter from soil
23. Isolation of Azospirillum from roots
24. Isolation of BGA
25. Staining and microscopic examination of microbes
26. Staining and microscopic examination of biofertilizer organisms.
27. Isolation of VAM from soil by wet sieving and decantation technique.
28. Determination of VAM root colonization by staining the infected roots.

RESOURCES / STUDY MATERIALS

TEXTBOOKS:

1. N. S. Subba Rao, 2020, Agricultural Microbiology
2. N. S. Subba Rao, 2020, Soil Microbiology
3. LEJR, 2019, Industrial Microbiology

REFERENCE BOOKS:

1. Mark Coyne, 2016, Introductory to Soil microbiology
2. Mahendra Rai, 2018, Hand book of Microbial Bio fertilizers

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=f7UXyVImZ_c&list=PLC8-e-eo6qltR6EOQELOeSS7Vr2UucADO
2. https://www.youtube.com/watch?v=gM9wVAYsOwY&list=PLC8-e-eo6qltR6EOQELOeSS7Vr2UucADO&index=2
3. https://www.youtube.com/watch?v=iNpWiE8hf7I&list=PLC8-e-eo6qltR6EOQELOeSS7Vr2UucADO&index=3
4. https://www.youtube.com/watch?v=WtRDosnchZc&list=PLC8-e-eo6qltR6EOQELOeSS7Vr2UucADO&index=4

WEB RESOURCES:

1. https://agrimoon.com/wp-content/uploads/AGRICULTURAL-MICROBIOLOGY.pdf

B.Sc. Hons. (Agri) – III Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO201	Crop Production Technology – I (Kharif Crops)	1	-	1	2
2.	AGRO202	Introduction to Forestry 2(1+1)	1	-	1	2
3.	GPB211	Crop Improvement-I (Kharif crops) 3(2+1)	2	-	1	3
4.	AECO241	Agricultural Finance and Cooperation 3(2+1)	2	-	1	3
5.	AENG251	Farm Machinery and Power 2(1+1)	1	-	1	2
6.	PATH271	Agricultural Microbiology 2(1+1)	1	-	1	2
7.	HORT281	Production Technology for vegetables and spices and condiments Part-2 2(1+1)	1	-	1	2
8.	EXTN291	Fundamentals of Agricultural Extension Education	1	-	1	2
9.	MATH201	Agri-Informatics (Fundamentals of computer application in Agriculture) 2(1+1)	1	-	1	2
10.	SSAC221	Manures, Fertilizers and Soil Fertility Management 3(2+1)	2	-	1	3
		Total	**13**	**-**	**10**	**23**

Course Code	Course Title	L	T	P	S	C
AGRO202	Introduction to Forestry	1	-	1	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course is designed to provide knowledge on importance of forest and agroforestry systems in sustaining the land productivity, crop tree interactions in different types of agroforestry systems and productive and protective functions of agroforestry.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1.	To understand the importance of forest and their related terminologies
CO2.	To gain knowledge about Crown classification
CO3.	To understand the forest mensuration
CO4.	To get knowledge on different instrumental measurements method
CO5.	To create awareness about Agro forestry and the cultivation practices
CO6.	Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Introduction to forestry and their basic concepts (4 Periods)

Introduction – definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest

regeneration, Natural regeneration - natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration – objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification

Module 2: Crown classification and tender operations (3 Periods)

Crown classification. Tending operations – weeding, cleaning, thinning – mechanical, ordinary, crown and advance thinning.

Module 3: Forest mensuration (3 Periods)

Forest mensuration – objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method.

Module 4: Different methods of Measurements (3 Periods)

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.

Module 5: Agroforestry – Introduction and Importance (3 Periods)

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.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
1.	Identification of tree-species
2.	Diameter measurements using calipers and tape
3.	Height measurement of standing trees by shadow method, single pole method and hypsometer
4.	Volume measurement of logs using various formulae
5.	Forest nursery – types – layout
6.	Nurserytechnology
7.	seed sowing
8.	vegetative propagation techniques

9.	Forest plantations and their management
10.	Agri-silvicultural systems
11.	Silvopastoral systems
12.	Agrosilvi pastoral systems
13.	Identification of important major and minor forest products
14.	Collection and maintenance of forest products and herbarium
15.	Visit to nearby forest department.
16.	Visit to nearby forest-based industries.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	NIRAKAR BHOL, V.K. MISHRA, S.K. CHAUHAN, Text Book of Introduction To Forestry, Kalyani Publishers, 2020
2.	C. Nagamani S.R. Reddy, Introduction to Forestry, Kalyani publishers, 2017.
REFERENCE BOOKS:	
1.	Dwivedi,A.P.Forestry in India, Jugal Kishore and Company, DehraDun, 1980.
2.	Negi, S.S. Agroforestry hand book, international book distributor, DehraDun, 1999
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=t3hng_whPJ8&list=PLBbOLgn_A1PkeTQbgkgiArmUCiEUC6HgP
2.	https://www.youtube.com/watch?v=5POxOcIt26I&list=PLBbOLgn_A1PkeTQbgkgiArmUCiEUC6HgP&index=2
WEB RESOURCES:	
1.	Ram Prakash and Drake Hocking, Some favourite trees for fuel and fodder, International book distributor, 1986.
2.	Singh, S.P, Tree farming-. Agrotech Publishing academy, Udaipur, 2009.
3.	Troup, T.S, Silviculture of Indian trees (Vol. II & III)- International book distributor,

	1986.

Course Code	Course Title	L	T	P	S	C
AGRO201	CROP PRODUCTION TECHNOLOGY – I (Kharif Crops)	1	-	1	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course is designed to provide knowledge on practical cultivation practices and origin, soil and climatic requirement, economic importanceof kharif crops. To learn about importance of cereals, minor millets and its cultivation practices and various constraints of pulse production and production technologies for various pulse crops. The students acquire knowledge on agronomical aspects of cereals, legume and perennial fodders and its preservation. To get familiar with importance and cultivation aspects of green and green leaf manures

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1.	To understand the importance offood grain requirement and cultivationof major cereal crops
CO2.	To gain knowledge about importance of minor millets and its cultivationpractices
CO3.	To formulate legume-based cropping system and production technologies for various pulse crops
CO4.	To get knowledge on growing of legume andperennial fodders and its preservation
CO5.	To create awareness about role of green manures in soil fertility
CO6.	Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	3	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Agronomy of Cereals (8 Periods)

Rice, Wheat, Maize, Barley, Oat, Rye and Triticale - Origin, geographic distribution, economic importance,soil and climatic requirements, varieties, cultural practices (from land preparation to harvest) and yield. Post harvest management practices. Value addition and by products utilization of cereals.

Module 2: Agronomy of Major and Minor Millets (6 Periods)

Sorghum, Pearl millet, Finger millet, Foxtail millet, little millet, Kodo millet, Barnyard millet and Proso millet - Origin, geographic distribution, economic importance, soilandclimatic requirement, varieties, cultural practices and yield. Post harvest management practices. Value addition and by products utilization of millets.

Module 3: Agronomy of Pulses (6 Periods)

Redgram, Blackgram, greengram, Bengalgram, Horsegram, Cowpea, Soybeanand Lentil - Origin, geographic distribution, economic importance, soil and climaticrequirement, varieties, cultural practices and yield. Post harvest management practices. Value addition and by products utilization of pulses.

Module 4: Agronomy of Fodder and Forage Crops (6 Periods)

Fodder crops: Sorghum, Maize, Pearlmillet, Forage crops: Guinea grass, Cumbu -Napier, Water grass, Buffalo grass, Elephant grass, Kolukkattai grass, Lucerne, Berseem, Desmanthus, Stylosanthus and Cowpea - Economic importance, soil and climaticrequirement,varieties, cultural practices and yield. Fodder preservation techniques

Module 5: Agronomy of Green Manures (6 Periods)

Daincha,Sunnhemp, Sesbania,Kolingi,Glyricidia,Subabul, Pungam,Poovarasu and Neem - Origin, economic importance, soil and climatic requirement, Varieties,cultural practices and yield. Insitu incorporation of green manures.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
1.	Identification of cereals, millets, pulses, green manures and forage crops in thecrop cafeteria.
2.	Practicing various nursery types and main field preparation for rice crop.
3.	Nursery and main field preparation for important millets and pulses.
4.	Acquiring skill in different seed treatment techniques in important field crops.
5.	Estimation of plant population, seed rate and fertilizer requirement for important field crops.
6.	Acquiring skill in field preparation, sowing and manuring of crops under pure and intercropping situations for cereals and millets.
7.	Acquiring skill in field preparation,sowing and manuring of crops under pureand intercropping situations for pulses, green manures and forage crops

8.	Acquiring skill in using seed drill for sowing operations.
9.	Acquiring skill in foliar nutrition for important field crops.
10.	Observations on growth parameters of cereals, millets, pulses, green manures and forage crops.
11.	Study on yield parameters and estimation of yield in cereals and millets.
12.	Study on yield parameters and estimation of yield in pulses and forage crops.
13.	Acquiring skills in post-harvest technology for important cereals, millets and Pulses.
14.	Working out cost and returns of important cereals, millets and pulses.
15.	Visit to Dairy Unit / farmers field to acquire skill and silage and hay making.
16.	Visit to farmers field / research stations to study the cultivation techniques of cereal, millets, pulses, green manures and forage crops.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	Dr. Rajendra Prasad, Textbook of Field Crops Production Volume 1 And 2 (Foodgrain Crops & Commercial Crops), ICAR, 2017.
2.	Joshi M, Textbook of Field Crops – 1 January 2015, PHI.
REFERENCE BOOKS:	
1.	SR Reddy, Y Reddi Ramu, Agronomy of Field Crops, Kalyani publishers, 2018
2.	S.R REDDY, C NAGAMANI, Principles of Crop Production, Kalyani publishers, 2016
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=EoMyAVFZ4DQ
2.	https://www.youtube.com/watch?v=kWdKMz4-TuI
3.	https://www.youtube.com/watch?v=n8e-snQMqiA
WEB RESOURCES:	
1.	https://www.scribd.com/doc/22308132/AGRONOMY-OF-FIELD-CROPS-1
2.	http://nsdl.niscair.res.in/123456789/524
3.	http://nsdl.niscair.res.in/123456789/502

4.	http://nsdl.niscair.res.in/123456789/505GRAM-Formatted.pdf
5.	http://nsdl.niscair.res.in/123456789/503

Course Code	Course Title	L	T	P	S	C
EXTN291	**FUNDAMENTALS OF AGRICULTURAL EXTENSION**	**2**	**-**	**1**	**-**	**3**

	EDUCATION					
Pre-Requisite	**NA**					
Anti-Requisite	**-**					
Co-Requisite	**-**					
COURSE DESCRIPTION:						
This course is designed to provide an overview on the concepts ofextension education, extension programme planning, programme development, extension systems in India, extension/ agriculture development programmes launched by ICAR/Govt. of India, new trends in agricultural extension. The course also provides insightsinto various concepts such as rural development, rural leadership, monitoring and evaluation of extension programmes, transfer of technology, extension teaching methods and agricultural journalism.						
COURSE OUTCOMES: After successful completion of the course, students will be able to:						
CO1.	Understand the basic concepts of extension education and extension programme planning					
CO2.	Gain knowledge about extension systems in India and various extension programmes launched by ICAR / government of India.					
CO3.	Understand the new trends in agricultural extension, rural development, community development, rural leadership and monitoring and evaluation.					
CO4.	Understand the concepts of transfer of technology, communication, agricultural journalism and diffusion and adoption of innovation.					
CO5.						

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	-	1	-	-	-	-	-	**-**	3	-	-	-
CO2	3	3	-	3	-	-	-	-	-	**-**	3	-	-	-
CO3	3	3	-	3	3	-	-	-	-	**-**	3	-	-	-
CO4	3	3	-	3	3	2	-	-	-	**-**	3	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	3	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**3**	**2**	**3**	**3**	**-**	-	**3**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1:	Extension education and extension programme	(8 Periods)
Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning-Meaning, Process, Principles and Steps in Programme Development. .		
Module 2:	**Extension programmes in India**	**(8 Periods)**
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.).		
Module 3:	**New trends and rural development**	**(8 Periods)**
New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc. Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.-meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes		
Module 4:	**Transfer of technology and communication**	**(8 Periods)**
Transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (News 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.		
Total Periods:32		

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
29.	To get acquainted with university extension system.
30.	To study about the group discussion
31.	Handling and use of audio visual equipments
32.	Handling of liquid crystal display (LCD) projector
33.	Preparation and use of audio visual aids

34.	Preparation of extension literature – leaflets and pamphlets
35.	Preparation of extension literature – folders and booklets/bulletins
36.	Preparation of extension literature – news stories and success stories
37.	Visit to a village to understand the problems being encountered by the villagers/ farmers
38.	Planning and preparation of micro teaching skill
39.	Study of the organization and functioning of DRDA
40.	Awareness about the ATMA programme
41.	Study about the script writing for television and radio
42.	Understanding PRA techniques and their application in village development planning
43.	Exposure to mass media: visit to community radio and television studio for understanding the process of programme production
44.	Visit to a KVK and NGO to study about its functions and activities

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	Adivi Reddy, A., 2001, Extension Education, Sree Lakshmi press, Bapatla.
2.	Dahama, O. P. and Bhatnagar, O.P., 1998, Education and Communication for Development, Oxford and IBH publishing Co. Pvt. Ltd., New Delhi.
REFERENCE BOOKS:	
1.	Jalihal, K. A. and Veerabhadraiah, V., 2007, Fundamentals of Extension Education and Management in Extension, Concept publishing company, New Delhi.
2.	Muthaiah Manoraharan, P. and Arunachalam, R., Agricultural Extension, Himalaya Publishing House (Mumbai).
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=rbjE2b51HXI&list=PL5NFt6otPjPbGj21ATvnaRVuQerOU78Va&index=6
2.	https://www.youtube.com/watch?v=9ltGmvosg8E

WEB RESOURCES:	
1.	http://jnkvv.org/PDF/02042020113635FAEE%20(1).pdf
2.	http://ecoursesonline.iasri.res.in/course/view.php?id=602

Course Code	Course Title	L	T	P	S	C
GPB112	**FUNDAMENTALS OF PLANT BREEDING & BIOTECHNOLOGY**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self – incompatibility and male sterility- genetic consequences, cultivar options. Domestication, Acclimatization, introduction; Concepts of population genetics and Hardy-Weinberg Law, Genetic basis and methods of breeding cross-pollinated crops, modes of selection; Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties; Breeding methods in asexually propagated crops, clonal selection and hybridization; Wide hybridization and pre-breeding; Polyploidy in relation to plant breeding, mutation breeding-methods and uses; Breeding for important biotic and abiotic stresses; Biotechnological tools-DNA markers and marker-assisted selection. Participatory plant breeding; Intellectual Property Rights, Patenting, Plant Breeders and & Farmer's Rights.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO6. Explain the fundamental principles of plant breeding with its historical view and realize the value of its scope.

CO7. Comprehend the conventional and modern plant breeding techniques to boost the crop productivity.

CO8. Determine the gene combinations in plant breeding techniques, procedure and process for developing varieties in self- and cross-pollinated crops.

CO9. Explain the mechanism of apomixes and study the exploitation of apomixis in crop improvement

CO10. Develop plant breeding solutions for yield increment and stress tolerance

CO11. Associate the appropriate data from the field experiments and interpret the data to identify the superior genotypes

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	1	-	2	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1:		***(02 Periods)***

Historical developments, concept, nature and role of plant breeding, major achievements and future prospects - Definition, aim, objectives, history and developments of plant breeding, scientific contributions of eminent scientists - Landmarks in plant breeding - Scope of plant breeding.

Module 2:		***(06 Periods)***

Modes of reproduction and apomixis - Asexual reproduction (vegetative reproduction and apomixis) and sexual reproduction - Their classification and significance in plant breeding. Modes of pollination - Classification of crop species on the basis of mode of pollination– self pollination – mechanisms promoting self pollination – Genetic consequences of self pollination – Cross pollination – Mechanisms promoting cross pollination – Genetic consequences of cross pollination – Often cross pollinated crops. Self– incompatibility - Classification – Heteromorphic, homomorphic, gametophytic and sporophytic systems of incompatibility – Advantages and disadvantages – Utilization in crop improvement. Male sterility- Genetic consequences, cultivar options - Different types – Genetic, cytoplasmic and cytoplasmic genetic male sterility – Inheritance and maintenance– utilization of male sterile lines in hybrid seed production – Their advantages and disadvantages.

Module 3:		***(06 Periods)***

Domestication, acclimatization and introduction - Plant introduction – Primary introduction and secondary introduction – Plant introduction agencies in India – National Bureau of Plant Genetic Resources (NBPGR) and its activities – Procedure of plant introduction – Merits and demerits of plant introduction. Centre of origin/diversity - Centres of diversity– Centres of origin – Classification – law of homologous series – Types of centres of diversity – Germplasm collections – Genetic erosion – Main reasons of genetic erosion – Extinction - Gene sanctuaries - Introgression – Gene banks – Types of gene banks. Breeding methods in self pollinated crops - Modes of selection - Selection – Natural and artificial selection – Basic principles of selection – Basic characteristics and requirements of selection – Selection intensity – Selection differential, heritability (narrow and broad sense) – Genetic advance as per cent of mean. Mass selection – Procedure for evolving a variety by mass selection – Modification of mass selection – Merits, demerits and achievements. Pure line selection - Johannsen's pure line theory and its concepts and significance – Origin of variation in pure lines – Characters of pure lines – Progeny test, genetic basis of pure line selection – General procedure for evolving a variety by pure line selection – Merits, demerits and achievements – Comparison between mass and pure line selection. Hybridization techniques - Hybridization – Aims and objectives – Types of hybridization – Pre-requisites for hybridization – Procedure / steps involved in hybridization Handling of segregating population - Pedigree method – Procedure – Merits, demerits and achievements. Bulk method – Procedure – Merits, demerits and achievements – Comparison between pedigree and bulk methods - Single seed descent method – Merits and demerits. Backcross method of breeding–Its requirements and applications – Procedure for transfer of single dominant gene - Procedure for transfer of single recessive gene – Merits, demerits and achievements - comparison between pedigree and backcross method.

Module 4:		

Multiline concept - Definition – Characteristics of a good multiline – Development of multiline varieties – Achievements. Concepts of population genetics and Hardy - Weinberg Law - Hardy Weinberg Law – Factors affecting equilibrium frequencies in random mating populations - Selection without progeny testing – Selection with progeny testing - Merits and demerits of progeny selection – Line breeding– achievements. Recurrent selection – Different types – Detailed procedure of simple recurrent selection and other recurrent selection methods – Conclusion on the efficiency of different selection schemes. Heterosis - Heterosis and hybrid vigour – Luxuriance – Heterobeltiosis – Brief history– heterosis in cross pollinated and self pollinated species – Manifestations of heterosis Genetic basis of heterosis – Dominance, over dominance and epistasis hypotheses – Objections and their explanations – Comparison between dominance and overdominance hypotheses – Physiological basis of heterosis – Commercial utilization Inbreeding depression - Brief history – Effects of inbreeding – Eegrees of

inbreeding depression – Procedure for development of inbred lines and their evaluation Development of inbred lines and hybrids - Exploitation of heterosis – History of hybrid varieties – Important steps in production of single and double cross hybrids – Brief idea of hybrids in maize, pearl millet, sunflower and rice. Composite and synthetic varieties - Production procedures – Merits, demerits and achievements – Factors determining the performance of synthetic varieties – Comparison between synthetics and composites

Module 5 ***(06 Periods)***

Breeding methods in asexually propagated crops, clonal selection and hybridization - Characteristics of asexually propagated crops – Characteristics of clones –Clonal selection – Procedure – Advantages and disadvantages – Problems in breeding asexually propagated crops – Genetic variation within a clone – Clonal degeneration – Achievements – Comparison among clones, purelines and inbreds - Breeding of annual asexually propagated species through hybridization – Interspecific hybridization Wide hybridization and pre breeding - History – Objectives – Barriers for the production of distant hybrids– Techniques for production of distant hybrids – applications of wide hybridization in crop improvement – Sterility in distant hybrids – Limitations and achievements -use of gene pools to develop intermediate breeding material. Polyploidy in relation to plant breeding - Polyploidy – Autopolyploids – Origin and production – Morphological and cytological features– Applications in crop improvement – Limitations– Allopolyploidy – Morphological and cytological features– Applications in crop improvement – Limitations. Mutation breeding - Methods and uses - Mutation breeding – Procedure of mutation breeding – Applications – Advantages, limitations and achievements. Breeding for important biotic and abiotic stresses - Disease resistance – Mechanisms of disease resistance in plants (disease escape, tolerance, resistance, immunity and hypersensitivity) – Genetic basis of disease resistance – Gene for gene hypothesis – sources of disease resistance – Breeding methods for disease resistance – Achievements. Insect resistance – Mechanism of insect resistance in plants (non preference, antibiosis, tolerance and avoidance) – Nature of insect resistance – Genetics of insect resistance – Horizontal and vertical resistance– Sources of insect resistance – breeding methods for insect resistance – Problems in breeding for insect resistance – Achievements. Drought resistance – Mechanisms of drought resistance (drought escape, avoidance, tolerance, and resistance) – Features associated with drought resistance – Sources of drought resistance – Breeding methods for drought resistance – Limitations – achievements - Resistance to water logging – Effects of water logging - Mechanism of tolerance – Ideotype for flooded areas. Salt tolerance – Response of plants to salinity – Symptoms – Mechanisms of salt tolerance – Breeding methods for salt tolerance – Problems – Achievements. Cold tolerance – Chilling resistance – Effects of chilling stress on plants – Mechanism of chilling tolerance – Sources of chilling tolerance – Selection criteria. Biotechnological tools - DNA markers and marker assisted selection - Definition and classification of DNA markers and applications. Participatory plant breeding - Definition – Goals – Methodology – Advantages and limitations.

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; 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; 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

Total Periods:32

PRACTICALS

LIST OF EXCERCISES

B.Sc. (Hons) Agriculture

1. Plant Breeder's kit.
2. Study of germplasm of various crops.
3. Emasculation and hybridization techniques in self-pollinated crops – rice, groundnut.
4. Emasculation and hybridization techniques in self-pollinated crops – greengram, sesame.
5. Emasculation and hybridization techniques in cross pollinated crops – maize, castor
6. Emasculation and hybridization techniques in often cross-pollinated crops – cotton, redgram.
7. Consequences of inbreeding on genetic structure of resulting populations.
8. Study of male sterility systems.
9. Handling of segregation populations.
10. Methods of calculating mean, range, variance, standard deviation.
11. Designs used in plant breeding experiments.
12. Layout of field experiment.
13. Analysis of Randomized Block Design.
14. Estimation of heterosis, inbreeding depression and heritability
15. Prediction of performance of double cross hybrids.
16. Work out the mode of pollination in a given crop and extent of natural out crossing

RESOURCES

TEXT BOOKS:

7. Singh, B.D. 2018. Plant breeding – Principles and methods. Kalyani Publishers, New Delhi.
8. Allard, R. 2019. Principles of Plant breeding. John Wiley and Sons, New Delhi.
9. Phundan Singh 2018 Essentials of Plant Breeding, Kalyani Publishers

REFERENCE BOOKS:

8. G. Acquaah 2012 Principles of Plant Genetics and Breeding, 2nd Edition, Wiley Publications.
9. D.N.Bharadwaj. 2012. Breeding Field Crops. Agrobios (India), Jodhpur

VIDEO LECTURES:

1. https://www.youtube.com/playlist?list=PLmVYuxv4mIil1yNrudAoGL1Ilqd2rkAjI-Plant breeding series
2. https://www.youtube.com/playlist?list=PLmVYuxv4mIil1yNrudAoGL1Ilqd2rkAjI-Lecture series developed by Cornell University

WEB RESOURCES:

5. http://ecoursesonline.iasri.res.in/course/view.php?id=134
6. https://plantreeding.ncsu.edu/academics/plant-breeding-lectures/

Course Code	Course Title	L	T	P	S	C
AECO241	AGRICULTURAL FINANCE AND CO-OPERATION	2	-	1	-	3
Pre-Requisite	NA					

Anti-Requisite	**-**
Co-Requisite	**-**
COURSE DESCRIPTION: This course is designed to provide an overview on the concepts ofagricultural finance and its role in Indian agriculture. The course provides insightsinto various concepts such as agricultural credit, sources of agricultural finance, higher financing institutions, financial statements, preparation of project reports and agricultural cooperation.	
COURSE OUTCOMES: After successful completion of the course, students will be able to:	
CO1.	Understand the basic concepts of agricultural finance, credit needs in Indian agriculture and credit analysis.
CO2.	Gain knowledge about sources of agricultural finance, micro financing, lead bank scheme and about higher financing institutions.
CO3.	Understand the cost of credit, know the recent developments in agricultural credit, preparation of financial statements and preparation of project reports.
CO4.	Understand the concepts of agricultural cooperation and developments of agricultural cooperatives, their significance in Indian agriculture and different services provided by agricultural cooperatives.
CO5.	Work independently or in teams to solve problems with finace

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	3	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	3	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Nature and scope of agriculture finance **(07 Periods)**

Agricultural Finance - meaning, scope and significance, credit needs and its role in Indian agriculture. Agricultural credit: meaning, definition, need, classification. Credit analysis: 4 R's, and 3C's of credits

Module 2: Financial institutions (09 Periods)

Sources of agricultural finance: institutional and non-institutional sources, commercial banks, social control and nationalization of commercial banks, Micro financing including KCC. Lead bank scheme, RRBs, Scale of finance and unit cost. An introduction to higher financing institutions – RBI, NABARD, ADB, IMF, world bank, Insurance and Credit Guarantee Corporation of India.

Module 3: Farm financial analysis (07 Periods)

Cost of credit.5C's, 3R's and 7P's of credit. Recent development in agricultural credit. Preparation and analysis of financial statements – Balance Sheet and Income Statement. Basic guidelines for preparation of project reports- Bank norms – SWOT analysis.

Module 4: Agricultural cooperation (09 Periods)

Agricultural Cooperation – Meaning, brief history of cooperative development in India, objectives, principles of cooperation, significance of cooperatives in Indian agriculture. Agricultural Cooperation in India- credit, marketing, consumer and multi-purpose cooperatives, farmers' service cooperative societies, processing cooperatives, farming cooperatives, cooperative warehousing; role of ICA, NCUI, NCDC, NAFED.

Total periods: 32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
45.	Determination of most profitable level of capital use
46.	Optimum allocation of limited amount of capital among different enterprises
47.	Analysis of progress and performance of cooperatives using published data
48.	Analysis of progress and performance of commercial banks and RRBs using published data
49.	Visit to a commercial bank, cooperative bank and cooperative society to acquire first hand knowledge of their management, schemes and procedures
50.	Visit to a district central cooperative bank (DCCB) to study its role, functions and procedures for availing loan - fixation of scale of finance

51.	Estimation of credit requirement of farm business - A case study
52.	Preparation and analysis of balance sheet and cash flow statement - A case study
53.	Preparation and analysis of income statement - A case study
54.	Exercise on financial ration analysis, appraisal of loan proposal - A case study
55.	Estimation of undiscounted methods
56.	Estimation of discounted methods
57.	Preparation of repayment plans
58.	Preparation of bankable projects/farm credit proposals and appraisal
59.	Techno-economic parameters for preparation of projects for various agricultural products and its value-added products
60.	Seminars on selected topics

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	Subba Reddy, Raghuram, P., Neelakanta Sastry, T.V. and Bhavani Devi, 2005, Agricultural Economics, Oxford and IBH Pub Co. Pvt. Ltd., New Delhi (2nd Edition)
2.	Subba Reddy and Raghuram, P., 2005, Agricultural Finance and Management, Oxford and IBH Publishing Co. Private Ltd., New Delhi.
3.	Amarjit Singh, A N Sadhu and Jasbir Singh, 2018, Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai (11th edition)
REFERENCE BOOKS:	
1.	Subba Reddy and Raghuram, P., 2005, Agricultural Finance and Management, Oxford and IBH Publishing Co. Private Ltd., New Delhi.
2.	Amarjit Singh, A N Sadhu and Jasbir Singh, 2018, Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai (11th edition)
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=5yQHbbxRJyA

2.	https://www.youtube.com/watch?v=pRmpOMH3zhY&list=PLRm
3.	https://www.youtube.com/watch?v=n8e-snQMqiA
WEB RESOURCES:	
1.	Agricultural-Finance-Cooperation.pdf (agrimoon.com)
2.	https://www.iaritoppers.com/2019/05/agricultural-finance-and-cooperation-icar-ecourse-pdf-book-download.html

Course Code	Course Title	L	T	P	S	C
AENG251	**FARM MACHINERY AND POWER**	**1**	**-**	**1**	**-**	**2**
Pre-Requisite	**NA**					
Anti-Requisite	**-**					
Co-Requisite	**-**					

COURSE DESCRIPTION: This course is designed to provide an overview of Farm Machinery and Power. The course provides deep insight into various concepts of Farm power (Tractor and power tiller) and Farm Machinery equipment such as ploughing, seed bed preparation, bunding, sowing, planting, crop protection and crop harvesting related to agriculture practices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1.	Know the Status of farm power in India and its importance in agriculture.
CO2.	Demonstrates tractor maintenance and usage in agricultural fields.
CO3.	Know different Tillage and sowing equipment that is currently used in agriculture.
CO4.	Know how to use plant protection equipment that to control pests and diseases that cause damage to crop fields.
CO5.	Know the importance and usage of Harvesting and threshing equipment in agriculture.
CO6.	Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	1	-	-	-	-	-	-	-	-	-	3
CO2	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO3	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO4	3	3	-	3	-	1	-	-	-	-	-	-	-	3
CO5	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Farm power and Farm tractor **(02 Periods)**

Status of farm power in India, Source of different farm power, farm mechanization concept, and indicator., Classification and selection of tractors, components of tractor.

Module 2: Tractor engine and working systems (04 Periods)

I.C. Engines. Working principle of four-stroke and two-stroke cycle engine - Difference between four and two-stroke engine, Comparison between diesel and petrol engine. Components of I.C. engine and Terminology related to engine power. Types and working principles of the Fuel supply system, lubrication system, ignition system, cooling system, and governor in I.C. engine.

Module 3: Tillage and sowing equipment. (04 Periods)

Primary and secondary tillage equipment, Numerical problems on M.B. plough and disc plough., Sowing equipment – seeding methods, seed drill and Seed cum fertilizer drills – components., planters-functions and types.

Module 4: Plant protection equipment (03 Periods)

Sprayers – basic components of sprayers, classification of sprayers., Dusters-types of dusters, care and maintenance of sprayers and Dusters.

Module 5: Harvesting and threshing equipment (03 Periods)

Harvesting-harvesting methods, types-sickles, mowers, reapers, combine harvesters. Threshing-principles-methods of threshing, types of threshing, power threshers, and types. Hey harvesting and methods-mowing, raking and baling

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

61. Familiarization with tractor components and their working principles
62. Exploring the clutch and brakes with working principles and their types.
63. Exploring the steering system of tractor and types of steering system
64. Exploring of periodical maintenance of tractor and storage of tractor
65. Different Type of Tractors Available in India/abroad
66. Driving of Tractor and power tiller.
67. Attachment of an implement by using a Drawbar and 3-point hitch system of a tractor.
68. Tractor tyres terminology, types, and their importance in agricultural fields.

69. Familiarization with primary tillage implements like an indigenous plough, M. B. Plough, disc plough, and its adjustments.

70. Ploughing of land and exploring methods of ploughing

71. Calibration of the seed drill – calculations of seed rate, cost of seeding per hectare.

72. Calibration of sprayers – calculations of discharge rate and area coverage

73. Land levelling and Familiarization with laser leveler – different components

74. Familiarization with intercultural equipment and different types available in the market.

75. Factors affecting thresher performance and safety Precautions in the operation of threshers.

76. Familiarization with tractor components and their working principles

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. T. P. Ojha and A.M. Michael. 2005. Principles of Agricultural Engineering (Volume - 1), Jain Brothers
2. Surendra Singh. 2007. Farm Machinery Principles and Applications. ICAR Publications
3. Surendra Singh & Verma. 2009. Farm Machinery Maintenance & Management. ICAR Publication.
4. M.M. Pandey & Others. 2012. Handbook of Agricultural Engineering. ICAR publication yyJagadishwar Sahay.1992. Elements of Agricultural Engineering. Agro Book Agency, Patna.

REFERENCE BOOKS:

1. Kepner RA Roy Bainer and Barger BL.1978. Principles of Farm Machinery. CBS Publisher and Distributors, Delhi.
2. Jain S C. 2003. Farm Machinery- An approach. Standard Publishers and Distributors, New Delhi Nakra, C.P.1986. Farm Machinery and Equipment. Dhanpat Rai and Sons, New Delhi
3. Klein, N.I. Popov, I.F. and Sakun, V.A.1985. Agricultural Machines. Amerind publishing Co. Pvt. Ltd., New Delhi

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=5tN6eynMMNw

2. https://www.youtube.com/watch?v=F_jtpWcZjME
3. https://www.youtube.com/watch?v=n8e-snQMqiA
5. https://www.youtube.com/watch?v=KoUkhF7tpDs
6. https://www.youtube.com/watch?v=uo1hXf35Uqg

WEB RESOURCES:

1. https://farmech.dac.gov.in/FarmerGuide/TN/Harvesting%20Equipments.htm
2. https://khetigaadi.com/blog/dusters-in-agriculture/
3. https://farmer.gov.in/dacdivision/Machinery1/chap1.pdf

Course Code	Course Title	L	T	P	S	C
HORT281	**Production Technology for Vegetables, Spices and Condiments Part-2**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**
Anti-Requisite **-**

B.Sc. (Hons) Agriculture

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of Production Technology for Vegetables, Spices, and Condiments. The course provides deep insight into various concepts such as cultivation Practices of Various Vegetables and Spices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO6. To understand the Scope, Importance and classification of vegetable & Spice crops
CO7. To gain knowledge about production technology of tropical and leafy vegetable crops and its cultivation practices
CO8. To construct idea regarding knowledge on growing of cole, legume, bulb, root & perennial vegetable crops
CO9. To create awareness about Production techniques of spice crops and their use
CO1(Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	1	2	-	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	1	-	2	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: **Scope, Importance and classification of vegetables& Spices** **(01 Periods)**

Importance of vegetable growing, nutritive value, human nutrition and classification of vegetables and spice crops.

Module 2: **Production technology of tropical, leafy & cucurbits crops** **(05 Periods)**

Cultivation practices of tropical crops- Tomato, brinjal, chilli, bhendi, Amaranthus, palak. Cucurbits- gourds (cucumber, pumpkin, bitter gourd, ridge gourd, bottle gourd, musk melon and watermelon)

Module 3: **Production technology of cole, legume, bulb, tuber, root & perennial vegetable crops** **(05 Periods)**

Cole crops- Cabbage & Cauliflower, Peas & beans (Cluster bean, French bean, Dolichos), Root crops (carrot & radish), potato& sweet potato, Perennialvegetables – drumstick & curry leaf, Bulb crops – onion & garlic,

Module 4: **Production techniques of spice crops** **(05 Periods)**

Cultivation practices of spices- Black pepper, Cardamom, Cloves, Turmeric, Ginger,Coriander, Cumin & Fenugreek

Total Periods:**16**

EXPERIENTIAL LEARNING

LIST OF EXERCISES:	
17.	Identification of important vegetables and spice crops based on different Morphological traits
18.	Nursery management, seed treatment, sowing seeds and raising seedlings.
19.	Preparation of main field and planting of seedlings
20.	Layout of Kitchen Garden / Nutrition Garden
21.	Use of plant growth regulators in important vegetable crops
22.	Physiological disorders in important vegetable crops
23.	Study of maturity indices and harvesting of major vegetables& spices
24.	Identification and description of varieties/hybrids in Tomato and chilli.
25.	Identification and description of varieties/hybrids in Brinjal and Okra
26.	Identification and description of varieties/hybrids in watermelon and musk melon.
27.	Identification and description of varieties/hybrids in Pea and French bean
28.	Identification and description of varieties/hybrids in Amaranthus and palak.
29.	Identification and description of of varieties/hybrids in onion and Garlic
30.	Identification and description of varieties/hybrids in black potato and drumstick
31.	Identification and description of varieties/hybrids in black pepper and cardamom
32.	Visit to vegetable Farm/nursery.

RESOURCES

TEXT BOOKS:

1. Textbook of vegetable, tuber crops, and Spices. S. Thamburaj, ICAR, New Delhi, 2014.
2. A Textbook on the production technology of vegetables. B.R. Choudhary, Kalyani Publishers. Ludhiana, 2009.
3. Vegetable Crops. T.K. Bose, Nayaprakash. Kolkata, 2002.
4. Modern Technology in Vegetable Production. P. Hazra, New India Publishing Agency. New Delhi, 2011.
5. Shanmugavelu, K.G., N. Kumar and K.V. Peter 2005. Production Technology of

Spices and Plantation Crops. Agrobios (India), Jodhpur.

6. Handbook of Vegetable Crops. M.S. Dhaliwal, Kalyani Publishers. Ludhiana, 2008.

REFERENCE BOOKS:

1. Vegetable crops: production technology. Dhaliwal M.S, Kalyani Publishers. Ludhiana
2. A Textbook on the production technology of vegetables. B.R. Choudhary, Kalyani Publishers. Ludhiana, 2009.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=nv4zp3p3D_I
2. https://www.youtube.com/watch?v=v5ElJHw7deY
3. https://www.youtube.com/watch?v=T6a2SWuTbH8

WEB RESOURCES:

1. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1776584
2. https://vigyanvarta.com/adminpanel/upload_doc/VV_1220_11.pdf
3. https://www.allthatgrows.in/blogs/posts/vegetables-kitchen-garden
4. https://content.kopykitab.com/ebooks/2013/11/2288/sample/sample_2288.pdf

Course Code	Course Title	L	T	P	S	C
PATH171	**FUNDAMENTALS OF PLANT PATHOLOGY**	**3**	**-**	**1**	**-**	**4**
Pre-Requisite	**NA**					
Anti-Requisite	**-**					
Co-Requisite	**-**					

COURSE DESCRIPTION: This course is designed to provide an overview of the

fundamentals of Plant Pathology. The course provides deep insight into the various concepts, the Importance of plant pathogenic organisms, different groups, Diseases due to abiotic causes, their reproduction, plant disease management, fungicides and antibiotics.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

- **CO1.** Understand the basic concepts of Plant pathology and identify different pathogenic organisms.
- **CO1.** Analyze the General characters and taxonomy to identify the abiotic disorders of Fungi, Bacteria & Mollicutes.
- **CO2.** Analyze the General characters and taxonomy to identify the abiotic disorders of viruses&Nematodes.
- **CO3.** Understand the Reproduction and Pathogenesis to develop defensemechanisms in plants.
- **CO4.** Apply Fungicides and Antibiotics in plant disease management.
- **CO5.** Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	-	-	1	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	1	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	1	-	1	-	-	-	-	-	3	-	-
CO5	3	-	1	3	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	3	-	-
Course correlation mapping	**3**	**3**	**1**	**1**	**-**	**1**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Introduction and Classification of Pathogenic Organisms. **(12Periods)**

Importance of plant Pathology, Pathogenesis. classification of plant diseases. Important plant pathogenic organisms, different groups of Diseases and symptoms.

Module 2: General Characters, taxonomy and abiotic disorders of Fungi, Bacteria & Mollicutes. **(12Periods)**

Taxonomy, general characters, classification, reproduction of fungus, Bacteria and mollicutes.

Module 3: General Characters, taxonomy and abiotic **(12Periods)**

disorders of Viruses and Nematodes

Nature, structure, replication and transmission, plant parasites, General morphology and reproduction, classification, symptoms of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina, Radopholus etc.).

Module 4: Reproduction and Pathogenesis (06Periods)

Liberation/dispersal and survival of plant pathogens, parasitism and variability, Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants.

Module 5: Epidemiology and Fungicides (06Periods)

Factors affecting disease development, plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

Total Periods:48

EXPERIENTIAL LEARNING

LIST OF EXERCISES:	
77.	Acquaintance with light microscope- preparation of media for isolation of plant pathogens and proving Koch's postulates
78.	General characters of fungi – Types of mycelia -Types of vegetative, asexual, and sexual spores - asexual and sexual fruiting bodies
79.	Study of important taxonomic characters and symptoms produced by *Plasmodiophora*, *Pythium,* and *Phytophthora*
80.	Study of important taxonomic characters and symptoms produced by *Sclerospora, Plasmopara*and *Albugo*
81.	Study of Important Taxonomic Characters and Symptoms Produced by *Rhizopus, Taphrina, Capnodium, Mycosphaerella, Cochliobolus, Lewia, Botryosphaeria* and *Macrophomina*
82.	Study of Important Taxonomic Characters and Symptoms Produced by *Eurotium, Talaromyces, Erysiphe, Golovinomyces, Leveillula,* and *Phyllactinia*
83.	Study of Important Taxonomic Characters and Symptoms Produced by *Claviceps, Ustilaginoidea, Gibberella, Verticillium* and *Sarocladium*
84.	Study of Important Taxonomic Characters and Symptoms Produced by *Glomerella, Pestalosphaeria*and *Magnaporthe*
85.	Study Of Important Taxonomic Characters and Symptoms Produced by *Puccinia, Uromyces* and *Hemileia*
86.	Exposure Field Visit to Understand Different Crop Diseases
87.	Study of Important Taxonomic Characters and Symptoms Produced by *Ustilago, Sporisorium, Moesziomyces and Exobasidium*
88.	Study of Important Taxonomic Character of *Agaricus, Pleurotus, Calocybe*and *Volvariella*
89.	Study of Important Taxonomic Character and Symptoms produced by *Athelia, Thanetephorus*and *Ganoderma*
90.	Symptoms of Bacterial Diseases: Leaf Spot, Leaf Blight, Leaf Streak, Canker, Scab, Crown Gall, Wilt, Soft Rot and Yellow Ear Rot

91.	Symptoms and Vectors of Viral Diseases- Mosaic, Chlorosis, Leaf Curl, Leaf Crinkle, Necrosis, Ring Spot, Vein Clearing, Spotted Wilt, Stem Pitting, Rosette and Bunchy Top
92.	Symptoms of *Candidatus*Phytoplasma, Algae, Phanerogamic Parasites, and Non-Parasitic Diseases

RESOURCES

TEXT BOOKS:	
1.	Pathak (Author), V. N. (Author), Khatri, Fundamentals of Plant Pathology, Agrobios, January 2009.
2.	Ravichandra N. G., Fundamentals of Plant Pathology, PHI, 2011
REFERENCE BOOKS:	
1.	A.V.S.S. Sambamurty, A Textbook of Plant Pathology , Dream tech press, February 2020.
2.	S.K. Tripathi, M.S. Bhale , V.K. Yadav & Ashish Shrivastava, Fundamentals of plant pathology, Scientific publishers, 2020.
VIDEO LECTURES:	
1.	https://www.youtube.com/watch?v=ZozPzFZ7Dbk
2.	https://www.youtube.com/watch?v=SGhIRCsE8U8&list=PLc4C-ydJtfjk3nkpzh2_b8EefhV62zGck
3.	https://www.youtube.com/watch?v=vMGRD94R3RU
4.	https://www.youtube.com/watch?v=B2_QFfxNBDM
WEB RESOURCES:	
1.	http://ecoursesonline.iasri.res.in/course/view.php?id=143
2.	https://agri-bsc.kkwagh.edu.in/uploads/department_course/PATH-_121_FUNDAMENTALS_OF_PLANT_PATHOLOGY.pdf
3.	http://www2.ca.uky.edu/agcomm/pubs/ppa/ppa41/ppa41.pdf

Course Code	Course Title	L	T	P	S	C
HORT282	**PRODUCTION TECHNOLOGY FOR FRUIT AND PLANTATION CROPS**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide knowledge on practical cultivation practices and origin, soil and climatic requirement, economic importance of fruit and plantation crops. To learn about importance and its cultivation practices of tropical, sub-tropical and temperate region growing fruit and plantation crops.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. To understand the importance and production technology of fruit crops

CO2. To gain knowledge about importance of plantation crops and its cultivation practices

CO3. To formulate different planting systems and production technologies for fruit and plantation crops

CO4. To construct idea regarding knowledge on growing of tropical and sub-tropical fruit crops

CO5. To create awareness about plantation crops processing and its production technologies

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	2	-	3	-	1	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course correlation mapping	**3**	**3**	**-**	**2**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: 3: High 2: Medium 1: Low

COURSE CONTENT

Module 1: Importance and Scope of Fruit and Plantation Crops (04 Periods)

Origin and Economic Importance of Mango, Banana, Citrus, Grape, Guava, Litchi, Papaya, Sapota, Apple, Pear, Peach, Walnut, Almond and; Minor Fruits- Date, Ber, Pineapple, Pomegranate, Jackfruit, Strawberry, Plantation Crops-Coconut, Arecanut, Cashew, Tea, Coffee & Rubber.

Module.2: Production Technology Of Major Fruit Crops (04 Periods)

Mango, Banana, Citrus, Grape, Guava, Papaya, Sapota, Apple -Economic Importance, Nutritive Value, Origin & Distribution, Area & Production, Species and Varieties: Production Technology: Soil And Climatic Requirements; Propagation,Root Stocks, Planting, Pruning; Irrigation, Nutrition, Maturity Indices, Harvesting and Yield.

Module 3: Production Technology Of Minor Fruit Crops (04 Periods)

Date Palm, Ber, Pineapple, Pomegranate, Jackfruit, Litchi, Strawberry, Pear, Peach, Walnut, Almond-Economic Importance, Nutritive Value, Origin & Distribution, Area & Production, Species and Varieties: Production Technology: Soil and Climatic, Propagation,Root Stocks, Planting, Training and Pruning, Irrigation, Nutrition, Maturity Indices, Harvesting and Yield.

Module 4: Production Technology Of Plantation Crops (04 Periods)

Coconut, Arecanut, Cashew, Tea, Coffee & Rubber - Origin, Geographic Distribution, Economic Importance, Soil and Climatic Requirement, Varieties, Cultural Practices and Post-Harvest Management.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Description and identification of varieties of Mango and Banana
2. Description and identification of varieties of Grape and Citrus
3. Description and identification of varieties of Papaya and Sapota,
4. Description and identification of varieties of Guava and Apple
5. Description and identification of varieties of Date palm, Ber, Pine apple and Litchi
6. Description and identification of varieties of Pomegranate, Jackfruit and Strawberry
7. Description and identification of varieties of Pear, Peach, Walnut and Almond
8. Training and Pruning of Mango, Grape and Apple
9. Training and Pruning of Ber, Pomegranate, Pear
10. Description and identification of physiological disorders of Mango, Citrus, Grape and Apple
11. Root stock characteristics of Grape and Apple
12. Description and identification of Coconut,Cashew and coffee varieties
13. Raising of nursery for palm crops-Selection of coconut and Areca nut mother palms and seed nut and planting of seed nut in nursery
14. Layout and planting of Arecanut, Coconut, Cashewnut, Oil palm, Cocoa plantations
15. Different methods of tapping of Rubber
16. Visit to commercial orchards

RESOURCES

TEXT BOOKS:	
1.	T.K.Chattopadhyay, 1997. Text book on pomology. Kalyani Publishers, New Delhi.
2.	Chadha,K.L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.
3.	Shanmugavelu, K.G. Kumar, N and Peter, K.V., 2005. Production technology of spices and plantation crops. . Agrosis, Jodhpur.
REFERENCE BOOKS:	
1.	Radha T and Mathew L., 2007. Fruit crops. New India Publishing Agency.
2.	Mitra S.K, Rathore D.S and Bose T .K. 1992. Temperate Fruit Crops. Horticulture and Allied Publishers, Calcutta
3.	Kumar, N.J.B. M. Md. Abdul Khaddar, Ranga Swamy, P. and Irrulappan, I. 1997.Introduction to spices, Plantation crops and Aromatic plants. Oxford & IBH, New Delhi.
VIDEO LECTURES:	
https://www.youtube.com/results?search_query=production+technology+for+fruit+and+plantation+crops	
WEB RESOURCES:	
http://ecoursesonline.iasri.res.in/course/index.php?categoryid=12	

Course Code	**Course Title**	**L**	**T**	**P**	**S**	**C**
MATH102	**STATISTICAL METHODS**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**
Anti-Requisite **-**
Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview on the fundamentals of Statistics. The course provides a deep insight about the various concepts such as the importance of statistics in Agriculture, Descriptive statistics, Probability, Null hypothesis, sample test, Correlation, regression analysis, ANOVA and selection of Suitable designs for Agriculture research experiments.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts and components of statistics and Determine Descriptive statistics.
CO2. Analyze the methods of probability distribution and sampling theory.
CO3. Estimation of the null hypothesis, degree of freedom, large and small sample test.
CO4. Determine the Correlation and Regression analysis in Agriculture.
CO5. Analysis of variance and select suitable designs for Agriculture experiments.
CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	1	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	3	-	1	-	-	-	-	-	-	3	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Descriptive Statistics (2 Periods)
Basic concepts – statistics.

Module 2: Probability Distributions and Sampling Theory (2 Periods)
Probability–Probability distributions– Discrete distributions: Binomial and Poisson. Continuous distribution: Normal distribution –Sampling theory.

Module 3: Testing of hypotheses (4 Periods)
The null and alternative hypothesis – degrees of freedom. Large sample test– Small sample tests – chi square test for goodness of fit.

Module 4: Correlation and Regression (2 Periods)
Correlation – Scatter diagram – Karl Pearson's correlation coefficient – Regression.

Module 5: Analysis of Variance and Experimental Designs (6 Periods)
Analysis of Variance (ANOVA) – one way and two way classifications - experimental designs – Completely Randomized Design (CRD) – Randomized Block Design (RBD) – Latin Square Design (LSD) – layout.

Total Periods:16

EXPERIENTIAL LEARNING

B.Sc. (Hons) Agriculture

LIST OF EXERCISES:

1. Construction of frequency distribution tables.
2. Diagrammatic representation – simple, multiple, component and percentage bar diagrams, pie diagram. Graphical representation – frequency polygon, frequency curve and histogram.
3. Computation of arithmetic mean, geometric mean, harmonic mean, median and mode for ungrouped and grouped data.
4. Computation of range, standard deviation, variance, coefficient of variation for ungrouped and grouped data. Computation skew ness and kurtosis for ungrouped and grouped data.
5. Simple problems in Binomial distribution and Poisson distribution.
6. Simple problems in Normal distribution.
7. Selection of simple random sample using simple random sampling method.
8. Large sample test – test for single proportion and difference between two proportions.
9. Large sample test – test for single mean and difference between two means.
10. Small samples test – t-test for single mean – independent t test for difference between two sample means (equal variances only) – Paired t-test.
11. Chi square test for goodness of fit – Chi square test for testing the association of attributes.
12. Computation of Karl Pearson's correlation coefficient.
13. Fitting of simple linear regression equation y on x.
14. One way ANOVA – analysis of experimental data using Completely Randomised Design (CRD)(for equal replications only).
15. Two way ANOVA – analysis of experimental data using Randomised Block Design (RBD).
16. Analysis of experimental data using Latin Square Design (LSD).

RESOURCES

TEXT BOOKS:

1. Federer, W.T. (1955), Experimental Design. Macmillan, New York.
2. Gomez, K.A. and Gomez, A.A. (1984). Statistical Procedures for Agricultural Research. John Wiley and Sons. New York. 680 p.
3. Nigam A.K. and Gupta, V.K. (1979). Hand book on Analysis of Agricultural Experiments. IASRI Publication, New Delhi.

REFERENCE BOOKS:

1. Anderson, R.L. and Bancroft, T.A. (1952). Statistical Theory in Research. Mc. Graw Hill Book Co., New York.
2. Cochran, W.G and Cox, G.M. (1958). Experimental designs. Wiley, New York
3. Das, M.N. and Giri, N.C. (1986). Design and Analysis of Experiments. Wiley Eastern Ltd., New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=LvMtEZCRA8A
2. https://www.youtube.com/watch?v=delGPGflXvo
3. https://www.youtube.com/watch?v=RALOqYe9JEI

WEB RESOURCES:

1. https://agrimoon.com/wp-content/uploads/Statistics.pdf
2. https://bscagristudy.online/wp-content/uploads/2022/03/STAT-231-HANDWRITTEN-NOTES-2.pdf
3. https://krishi.icar.gov.in/jspui/bitstream/123456789/69935/1/teaching%20manual_ANASTU_2021-22.pdf

B.Sc. Hons. (Agri) – IV Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO203	Crop Production Technology –II (Rabi Crops)	1	-	1	2

2.	AGRO205	Farming System and Sustainable Agriculture 1(1+0)	1	-	0	1
3.	GPB212	Crop Improvement-II (Rabi crops) 2(1+1)	1	-	1	2
4.	ENTO231	Management of Beneficial Insects 3(2+1)	2	-	1	3
5.	AECO242	Agricultural Marketing Trade and Prices 3(2+1)	2	-	1	3
6.	AGRO204	Renewable Energy and Green Technology 2(1+1)	1	-	1	2
7.	PATH272	Diseases of Field and Horticultural Crops and their Management -I 3(2+1)	2	-	1	3
8.	HORT282	Production Technology for Fruit and Plantation Crops	1	-	1	2
9.	EC201	Fundamentals of Stress Physiology	2	-	1	3
		Total	**13**	**-**	**8**	**21**

Course Code	Course Title	L	T	P	S	C
AGRO203	CROP PRODUCTION TECHNOLOGY – II (RABI CROPS)	1	-	1	-	2

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide knowledge on practical cultivation practices and origin, soil and climatic requirement, economic importance of rabi crops. It provides a comprehensive understanding of Rabi crops, including their cultivation, management, and the application of modern agricultural practices. Students will gain insights into the unique characteristics of Rabi crops, their importance in agricultural systems, and the challenges associated with their production

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO7. To understand the importance of food grain requirement and cultivation of major cereal crops

CO8. To gain knowledge about importance of minor millets and its cultivation practices

CO9. To formulate legume-based cropping system and production technologies for various pulse crops

CO10. To get knowledge on growing of legume and perennial fodders and its preservation

CO11. To create awareness about role of green manures in soil fertility

CO12. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	-	1	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	3	-	-	-	-	-
Course	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Mapping														

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1:	**Cereals- Wheat and barley**	**(8 Periods)**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Rabi crops; cereals -wheat and barley, fibre crops, cotton, jute and Mesta		
Module 2:	**Pulses Crops**	**(6 Periods)**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of pulses-chickpea, lentil, peas,		
Module 3:	**Oil Seed Crops**	**(6 Periods)**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of oilseeds-Groundnut, sesamum,soybean, rapeseed, mustard, sunflower, safflower, castor, linseed and Niger.		
Module 4:	**Sugar Crops**	**(6 Periods)**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of sugar crops-sugarcane and sugarbeet		
Module 5:	**Medicinal and Aromatic Crops**	**(6 Periods)**
Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of medicinal and aromatic crops-mentha, lemon grass and citronella, Forage crops-berseem, lucerne and oat		
		Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICALS

1. Land preparation and layout of plots
2. Sowing methods of sugarcane
3. Sowing of oil seeds, fiber, sugar crops and fodder crops
4. Identification of plant characteristics of oil seeds, fiber, sugar crops and fodder crops

5. Recording of yield contributing characters (biometric observations) of oil seeds, fiber, sugar crops and fodder crops ,
6. Yield and juice quality analysis of sugarcane
7. Visit to agronomic experiments of Oil seeds, fiber, sugar crops and fodder crops at experimental farms.
8. Visit to forage experiments Hay and silage making
9. Visit to research stations of related crops
10. Raising of tobacco nursery
11. Visit to related agro-based industries
12. Visit to nearby farmers' fields
13. Visit to nearby processing units
14. oil extraction of medicinal crops,
15. identification of weeds in *rabi* season crops,
16. Study of morphological characteristics of *rabi* crops,

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Dr. Rajendra Prasad, Textbook of Field Crops Production Volume 1 And 2 (Foodgrain Crops & Commercial Crops), ICAR, 2017.
2. Joshi M, Textbook of Field Crops – 1 January 2015, PHI.

REFERENCE BOOKS:

1. SR Reddy, Y Reddi Ramu, Agronomy of Field Crops, Kalyani publishers, 2018
2. S.R REDDY, C NAGAMANI, Principles of Crop Production, Kalyani publishers, 2016

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=EoMyAVFZ4DQ
2. https://www.youtube.com/watch?v=kWdKMz4-TuI
3. https://www.youtube.com/watch?v=n8e-snQMqiA

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WEB RESOURCES:

1. https://www.scribd.com/doc/22308132/AGRONOMY-OF-FIELD-CROPS-1
2. http://nsdl.niscair.res.in/123456789/524
3. http://nsdl.niscair.res.in/123456789/502
4. http://nsdl.niscair.res.in/123456789/505GRAM-Formatted.pdf
5. http://nsdl.niscair.res.in/123456789/503

Course Code	Course Title	L	T	P	S	C

EC201	**FUNDAMENTALS OF STRESS PHYSIOLOGY**	**2 - 1 - 3**
Pre-Requisite	**NA**	
Anti-Requisite	**-**	
Co-Requisite	**-**	

COURSE DESCRIPTION: This course is designed to provide an overview of the stress physiology concept. The course provides deep insight into various concepts about the stress physiology like drought stress, salinity stress, temperature stress and also heavy metal stress. To impart basic knowledge about different aspects of stress physiological processes and their applications in agricultural research; to impart knowledge the physiological and molecular basis of abiotic stress tolerance in plants and climate resilient crops.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand Abiotic stresses affecting plants productivity. Interaction between biotic and abiotic stress and effect and mechanism of drought stress on plant.

CO2 Understand the concept of high and low temperature stress on plants and also mechanism of high temperature stress tolerance in plant system

CO3 Understand the concept of flooding stress and physiological consequences and stress hormones and antioxidant enzymatic activity to overcome stress condition

CO4 Understand concept of salinity stress and stress tolerance mechanism and classification of plants based on salinity.

CO5 Understand the concept of environmental pollution and impact of heavy metal stress on plant productivity.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific C			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	
CO1	3	1	2	-	-	-	-	-	-	-	3	-	
CO2	3	3	-	-	-	-	-	-	-	-	3	-	
CO3	3	3	-	1	-	-	-	-	-	-	3	-	
CO4	3	2	-	2	-	-	-	-	-	-	3	-	
CO5	3	1	-	2	-	-	-	-	-	-	3	-	
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	

Module1. Stress concept and drought stress (8 periods)

Stress, strain concept and terminologies. Classification of different kinds of abiotic stresses. Response of plants to abiotic stresses: Abiotic stresses affecting plant productivity. General features of drought stress. Temporary and permanent wilting, Morphological and physiological responses to drought, Drought resistance mechanisms: Escape and dehydration postponement (Drought avoidance), Dehydration tolerance. Compatible solutes and osmotic adjustment,

Osmoprotectants, Stress proteins. Water use efficiency as a drought resistant trait.

Module 2. High temperature stress and low temperature stress (7 periods)

High temperature or heat stress: meaning of heat stress, heat injury and resistance in plants, Tolerance mechanisms- role of membrane lipids and HSPs, practical ways to overcome the effect of heat stress through soil and crop manipulations. Low temperature stress: freezing injury and resistance in plants, measurement of freezing tolerance, chilling injury and resistance in plants, Tolerance mechanism- crucial role of membrane lipids, practical ways to overcome the effect of low temperature tress through, soil and crop manipulations.

Module 3. Water logging and oxidative stress (6 periods)

Excess water or flooding stress: meaning of excess water stress, its kinds and effects on crop plants, physiological consequences, excess water stress injury and resistance, practical ways to overcome excess water stress through soil and crop manipulations. Stress and hormones: Stress signaling molecules. Role of ABA in stomata closure. **Oxidative stress**: Reactive Oxygen Species (ROS); Generation of ROS in plants –Scavenging mechanisms: Enzymatic (SOD, catalase, peroxidase, ascorbate peroxidase, glutathione reductase etc) and non-enzymatic anti-oxidants (Ascorbate (Vit. C), Tocopherol (Vit. E), carotenoids, glutathione etc.

Module 4. Salinity stress and mechanism (6 Periods)

Salinity effects at cellular and whole plant level. Effects of salinity on growth, yield and some physiological processes of crop plants. Species and varietal variation in salt tolerance. Classification of salt tolerant plants. Salinity: Salt tolerance mechanism. Salt stress perception and signal transduction.

Module 5. Environmental pollution and heavy metal stress (5 periods)

Environmental pollution: air, soil and water pollution, and their effect on crop growth and quality of produce; ways and means to prevent environmental pollution. Heavy metal stress: Aluminum and cadmium toxicity in acid soils. Role of Phytochelatins (heavy metal binding proteins).

Total Periods: 32

periods

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Measurement of Relative water content (RWC) in leaf
2. Determination of osmotic potential and tissue water potential
3. Determination of membrane injury (MI) and Membrane stability index (MSI)
4. Effect of moisture and salinity stress on seed germination and seedling growth
5. Measurement of chlorophyll stability index (CSI) in response to drought and salinity
6. Effect of ABA on stomatal closure
7. Measurement of proline content on plant parts
8. Measurement of peroxidase enzymatic activity on plants
9. Measurement of catalase enzymatic activity on plants

10.Screening techniques for salt tolerance

11. Measurement of transpiration rate

12.Estimation of chlorophyll content on different plant leaves

13.Studying the role of growth regulators in amelioration of abiotic stress effects in plants

14.Determination of soil water potential and content by psychometric and other systems

15. Studies on effect of osmotic and ionic stress on seed germination and seedling growth.

16.Studies on Effect of salinity on transpiration

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Jain, J.K. 2007. Fundamentals of plant physiology, S.Chand & Company Ltd., New Delhi.
2. Pandey, S. N. and B. K.Sinha, 2006. Plant Physiology. Vikas Publishing House Private Limited, New Delhi.
3. Purohit, S.S, 2005. Plant physiology, Student edition, Jodhpur.

REFERENCE BOOKS

3. Ray Noggle, G. and Fritz, G. J., 1991. Introductory Plant Physiology. Prentice Hall of India Pvt. Ltd., New Delhi.
4. Taiz. L. and Zeiger. E., 2006. Plant Physiology. Publishers: Sinauer Associates, Inc., Massachusetts, USA.

VIDEO LECTURES:

5. https://www.youtube.com/watch?v=66pQplA3bCQ&t=4s&ab_channel=TEACHINGPATHSHALA
6. https://www.youtube.com/watch?v=Rztffk3ZjCQ&t=5s&ab_channel=TEACHINGPATHSHALA
7. https://www.youtube.com/watch?v=YoNgSOIsk0A&t=3s&ab_channel=TEACHINGPATHSHALA
8. https://www.youtube.com/watch?v=iikdi_IGAtY&ab_channel=WorldofPlants

WEB RESOURCES:

1. http://www.plantphys.org
2. http://www. **Biologie. Uni-hamburg. de/b-online**
3. http://4e.plantphys.net
4. http://3e.plantphys.net
5. http://www.botany.org

Course Code	**Course Title**	**L**	**T**	**P**	**S**	**C**

AGRO205 **FARMING SYSTEM AND SUSTAINABLE AGRICULTURE** **1 - 0 - 1**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide knowledge

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. To understand the importance offood grain requirement and cultivationof major cereal crops

CO2. To gain knowledge about importance of minor millets and its cultivationpractices

CO3. To formulate legume-based cropping system and production technologies for various pulse crops

CO4. To get knowledge on growing of legume andperennial fodders and its preservation

CO5. To create awareness about role of green manures in soil fertility

CO6. Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO2	2	3	-	2	-	2	-	-	-	3	-	-	-	-
CO3	3	3	-	1	-	1	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	2	-	-	-	3	-	-	-	-
CO5	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**2**	**-**	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Farming Systems- Introduction (03 Periods)

Farming System-scope, importance, and concept, Types and systems of farming systemand factors affecting types of farming.

Module 2: Components of Farming Systems (04 Periods)

Farming system components and their maintenance,cropping system and pattern, multiple cropping system, Efficient cropping system and theirevaluation, Allied enterprises and their importance, Tools for determining production andefficiencies in cropping and farming system.

Module 3: Sustainable Agriculture (03 Periods)

Sustainable agriculture-problems and its impacton agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculturestrategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability.

Module 4: Integrated Farming Systems (03 Periods)

Integratedfarming system-historical background, objectives and characteristics, components of IFS and itsadvantages, Site specific development of IFS model for different agro-climatic zones.

Module 5: Resource use efficiency (03 Periods)

Resource useefficiency and optimization techniques, Resource cycling and flow of energy in different farmingsystem, farming system and environment, Visit of IFS model in different agro-climatic zones ofnearby states University/ institutes and farmers field

Total Periods:16

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

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

REFERENCE BOOKS:

1 Panda.S.C. 2011. Cropping and farming systems. Agrobios (India) Jodhpur.

2 Ruthenburg, H. 1980. Farming systems in the tropics. Oxford university press.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=OxVc9M2pwK4

2 https://www.youtube.com/watch?v=uafPYKSsGWY

3 https://www.youtube.com/watch?v=tIqvxD7ao74

WEB RESOURCES:

1 https://jnkvv.org/PDF/050420201342513420082 2.pdf

2 https://www.agricorn.in/p/farming-system-sustainable-agriculture.html

Course Code	Course Title	L	T	P	S	C
GPB212	Crop Improvement-II (Rabi Crops)	1	-	1	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION:

This course is designed to impart knowledge on Diversity, inheritance and genetic variations present in kharif crops, the different breeding methods in asexually propagated, self and cross pollinated kharif crops and hybrid seed production techniques and ideotype concepts in kharif crops

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO13.	Get knowledge about distribution of cereals, pulses, oil seeds, fibers, fodders, cash crops and horticultural crops.
CO14.	Understand the plant genetic resource, its utilization and conservation
CO15.	Get knowledge on different breeding techniques
CO16.	Impart knowledge on different modern breeding techniques for development of hybrids
CO17.	Understand different hybrid seed production technology in different crops

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	3	3	-	-	-	-	-	3	-	-	-
CO4	3	3	-	3	3	2	-	-	-	-	3	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	3	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**3**	**2**	**3**	**3**	**-**	-	**3**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1:	**Distribution of cereals, pulses, oil seeds, fibers, fodders, cash crops and horticultural crops**	**(8 Periods)**
Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers, fodders and cash crops; vegetable and horticultural crops.		
Module 2:	**Study of PGR and their characters**	**(6 Periods)**
Plant genetic resources, its utilization and conservation, study of genetics of qualitative and quantitative characters.		
Module 3:	**Asexual Breeding Techniques**	**(6 Periods)**
Important concepts of breeding self-pollinated, cross pollinated and vegetatively propagated crops.		
Module 4:	**Modern Breeding Techniques**	**(6 Periods)**
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)		
Module 5:	**Hybrid Seed Production**	**(6 Periods)**
Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeon pea, etc. Ideotype concept and climate resilient crop varieties for future		
		Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
93.	Pollination and reproduction in plants - Alternation of generation and life cycle.
94.	Description and drawingdifferentpollinationsystems-Mechanismsenforcingselfandcrosspollinationincrops;Pollenmorphology. Fertility and sterility inA, B, R and TGMS lines.
95.	Breederkitanditscomponents– uses;Basicstepsofselfingandcrossing techniques.
96.	Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi.

97.	Floral biology, emasculation and hybridization techniques in different crop species Pigeon pea, and Cowpea Urd bean, Mungbean,
98.	Floral biology, emasculation and hybridization techniques in different crop species Tobacco, Brinjal, Okra and Cucurbitaceous crops
99.	Floral biology, emasculation and hybridization techniques in Soybean, Groundnut, Sesame, Caster, Cotton,
100.	Studies on segregating generation and maintenance of records.
101.	Maintenance breeding of different *kharif* crops
102.	Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods
103.	Study of field techniques for seed production and hybrid seeds production in *Kharif* crops
104.	Estimation of heterosis, inbreeding depression and heritability
105.	Layout of field experiments
106.	Study of quality characters, donor parents for different characters
107.	Visit to seed production plots
108.	Visit to AICRP plots of different field crops

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	Singh, B.D. 2005. Plant breeding - Principles and methods. Kalyani Publishers, New Delhi.
2.	Allard, R. 1989. Principles of Plant breeding. John Wiley and Sons, New Delhi.
REFERENCE BOOKS:	
1.	D.N. Bharadwaj.2012. Breeding Field Crops. Agrobios (India), Jodhpur
2.	Chahal, G.S. and S.S.Gosal. 2002. Principles and Procedures of plant breeding: biotechnological and conventional Approaches. Narosa Publishing House (India)
VIDEO LECTURES:	
1.	https://www.youtube.com/@scienceagriculturebotany932
2.	https://www.youtube.com/@agriculturaldevelopmenttru8788

3.	https://www.youtube.com/watch?v=WBXYVMpG6QA
WEB RESOURCES:	
1.	efaidnbmnnnibpcajpcglclefindmkaj/https://bscagristudy.online/wp-content/uploads/2021/09/GPB-355-PRINTED-LONG-NOTE-2.pdf
2.	efaidnbmnnnibpcajpcglclefindmkaj/https://bscagristudy.online/wp-content/uploads/2021/03/GPB-355-PRINTED-LONG-NOTE.pdf
3.	https://www.rlbcau.ac.in/pdf/Agriculture/AGP-312%20Crop%20Improvement%20-%20I%20(Kharif%20Crops).pdf
4.	http://www.agritech.tnau.ac.in/farm_innovations/pdf/agritech_kvk_pdf/02.%20Crop%20Improvement.pdf

Course Code	Course Title	L	T	P	S	C
SSAC221	**MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite	**NA**
Anti-Requisite	**-**
Co-Requisite	**-**

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts ofmanures, fertilizers and soil fertility management. The course provides deep insightsinto various concepts such as types of fertilization, organic manures, biofertilizers, green and green leaf manures, chemical fertilizers, nutrient composition, soil fertility, plant nutrition, chemistry of plant nutrients, soil fertility evaluation, critical levels of nutrients, forms of nutrients in soil and plants, fertilizer recommendations to crops, nutrient use efficiency and methods of fertilizer application in rainfed and irrigated conditions.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO18.	Know the history of soil fertility and plant nutrition - Understand the nutrient availability to plants - mechanisms of nutrient transport to plants- Understand the chemistry of plant nutrients.
CO19.	Understand chemical fertilizers with their classification, composition and properties. Understand about soil amendments - fertilizer storage and Fertilizer Control Order. Biofertilizers – classification – Types- importance
CO20.	Gaining knowledge about the basic concepts of organic manures- green and green leaf manures- integrated nutrient management.
CO21.	Understand soil fertility evaluation - soil testing. Gain knowledge on critical levels of nutrients in soils - forms of nutrients in soil and plants. Understand the methods of fertilizer recommendation - nutrient use efficiency and fertilizer application methods in rainfed and irrigated conditions.
CO22.	Work independently and/or in teams to understand and suggest solutions to any practical problems.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	3	-	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-

CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1:	**Soil fertility and plant nutrition**	**(8 Periods)**
History of soil fertility and plant nutrition- Criteria of essentiality- Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants. Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients.		
Module 2:	**Chemical fertilizers**	**(6 Periods)**
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. Biofertilizers		
Module 3:	**Organic manures and integrated nutrient management**	**(6 Periods)**
Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green manure/leaf manure. Integrated nutrient management.		
Module 4:	**Evaluation of soil fertility and fertilizer recommendations**	**(6 Periods)**
Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Indicator plants. Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.		
Total Periods:32		

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
109.	IntroductiontoColorimetric-principles,calibrationand applications
110.	Introductiontoflamephotometry-principles, calibration andapplications

111.	Estimationofsoilorganiccarbon
112.	EstimationofAvailable Nitrogen insoilbyalkaline permanganatemethod
113.	EstimationofAvailable Phosphorusinsoil
114.	EstimationofAvailablePotassiuminsoil
115.	PreparationofHClextractfortheestimationof exchangeableCaand Mginsoil
116.	PreparationofSesquioxideextractfortheestimationof exchangeableCaandMg.
117.	EstimationofexchangeableCaand Mgin soil
118.	EstimationofextractableSinsoil
119.	Extractionofmicronutrients(Fe, Zn, Cu & Mn) in soils soilusingDTPAextractant.
120.	EstimationofDTPAextractablemicronutrientsinsoil
121.	Estimationoftotal nitrogen in plant sample
122.	Estimationoftotal phosphorus in plant sample
123.	Estimationoftotal potassium in plant sample
124.	Estimationoftotal Sulphur in plant sample

RESOURCES / STUDY MATERIALS

TEXT BOOKS:	
1.	Tandon HLS, 1994. Fertilizers Guide. Fertilizers Development Consultation Organization, New Delhi.
2.	Ranjan Kumar Basak, 2000. Fertilizers: A Text book. Kalyani publishers, New Delhi.
REFERENCE BOOKS:	
1.	Brady, N. C. and Weil, R. R., 2010. Elements of the Nature and Properties of Soils (3rd Edition.), Pearson Education, New Delhi.
2.	Dilip Kumar Das, 2011, Introductory Soil Science, Kalyani Publishers, New Delhi.
3.	The fertilizer Association of India, 1985, Fertilizer control order, Shaheed Jit singh marg, New Delhi.

VIDEO LECTURES:	
1.	Manures & Fertilizers for AFO, NABARD etc By Roshan Kumar Sir - YouTube
2.	Mineral Nutrition, Role of essential nutrients, Deficiency Sym for AFO, NABARD by Roshan Kumar - YouTube
3.	Soil Fertility & Productivity for AFO, NABARD etc by Roshan Kumar - YouTube
WEB RESOURCES:	
1.	Manures, Fertilizers and Soil Fertility Management – Courseware :: Centurion University (cutm.ac.in)
2.	Dr. V.P. Bhalerao_SSAC-353 (bscagristudy.online)
3.	1627800020_AG.CHEM.3.2_manures, fertilizers and soil fertility management. pdf (coabnau.in)

Course Code	Course Title	L	T	P	S	C
AECO242	**Agricultural Marketing, Trade and Prices 3 (2+1)**	**2**	**-**	**1**	**-**	**3**

B.Sc. (Hons) Agriculture

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts ofaagricultural mmarketing, demand & supply, product life cycle, pricing and promotion, exchange functions, market functionaries & marketing channels, marketing costs, margins and price spread. The course also provides insightsinto various concepts such as role of government in agricultural marketing, risks in marketing, agricultural prices and policy, trade and agreement on agriculture.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of agricultural marketing, demand and supply of agricultural commodities.

CO2. Gain knowledge about product life cycle and pricing and promotion and marketing process.

CO3. Understand the exchange functions, facilitating functions, market functionaries, marketing channels, cost and price.

CO4. Understand the public sector institutions, risk in marketing, agricultural prices and policy, trade and IPR.

CO5. Workindependentlyorinteamtosolveproblemswitheffectivecommunication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

B.Sc. (Hons) Agriculture

Module 1: Agricultural Marketing and demand and supply (08 Periods)

Agricultural Marketing: Concepts and definitions of market, marketing, agricultural marketing, market structure, marketing mix and market segmentation, 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.

Module 2: Product life cycle, pricing and promotion (08 Periods)

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; marketing process and functions: Marketing process-concentration, dispersion and equalization.

Module 3: Exchange functions, price and costs (08 Periods)

Exchange functions – buying and selling; physical functions – storage, transport 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; meaning and definition of marketing channel; number of channel levels; marketing channels for different farm products; 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 costs.

Module 4: Public sector institutions, agricultural pricing and policy and trade (02 Periods)

Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP & DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation & hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for agricultural price policy; Trade: Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; GATT and WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Plotting and study of demand and supply curves and calculation of elasticities
2. Study of relationship between market arrivals and prices of some selected commodities
3. Computation of marketable and marketed surplus of important commodities
4. Study of price behaviour over time for some selected commodities

5.	Construction of index numbers
6 & 7	Visit to a local market to study various marketing functions performed by different agencies
8 & 9	Identification of marketing channels for selected commodity
10	Collection of data regarding marketing costs, margins and price spread and presentation of report in the class
11	Visit to market institutions – NAFED
12	Visit to market institutions – SWC, CWC
13	Visit to market institutions – cooperative marketing society
14-16	Application of principles of comparative advantage of international trade

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Acharya SS & Aggarwal NL, gricultural Marketing in India. Fifth Edition. Oxford and IBH Publishing Company Pvt. Ltd, 2011.
2. Ahuja HL. Advanced Economic Theory. S Chand and Company, 2007.

REFERENCE BOOKS:

1. Chandra P. Projects: Preparation, Appraisal & Implementation. McGraw Hill Inc, 1984
2. Dewett KK. Modern Economic Theory. S Chand and Company, 2005

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=0v_ChVgM-8M&list=PL_YXsNANo2M4YNEM47k2y8l0F6BufMyoJ
2. https://www.youtube.com/watch?v=nzH-WHbML7U

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/Courses/Agricultural%20Marketing%20Trade%20and%20Prices/Start%20to%20read%20the%20Course.html
2. https://drive.google.com/file/d/1ekXNfABpo6DXjFoWTfsEfEzU5Cf6W10o/view

Course Code	Course Title	L	T	P	S	C
B.Sc. (Hons) Agriculture						

AGRO204 **RENEWABLE ENERGY AND GREEN TECHNOLOGY** **1 - 1 - 2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide knowledge on comprehensive exploration of renewable energy sources and green technologies, focusing on their principles, applications, and the role they play in addressing environmental challenges. Students will gain a deep understanding of various renewable energy options and cutting-edge green technologies that contribute to sustainable development and prepares students to be knowledgeable professionals in the field of renewable energy and green technology, empowering them to contribute to the global shift towards sustainable and environmentally friendly practices.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. To understand the importance of energy sources and its classification

CO2. To gain knowledge about biomass utilization

CO3. To get awareness on solar energy and its utilization

CO4. To getfamiliarization with different solar energy gadgets

CO5. To create awareness on wind energy and its applications

CO6. Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO2	2	3	-	2	-	2	-	-	-	3	-	-	-	-
CO3	3	3	-	1	-	1	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	2	-	-	-	3	-	-	-	-
CO5	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**2**	**-**	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Energy Sources Classification **(03 Periods)**

Classification of energy sources, contribution of these of sources in agricultural sector.

Module 2: Bio Mass Utilisation **(04 Periods)**

Familiarization with biomass utilization for biofuel production and their application, Familiarization with types of biogas plants and gasifiers, biogas, bioalcohol, biodiesel, Biooil production and their utilization as bioenergy resource

Module 3: Solar Energy **(03 Periods)**

Introduction of solar energy, collection and their application,

Module 4: Solar Energy Gadgets **(03 Periods)**

Familiarization with solar energy gadgets: solar cooker, solar water heater,application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic systemand their application.

Module 5: Wind Energy **(03 Periods)**

Introduction of wind energy and their application.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICALS

1. Availability and uses of non - conventional energy in agricultural sector.
2. Bio-fuel production from biomass and its application.
3. Practical approach to biogas production and biogas plants capacity and design calculations.
4. Running gasifies and production details of producer gas.
5. Production details of briquettes from briquetting machine.
6. Experimenting with solar gadgets like solar-cooler and solar water heater for their performance.
7. Performance of solar photovoltaic system and observing various factors influencing efficiency of the photo-voltaic system.

8. Performance of solar photovoltaic system and observing various factors influencing efficiency of the photo-voltaic system.

9. Evaluation of solar pump for agriculture.

10. Study of solar drying system.

11. Study of solar distillation and solar pond.

12. Steps adopted for erecting solar fence.

13. Visit to solar wind farm.

14. Visit to solar wind farm.

15. Visit to solar photovoltaic farm.

16. Visit to solar photovoltaic farm.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

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.

REFERENCE BOOKS:

1 Ojha, T.P. and Michael, A.M. Principles of Agricultural Engineering. Vol. I, Jain Brothers, New Delhi.

2 Rathore, N.S., Mathur, A.N. and Kothari, S. Alternate Sources of Energy. ICAR Publication.

VIDEO LECTURES:

1 https://www.youtube.com/watch?v=y0vxxgYJlZE&list=PLnUGc0k_kCuPtLC7hYWWLRMuoe1uZ_KZQ

2 https://www.youtube.com/watch?v=6umbOKiWLcs&list=PLnUGc0k_kCuPtLC7hYWWLRMuoe1uZ_KZQ&index=2

3 https://www.youtube.com/watch?v=S6e13w-uJIs&list=PLnUGc0k_kCuPtLC7hYWWLRMuoe1uZ_KZQ&index=3

WEB RESOURCES:

1 chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://eternaluniversity.edu.i

n/docs/RenewableEnergyandGreenTechnology.pdf

2 https://www.routledge.com/Renewable-Energy-and-Green-Technology-Principles-and-Practices/Kumar-Singh-Kumar/p/book/9781032008158

Course Code	Course Title	L	T	P	S	C

PATH272 **DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT -I** **2 - 1 - 3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview onetiology,symptoms, epidemiology, mode of spread, survival and integrated management of important diseases due to fungi, bacteria, viruses, phytoplasma, phanerogamic parasites and non-parasitic causes of the field and horticultural crops

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Acquire the knowledge on about new emerging diseases of Cereals and pulses.

CO2. Gain knowledge expertise in identifying and managing diseases in Oil Seeds and millet crops.

CO3. expertise in identifying and managing diseases in pulses and cash crops.

CO4. get expertise in identifying and managing diseases in fruits.

CO5. Trained in identifying and managing disease of vegetables.

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	2	-	-	-	-	-	-	-	3	-	-
CO2	3	2	-	2	-	-	-	-	-	-	-	3	-	-
CO3	3	2	-	2	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	1	-	-	-	-	-	-	-	3	-	-
CO5	2	3	-	3	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	3	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: **Symptoms, etiology, disease cycle and management of major diseases of field crops.** **(08 Periods)**

Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra: downy mildew and ergo

Module 2: **Symptoms, etiology, disease cycle and management of major diseases of oil seeds and millets.** **(04 Periods)**

Groundnut: early and late leaf spots, wilt. Soybean: Rhizoctonia blight, bacterial spot, seed and seedling rot and mosaic; Finger millet: Blast and leaf spot;

Module 3: **Symptoms, etiology, disease cycle and management of major diseases pulses and cash crops.** **(08 Periods)**

Pigeonpea: Phytophthora blight, wilt and sterility mosaic; black & greengram: Cercospora leaf spot and anthracnose, web blight and yellow mosaic; Castor: Phytophthora blight. Tobacco: black shank, black root rot and mosaic.

Module 4: **Symptoms, etiology, disease cycle and management of major diseases of fruits** **(04 Periods)**

Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, Sigatoka and bunchy top; Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: Alternaria leaf spot and black rot

Module 5: **Symptoms, etiology, disease cycle and management of major diseases of vegetables.** **(08 Periods)**

Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: Phytophthora blight; Coconut: wilt and bud rot; Tea: blister blight; Coffee: rust.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Diseases of cereals
2. Diseases of cereals and minor millets
3. Diseases of pulses
4. Diseases of storage grains
5. Diseases of oilseeds

6. Diseases of cash crops
7. Field visit
8. Diseases of fruits
9. Diseases of fruits
10. Diseases of flower crops
11. Diseases of vegetables
12. Diseases of vegetables
13. Post-harvest diseases of vegetables
14. Field Visit
15. Field Visit
16. Field visit, FCI warehouse visit, Students should submit 50 well-pressed diseased specimens

RESOURCES

TEXT BOOKS:

1. Manoj Kumar Kalita, Diseases of Field And Horticultural Crops And Their Management – I,Kalyani publications,2005.
2. Prof. R.S. Ratnoo, Dr. Amit TrivedI, Diseases of Field, Horticultural Crop & Their Management-I, Himanshu Publications, 2022

REFERENCE BOOKS:

1. Chaube H.S and Pandhir, Crop diseases and their management .Prentice hall of India Pvt. Ltd. New Delhi, 2005
2. Henry, L.D.C. and Lewin, H. Crop Diseases – Identification, Treatment and Management, New India Publishing Agencies, New Delhi, 2011.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=3oHD0QGqV58
2. https://www.youtube.com/watch?v=8FKMzQAeLzs

WEB RESOURCES:

1. www.ucmp.berkeley.edu/fungi
2. www.ictv.org

Course Code	Course Title	L	T	P	S	C
MATH201	**AGRI-INFORMATICS (FUNDAMENTALS OF COMPUTERS APPLICATIONS IN AGRICULTURE)**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide knowledge on computers, operating systems, applications of MS Office for document creation & editing, data presentation, Interpretation and graph creation,

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO23. Understand the basic in computers

CO24. Demonstrate the computer languages

CO25. Knowledge in IT applications in agriculture

CO26. Apply the decision supporting system in agriculture

CO27. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-	-	-	-	-	-	-	-	-	3
CO2	3	2	-	-	-	-	-	-	-	-	-	-	-	3
CO3	3	2	-	2	-	-	-	-	-	-	-	-	-	3
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	3
Course correlation mapping	**3**	**2**	**-**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Introduction to computers, Operating Systems (04 Periods)

Introduction to Computers, Operating Systems, definition, and types, applications of MS Office for Document Creation & Editing, Data Presentation, Interpretation and Graph Creation, Statistical Analysis, Mathematical Expressions, Database, concepts and types, uses of DBMS in Agriculture, World Wide Web (WWW): Concepts and components.

Module 2: Programming Languages (04 Periods)

Introduction to computer programming languages, concepts, and standard input/output operations, e-Agriculture, Concepts, and Applications, Use of ICT in Agriculture, Computer Models for understanding plant processes.

Module 3: IT applications in agriculture (04 Periods)

IT application for the computation of water and nutrient requirements of crops,Computer-controlled devices (automated systems) for Agri-input management, Smartphone Apps in Agriculture for farm advice, market price, postharvest management, etc, Geospatial technology for generating valuable agri-information-GPS, GIS and RS. Brief description of agricultural information systems, artificial intelligence, and artificial neural network.

Module 4: Decision Support Systemsand Applications in agriculture (04 Periods)

Decision support systems, concepts, components, and applications in Agriculture, Agriculture Expert System, Soil Information Systems etc for supporting Farm decisions, Preparation of contingent crop planning using IT tools.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

125. Study of Computer Components & Accessories
126. Practicing important DOS Commands.
127. Introduction of different operating systems such as Windows, Unix/ Linux, Creating, Files & Folders, and File Management.
128. Use of MS-WORD for creating, editing, and presenting a scientific Document
129. Use of MS PowerPoint for creating, editing and presenting a scientific Document.
130. MS-EXCEL - Creating a spreadsheet, using statistical tools, writing expressions, creating graphs, and analyzing scientific data.
131. Familiarization with Statistic Software such as R, SAS, SPSS, and STATA.
132. E- Agriculture
133. ICT in Agriculture
134. Simulating Crop Yield

135. InfoCrop - Dynamic crop simulation software

136. Smartphone mobile apps in Agriculture

137. Decision support systems-classification and types

138. Expert System in Agriculture – case study

139. Preparation of contingent crop planning/crop calendar

140. IT application for the computation of water and nutrient requirements of crops

RESOURCES

TEXT BOOKS:

1. Gurvinder Singh, Rachhpal Singh & Saluja KK. 2003. Fundamentals of Computer Programming and Information Technology. Kalyani Publishers.
2. Harshawardhan P. Bal. 2003. Perl Programming for Bioinformatics. Tata McGraw-Hill Education.

REFERENCE BOOKS:

1. Kumar A 2015. Computer Basics with Office Automation. IK International Publishing House Pvt Ltd.
2. Maidasani D. 2016. Learning Computer Fundamentals, MS Office and Internet & Web Technology. 3rd edition, Laxmi Publications

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Swqu-rXV7tg&list=PLsUA4pDhUS8pmVywF_AJexcI_D9e0lLFv
2. https://www.youtube.com/watch?v=55Lf79Rt3vw&list=PLsUA4pDhUS8pmVywF_AJexcI_D9e0lLFv&index=2

WEB RESOURCES:

1. https://www.kisangates.com/agro-informatics.html
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://kulbhaskarpgcollege.com/images/docs/E_lectures_2019/B.Sc.%20(Ag.)%20IVth%20Sem%20(Agri%20Informatics)%20%20By%20%20Mr.%20Sushant%20Srivastava.pdf

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO301	Geoinformatics and Nano-technology and Precision Farming	1	-	1	2
2.	AGRO302	Practical Crop Production – I (Kharif crops)	0	-	2	2
3.	GPB311	Principles of Seed Technology 3(1+2)	1	-	2	3
4.	ENTO331	Pests of crops & Stored grain and their management	1	-	1	2
5.	EXTN391	Intellectual Property Rights 1(1+0)	1	-	0	1
6.	AH301	Livestock and Poultry Management	3	-	1	4
7.	PATH371	Principles of Integrated Pest and Disease Management 3(2+1)	2	-	1	3
8.	HORT381	Production Technology for Ornamental Crops, MAP and Landscaping 2(1+1)	1	-	1	2
9.	AECO341	Entrepreneurship Development and Business Communication 2(1+1)	1	-	1	2
10.	EC301	Fundamentals of Food Technology & Processing	1	-	1	2
Total			**14**	**-**	**11**	**23**

Course Code	Course Title	L	T	P	S	C
AGRO301	GEOINFORMATICS, NANO-TECHNOLOGY AND PRECISION FARMING	1	-	1	-	2

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course is designed to provide an overview

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Gainknowledge on precision agriculture and Geo-informitcs-definition, concepts, tool and techniques

CO2. Understand GIS and Soil mapping techniques

CO3. Learn remote sensing and their techniques

CO4. Gain knowledge on crop simulation models

CO5. Understand nano technology and their applications

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Precision agriculture and Geo-informitcs- definition, concepts, tool and techniques (05 Periods)

Precision agriculture: concepts and techniques; their issues and concerns for Indian agriculture; Geo-informatics- definition, concepts, tool and techniques; their use in Precision Agriculture

Module 2: GIS and Soil mapping (02Periods)

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS;

Module 3: Remote sensing and their applications (03 Periods)

Remote sensing concepts and application in agriculture; Image processing and interpretation; Global positioning system (GPS), components and its functions

Module 4: Crop simulation models (03 Periods)

Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture

Module 5: Nano technology and their applications (03 Periods)

Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1 Introduction to GIS software, spatial data creation and editing

2 Introduction to image processing software

3 Visual and digital interpretation of remote sensing image

4 Generation of spectralprofiles of different objects

5 Supervised and unsupervised classification and acreage estimation

6 Multispectral remote sensing for soil mapping

7 & 8 Creation of thematic layers of soil fertility based on GIS

9 Creation of productivity and management zones

10 Fertilizers recommendations based of VRT and STCR techniques

11	Crop stress (biotic/abiotic) monitoring using geospatial technology
12	Use of GPS for agricultural survey
13 & 14	Formulation, characterization and applications of nanoparticles in agriculture
15 & 16	Projects formulation and execution related to precision farming

RESOURCES

TEXT BOOKS:

1. SR Reddy, Geoinformatics and Nanotechnology for Precision Farming (Prinsika), Kalyani publishers, 2018.
2. Tarun Kumar Upadhyay and Sushil Kumar Sharma, A Textbook on Geoinformatics, Nanotechnology and Precision Farming, New Delhi Publishers, 2020.

REFERENCE BOOKS:

1. Kishore Chandra Swain, A Textbook on Precision Agriculture Technology, New Delhi Publishers, 2020.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=zdRUCr7iX5Q&list=PLPzlW6NMlfyjLqXihf6Wj999L2bKIodD5
2. https://www.youtube.com/watch?v=NXx4_uiQpMo&list=PLPzlW6NMlfyjLqXihf6Wj999L2bKIodD5&index=2
3. https://www.youtube.com/watch?v=HfEF5E6oC6o&list=PLPzlW6NMlfyjLqXihf6Wj999L2bKIodD5&index=3

WEB RESOURCES:

1. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/Lecture-notes-of-Geoinformatics-and-Nanotecnology-for-Precision-Farming.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://bscagristudy.online/wp-content/uploads/2021/03/AGRO-3612-PRINTED-NOTE.pdf
3. https://bscagristudy.online/wp-content/uploads/2022/03/AGRO-3612-PRINTED-NOTES-2.pdf

Course Code	Course Title	L	T	P	S	C
AGRO302	**PRACTICAL CROP PRODUCTION – I (KHARIF CROPS)**	**0**	**-**	**2**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview knowledge about cultivation of rice in different ecosystem, Students will acquire skill on different nursery techniques, trained to treat the seeds with bio fertilizers and fungicides, aware about different methods of planting techniques, and learn about harvesting methods and processing

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	-	-	-	-	-	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of rice ecosystems, climate, weather, seasons and varieties of Tamil Nadu
2. Acquiring skills in selection of nursery area and preparation of different types of nurseries.
3. Acquiring skills in seed treatment, seed soaking and incubation, nursery sowing and management and calculation of seed requirement.
4. Study and practice of main field preparation and green manuring and bio-fertilizer application in rice
5. Study of different growth stages of rice.
6. Study and practice of transplanting techniques in lowland rice

7. Study of system of rice intensifications
8. Bio- metric observations and estimation of plant population and acquiring skills in cultural operations.
9. Study of weeds and weed management in rice.
10. Acquiring skill in nutrient management, calculation on fertilizer requirementand practicing top dressing techniques.
11. Study of water management practices for lowland rice.
12. Observation of insect pests and diseases and their management.
13. Yield parameters and estimation of yield in rice.
14. Post harvesttechniques, value addition and by products utilization in rice.
15. Working out cost of cultivation and economics.
16. Visit to any rice research stations or kvk.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Chidda Singh, 1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. ICAR 2006. Hand book of Agriculture. Indian Council of Agricuture, New Delhi.

REFERENCE BOOKS:

1. Crop Production Guide. 2005. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
2. Rajendra Prasad. 2004. Text Book on Field Crop Production, Indian Council of Agrl. Research, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=zLTd7b4F20E
2. https://www.youtube.com/watch?v=aeR8Jmf6aII

WEB RESOURCES:

1. http://nsdl.niscair.res.in/123456789/524RICE - FORMATTED.pdf
2. http://farmer.gov.in/imagedefault/pestanddiseasescrops/rice.pdf
3. http://www.knowledgebank.irri.org/images/docs/12-Steps-Required-for-Successful-Rice-Production.pdf

Course Code	Course Title	L	T	P	S	C
GPB211	**CROP IMPROVEMENT-I (Kharif Crops)**	1	-	1	-	2

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

A comprehensive knowledge of the plant genetic diversity, and genetic variations found in Rabi crops, as well as the various breeding techniques employed for asexually propagated, self- and cross-pollinated rabi crops. In addition to this, the hybrid seed production techniques, and ideotype concepts in rabi crops, will be delivered in this course.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Recall the origins and diversity of different Rabi crops.

CO2. Recognize the elements of heredity and different methods of crop improvement for the desirable traits like yield, quality and pest and disease resistance.

CO3. Describe different breeding techniques and achievements pertaining Rabi crops like wheat, barley, chickpea, fruit crops like banana and orange, bean, brinjal etc.,

CO4. Design and layout field experiments to analyze the yield parameters of rabi crops and evaluate the biotic and abiotic stress, stability, quality characteristics, and adaptability of different rabi crops.

CO5. Appraise the adaptability, stability, Quality parameters, biotic and abiotic stress of various rabi crops.

CO6. Summarize the hybrid seed production techniques and ideotypes in cultivation of rabi crops.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	3	3	-	1	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	3	3	-	-	-	-	-	3	-	-	-
CO4	3	3	-	3	3	2	-	-	-	-	3	-	-	-
CO5	3	3	-	3	2	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-

Course Correlation Mapping	**3**	**3**	**-**	**3**	**3**	**2**	**3**	**3**	**-**	-	**3**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

Module 1: Centers of Origin and dynamics of domestication: Plant genetic resources conservation and utilization (5 Periods)

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops. Plant genetic resources, its utilization and conservation; Gene pool, Germplasm, types of germplasm, international centers for genetic resources for various crop, Significance of plant genetic resources.

Module 2: Conventional and modern plant breeding tools (5 Periods)

Plant Breeding for food security, Improved quality, Resistance against pest and diseases, changes in phenology and maturity, Elimination of toxins from plants; Released varieties with improved traits for yield, pests and diseases, abiotic stresses. Innovative breeding techniques: Ideotype breeding, Plant tissue culture, Genetic Engineering, DNA fingerprinting, Molecular Breeding, Gene pyramiding.

Module 3: Breeding of Cereals and Millets (5Periods)

Cereals: Wheat, Barley, oats and oats -Wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and quality (physical, chemical, nutritional)

Module 4: Breeding of Pulses and Oil seed Crops (6Periods)

Chickpea, Field pea, cow pea and red gram; Oilseeds –Sunflower, Safflower and Mustard- Centers of origin, Distribution of species, Wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and qualities (physical, chemical, nutritional)

Module 5: Breeding Fodder and forage Crops (4Periods)

Fodders –Napier, Bajra, Sorghum, Maize and Berseem- Wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and qualities (physical, chemical, nutritional)

Module 6: Breeding of major commercial and Horticultural crops (5Periods)

Breeding Objectives, Procedures and Applications of various crop improvement programs in horticultural crops viz., Tomato, Potato Brinjal, Chillies, Lady's Finger, Cucumber, Chrysantemum, Marigold, Rose, Gerbera, Mango, Guava, Banana, Papaya- Wild relatives, Floral biology, Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, abiotic and biotic stress tolerance and qualities (physical, chemical, nutritional)

Total Periods: 32

EXPERIENTIAL LEARNING

LIST OF PRACTICALS

1. Floral biology and crossing techniques in wheat
2. Floral biology and crossing techniques in oat
3. Floral biology and crossing techniques in barley
4. Floral biology and crossing techniques in chickpea
5. Floral biology and crossing techniques in lentil
6. Floral biology and crossing techniques in field pea
7. Floral biology and crossing techniques in rapeseed and mustard
8. Floral biology and crossing techniques in sunflower
9. Floral biology and crossing techniques in safflower
10. Floral biology and crossing techniques in potato
11. Floral biology and crossing techniques in berseem
12. Floral biology and crossing techniques in suagrcane
13. Floral biology and crossing techniques in tomato
14. Floral biology and crossing techniques in onion
15. Handling segregating population
16. Visit to seed production and AICRP plots

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1 Singh, B.D. 2005. Plant breeding - Principles and methods. Kalyani Publishers, New Delhi.
2 David A.sleper and John Milton Poehlmen 2006. Breeding of Field Crops. ISBN : 978-981-16-9256-7

REFERENCE BOOKS:

1 D.N. Bharadwaj.2012. Breeding Field Crops. Agrobios (India), Jodhpur;ISBN: 9788177544749.
2 Chahal, G.S. and S.S.Gosal. 2002. Principles and Procedures of plant breeding: biotechnological and conventional Approaches. Narosa Publishing House (India)

ISBN: 978-81-7319-374-3

VIDEO LECTURES:

1 https://drive.google.com/file/d/1WbCKH2_ath9YkbpuYx8-bL9vbmWzljWc/view

2 chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rlbcau.ac.in/pdf/Agriculture/AGP-313%20Crop%20Improvement%20-%20II%20Rabi%20Crops.pdf

3 efaidnbmnnnibpcajpcglclefindmkaj/https://bscagristudy.online/wp-content/uploads/2021/09/GPB-355-PRINTED-LONG-NOTE-2.pdf

WEB RESOURCES:

1 https://www.cimmyt.org/

2 http://www.nbpgr.nic.in/

Course Code	Course Title	L	T	P	S	C
ENTO331	**PESTS OF CROPS AND STORED GRAIN AND THEIR MANAGEMENT**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overviewof symptoms, damage and seasonal incidence of agricultural, horticultural and storage pests, fundamental principles and components of insect pest management and importance of storage pest and management strategies to avoid losses.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Gain knowledge on different arthropods pests

CO2. Understand etiology of various arthropod pests of field crop, vegetable crop, fruit crops.

CO3. Understand etiology of various arthropod pests of plantation crops, field crop, vegetable crop, fruit crop.

CO4. Understand different factors effecting stored pest

CO5. Gain knowledge on Insect pests, mites, rodents, birds and microorganisms associated with stored grain

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	-	3	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	3	-	-
CO5	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	3	-	-
Course Correlation Mapping	**3**	**3**	**2**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Introduction about arthropods pest (02 Periods)

General account on nature and type of damage by different arthropods pests

Module 2: Etiology of various arthropod pests of field crop, vegetable crop, fruit crop. (05Periods)

Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of field crop, vegetable crop, fruit crop.

Module 3: Etiology of various arthropod pests of plantation crops, ornamental crops, spices and condiments. (06Periods)

Scientific name, order, family, host range, distribution, biology and bionomics, nature of damage, and management of major pests and scientific name, order, family, host range, distribution, nature of damage and control practice other important arthropod pests of various plantation crops, ornamental crops, spices and condiments.

Module 4: Effect of Abiotic factors in deterioration of grain (07Periods)

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Module 5: Insect pest associated with stored grains and principles of grain storage (07 Periods)

Insect pests, mites, rodents, birds and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage and fundamental principles of grain store management.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification of different types of damage.
2. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce of field Crops
3. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce of Vegetable Crops
4. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce Fruit Crops
5. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce of Gardens
6. Identification and study of life cycle and seasonal history of various insect pests

attacking crops and their produce of Plantation crops.

7. Identification and study of life cycle and seasonal history of various insect pests attacking crops and their produce ofNarcotics, spices & condiments

8. Identification of insect pests and Mites associated with stored grain

9. Determination of insect infestation by different methods

10. Assessment of losses due to insects

11. Calculations on the doses of insecticides application technique.

12. Fumigation of grain store / godown. Identification of rodents and rodent control operations in godowns

13. Identification of birds and bird control operations in godowns

14. Determination of moisture content of grain

15. Methods of grain sampling under storage condition

16. Visit to nearest FCI/CWC/SWC

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Khare and Bhale, Seed Technology, Scientific Publishers, New Delhi,2014.

2. Muthukrishnan, N., N. Ganapathy, R. Nalini and R. Rajendran, Pest Management in Horticultural Crops. New Madura Publishers, Madurai, 2005.

REFERENCE BOOKS:

1. Ragupathy, A. and R. Ayyasam, A Guide on crop pests. Namrutha Publications, Chennai, 2013.

2. Ranjeet Kumar, Insect pests of stored grain, Apple Academic press, Canada, 2017.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=RF1RGKqi1fw&list=PLg6dY4ATfXEsYDlHQ4GnqRTB_XMwVNZEN

2. https://www.youtube.com/watch?v=LewAQoqim2Y&list=PLg6dY4ATfXEsYDlHQ4GnqRTB_XMwVNZEN&index=2

3. https://www.youtube.com/watch?v=NScIc5Sx4co&list=PLg6dY4ATfXEsYDlHQ4GnqRTB_XMwVNZEN&index=3

WEB RESOURCES:

1. https://agrimoon.com/wp-content/uploads/Crop-Pests-and-Stored-Grain-Pests-and-Their-Management.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://agri-bsc.kkwagh.edu.in/uploads/department_course/ENT_353_Crop_Pests_Stored_Grain_Pests_and_Their_Management.pdf
3. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rlbcau.ac.in/pdf/Agriculture/APE%20322%20Pests%20of%20crops%20and%20stored%20grains%20and%20their%20management.pdf

Course Code	Course Title	L	T	P	S	C
SSAC122	**PROBLEMATIC SOILS AND THEIR MANAGEMENT**	2	-	-	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on the fundamentals of problematic soils and their management. The course provides a deep insight about the various concepts such as soil health, types of problematic soils, assessment of problematic soils by remote sensing and GIS technologies and bioremediation to improve soil fertility.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1 Understand the basic concepts soil health and quality.

CO2 Analyze the problematic soils and understand their reclamation.

CO3 Assessment of problematic soils by remote sensing and GIS technologies.

CO4 Understand bioremediation of soils through MPTs and improvement of soil fertility by different methods.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	-	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**1**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Soil Health and Types of problem soils (08 Periods)

Soil quality and health, Distribution of wasteland and problem soils in India, Their categorization based on properties.

Module 2: Reclamation of Problematic Soils (08 Periods)

Reclamation and management of soil physical and chemical constraints - like eroded soils, compacted soils, flooded soils, polluted soils; saline soils, sodic soils, acid soils and acid sulphate soils.

Module 3: Remote Sensing and GIS for Problem Soils (08 Periods)

Remote sensing and GIS in diagnosis and management of problem soils. Irrigation water – quality and standards. Utilization of saline water in agriculture.

Module 4: Bioremediation of Problematic Soils (08 Periods)

Multipurpose tree species, bioremediation of soils through MPTs, land capability classification, land suitability classification. Problematic soils under different agroecosystems.

***Total Periods:*32**

RESOURCES

TEXT BOOKS:

1. Problematic soils and Their Management by D.K. Das, Kalyani Publishers
2. Soil Technology by G.L. Maliwal, L. L. Somani, Agrotech Publications.

REFERENCE BOOKS:

1. Soil Resource Inventory & Management of Problematic Soils by P.P. Mahendra, S. Pandian, P. Balasubramanian, A. Saravanan, Agrotech Publishing Academy.
2. Introductory Soil Science by Dilip Kumar Das, Kalyani Publications, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=sN8sVZno1CY&list=PLvSukZ-l0KuNiOpk1xd1DM71SvKoyE4dM
2. https://www.youtube.com/watch?v=EnCpia7g39I&list=PLg6dY4ATfXEvU97TCzOwv25-4NMdSOl1X

WEB RESOURCES:

1. https://www.fao.org/soils-portal/soil-management/management-of-some-problem-soils/en/
2. https://journalsofindia.com/problem-soils/

Course Code	Course Title	L	T	P	S	C
ENTO231	**MANAGEMENT OF BENEFICIAL INSECTS**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to impart knowledge on the importance of beneficial insects and their characteristics, Mulberry cultivation and silkworm rearing using innovative techniques, Bee keeping techniques and mass culturing of predators and parasitiods.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. To know the importance of beneficial insects, morphology, biology and behaviour of beneficial insects

CO2. To get knowledge on bee pasture, foraging and pollinators

CO3. To acquire knowledge on rearing of silk worms with innovative techniques

CO4. To get awareness about lac insect production

CO5. To get expertise in importance and uses of predators and parasitoids

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	1	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	2	-	2	-	-	-	-	-	3	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	3	-	1	-	-	-	-	-	3	-	-
CO5	3	3	-	3	-	1	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Importance of beneficial insects (04 Periods)

Importance of beneficial Insects, Beekeeping and pollinators, bee biology, commercial methods of rearing, equipment used, seasonal management, bee enemies and disease.

Module 2: Bee pasturage, foraging, diseases and role of pollinators (02Periods)

Bee pasturage, bee foraging and communication. Insect pests and diseases of honeybee. Role of pollinators in cross-pollinated plants.

Module 3: Silk worm rearing and cultivation of mulberry (04 Periods)

Types of silkworms, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

Module 4: Lac insects (02 Periods)

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products.

Module 5: Uses and importance of Parasitoids and predators and (04 Periods)

Identification of major parasitoids and predators commonly being used in biological control. 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

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1	Honey bee species, castes of bees
2	Beekeeping appliances and seasonal management
3 & 4	Bee enemies and diseases
5 & 6	Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves
7 & 8	Species of lac insect, host plant identification

9 & 10	Identification of other important pollinators, weed killers and scavengers
11	Visit to research and training institutions devoted to beekeeping
12	Visit to research and training institutions devoted to sericulture
13	Visit to research and training institutions devoted to lac culture and natural enemies
14 & 15	Identification and techniques for mass multiplication of natural enemies
16	Visit to orchards and gardens

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. David B. Vasanthraj. Elements of Economic Entomology (1975)
2. K.N. Ragumoorthi, V. Balasubramani, M.R. Srinivasan, Natarajan. Insecta An Introduction. AE Publications (2014)

REFERENCE BOOKS:

1. M. Madan Mohan Rao. An Introduction to Sericulture (2019), B.S. Publications
2. Dr. Ashok Kumar Koshariya (Author), Dr. Somnath Maruti Jadhav, Management of beneficial insects, interative international publishers, 2021.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=rAQM-pF3mvk&list=PLg6dY4ATfXEuPmrc-sd8vLaN5R-cjDyUD
2. https://www.youtube.com/watch?v=aVUX0KsWBog&list=PLg6dY4ATfXEuPmrc-sd8vLaN5R-cjDyUD&index=2
3. https://www.youtube.com/watch?v=Dq5dDw9dVcQ&list=PLg6dY4ATfXEuPmrc-sd8vLaN5R-cjDyUD&index=3

WEB RESOURCES:

1. www.rlbcau.ac.in/pdf/Agriculture/APE%20323%20Management%20of%20beneficial%20insects.pdf
2. https://bscagristudy.online/wp-content/uploads/2021/04/ENTO-365-PRINTED-LONG-NOTE.pdf

EXTN391 **INTELLECTUAL PROPERTY RIGHTS 1 - 0 - 1**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview of the Individual's rights to protect/patent inventions obtained in the process of project work, Strategies to register inventions/designs, in India and abroad, Patenting, copyright, trademark, designs and information Technology Act.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand about intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO

CO2. Gain knowledge on types of Intellectual Property and legislations covering IPR in India

CO3. Understand Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders' rights, Registration of plant varieties under PPV&FR Act 2001.

CO4. Gain knowledge on Traditional knowledge-meaning and rights of TK holders, Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

B.Sc. (Hons) Agriculture

Module 1: Treatise for IPR protection (01 Periods)

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.

Module 2: Types of IPR (05 Periods)

Types of Intellectual Property and legislations covering IPR in India: -Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. 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.

Module 3: History of UPOV and different types of registration of plant varieties (05 Periods)

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, Plant breeders' rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights.

Module 4: Traditional knowledge on biological diversity, ITPGRFA, its salient features. (05 Periods)

Traditional knowledge-meaning and rights of TK holders. 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.

Total Periods:16

RESOURCES

TEXT BOOKS:

1. V K Ahuja, "Law Relating to Intellectual Property Rights", 2017.

2. R Radhakrishnan and S Balasubramanian, "Intellectual Property Rights: Text and Cases", 2008.

REFERENCE BOOKS:

1. Venkatraman, An Introduction to Intellectual Property Rights, 2012.

2. Dr. B.L. Wadehra Law relating to Intellectual Property, Universal Law Publishing Co, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=4PzOdMSvxW0

2. https://www.youtube.com/watch?v=VzIgPfAd0Fs

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://hau.ac.in/public/pages-pdf/1548828324.pdf
2. efaidnbmnnnibpcajpcglclefindmkaj/https://www.ramauniversity.ac.in/online-study-material/agriculture/bsc/vsemester/intellectualpropertyrights/lec%201.pdf

Course Code	Course Title	L	T	P	S	C

AGRO104 ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT **2 - 1 - 3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of disaster management. The course provides a deep insight into various concepts such as the importance of natural resources, ecosystems, biodiversity & conservation, environmental pollution, solid waste management, social issues, environmental ethics, human population, manmade disasters and their management.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand various natural resources and their importance on the existence and survival of life on the Earth, and also understand various problems and disasters associated with misuse and abuse of these natural resources and environment, and injudicious management of ecosystems and biodiversity.

CO2. Analyze different types/forms of environmental pollutionand their effect on the Earth, plants and animal lives, also assessing the ill-effects of solid waste and their causes, for effective control measures for a sustainable environment.

CO3. Identification of social issues related to the environment by humans and awareness related to environment.

CO4. Understand the population explosion on the environment and human health.

CO5. Understand various natural and manmade disasters and their management practices.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes					
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO 2	PSO 3	PSO 4	PSO5	PSO6
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-	-

CO5	3	3	-	2	-	-	-	-	-	3	-	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Natural Resources,Ecosystems, Biodiversity, and its conservation. (06 Periods)

Natural Resources: Renewable and non-renewable resources, Natural resources and associatedproblems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timberextraction, mining, dams and their effects on forest and tribal people. b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. e) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources. Case studies. f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. · Equitable use of resources for sustainablelifestyles.

Module 2: Environmental Pollution and Solid Waste Management (06 Periods)

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in the ecosystem. Ecological succession, Food chains,food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries. Biodiversity and its conservation: - Introduction, definition, genetic, species & ecosystem diversity and biogeographical classification of India. Value of biodiversity: consumptive use,productive use, social, ethical, aesthetic and option values. Biodiversity at global, National andlocal levels, India as a mega-diversity nation. Hot-sports 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.

Module 3: Environmental pollution their prevention methods (06 Periods)

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.

Module Social issues, environment and waste land (06

4: reclamations Periods)

Social Issues and the Environment: From Unsustainable to Sustainable development, Urban
problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act.Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness.

Module 5: Human population and the environment (08 Periods)

Population growth, variation among nations,population explosion, Family Welfare Programme. Environment and human health: HumanRights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technologyin Environment and human health.

Total Periods:32

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Collection, processing and storage of effluent samples
2. Determination of chemical oxygen demand in waste water sample
3. Estimation of dissolved oxygen in waste water sample
4. Determination of total dissolved solids in waste water sample
5. Analysis of temporary hardness of waste water sample by titration
6. Analysis of total hardness of waste water sample by titration
7. Preparation of sludge / waste water sample for analysis of heavy metals
8. Estimation of heavy metals in sludge / waste water by Atomic Adsorption Spectrophotometer (AAS)
9. Determination of sound level by using sound level meter
10. Estimation of species abundance of plants
11. Estimation of respirable and non – respirable dust in air by using dust sampler
12. Study of transpiration and water balance in plants
13. Assessment of chlorophyll content in plants
14. Visit to in-situ or ex-situ conservation center / Social Service Organization / Environmental Education Centre

15. Information and Communication Technology (ICT) in Environmental Science

16. Visit to a local polluted site – observations and remedial measures

RESOURCES

TEXT BOOKS:

1. Ahluwalia VK & Malhotra S. 2006. Environmental Science. Ane Books India.

2. Anjaneyulu Y. 2004. Introduction to Environmental Science. BS Publications.

3. Chauhan AS. 2009. Environmental Studies. 3rd Edition. Jain Brothers.

REFERENCE BOOKS:

1. Das RC & Behera DK. 2008. Environmental Science - Principles and Practice. I
–Hall of India Pvt Ltd.

2. GS & Kukal SS. 2005. Essentials of Environment Science. Kalyani Publishers.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=C9VFsrt4YPc&list=PL9AUXQTZw3SvT4H9J
Etg9dlWaTa7
2. https://www.youtube.com/watch?v=PwmSa09Cl6E&list=PL9AUXQTZw3SvT4H
8Etg9dlWaTa7&index=2
3. https://www.youtube.com/watch?v=RE2I_7M7Pi8&list=PL9AUXQTZw3SvT4H9
Etg9dlWaTa7&index=3
4. https://www.youtube.com/watch?v=n3VTOwqT_RI&list=PL9AUXQTZw3SvT4H
8Etg9dlWaTa7&index=4

WEB RESOURCES:

1. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/EVS-DM-E-Materi

2. http://www.jnkvv.org/PDF/210420201313252042018l1.pdf

3. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/EVS-DM-E-Materi

Course Code	Course Title	L	T	P	S	C
PATH371	**PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview various category of economically important pest and diseases, the principles and methods of detection and diagnosis of pest and diseases and Integrated Pest and Disease Management practices

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts, importance, history and principles of IPM

CO2. Gain knowledge on methods of diagnosis and detection of insect pest and diseases

CO3. Acquire adequate knowledge on control methods on pest and disease management

CO4. Understand the conventional pest and disease management

CO5. Gain knowledge on importance and implementation of IPM

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO 5
CO1	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	1	-	-	3	3	-	-	-	3	-	-
CO6	3	3	-	-	-	-	3	3	-	-	-	3	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: **Introduction, importance and concepts of** **(08**

IPM **Periods)**

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis.

Module 2: Detection and diagnosis of insect pest and diseases, EIL and ETL **(04 Periods)**

Methods of detection and diagnosis of insect pest and diseases. Calculation and dynamics of economic injury level and importance of Economic threshold level

Module 3: Control methods for pest and disease management **(08 Periods)**

Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment. Introduction to conventional pesticides for the insect pests and disease management.

Module 4: Conventional pesticide and disease management **(04 Periods)**

Introduction to conventional pesticides for the insect pests and disease management. Survey surveillance and forecasting of Insect pest and diseases. Development and validation of IPM module.

Module 5: Importance and Implementation of IPM **(08 Periods)**

Implementation and impact of IPM (IPM module for Insect pest and disease. Safety issues in pesticide uses. Political, social and legal implication of IPM. Case histories of important IPM programs. Case histories of important IPM programs.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Methods of diagnosis and detection of various insect pests, and plant diseases
2. Methods of insect pests and plant disease measurement
3. Assessment of crop yield losses
4. Calculations based on economics of IPM
5. Identification of biocontrol agents
6. Different predators and natural enemies

7. Mass multiplication of *Trichoderma, Pseudomona*s, *Trichogramma*, NPV etc.

8. Identification and nature of damage of important insect pests and diseases and their management

9. Identification and nature of damage of important insect pests and diseases and their management

10. Crop (agro-ecosystem) dynamics of a selected insect pest and diseases

11. Plan & assess preventive strategies (IPM module) and decision making

12. Crop monitoring attacked by insect, pest and diseases

13. Awareness campaign at farmers' fields

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Singh, Integrated Pest Management: Principles and Applications, Vol. 1: Volume 1: Principles, CBS HB, 2005
2. D.V. Bhagat, Integrated Pest Management,

   HSBC,2018

REFERENCE BOOKS:

1. Prem Kishore, Dictionary of Integrated Pest Management: Insect Disease And Week Management, Westvill Publishing House, 2004.
2. Edward B. Radcliffe (Editor), Rafael E. Cancelado (Editor), Integrated Pest Management: Concepts, Tactics, Strategies and Case Studies, Cambridge University Press, 2017

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ITUJZU6gtNg&list=PL9NKTtgDSTn1cl7Kl422eRxnbM6BiY8fE
2. https://www.youtube.com/watch?v=sr9VsXEWbtw&list=PL9NKTtgDSTn1cl7Kl422eRxnbM6BiY8fE&index=2

WEB RESOURCES:

1. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/Lecture-Notes-IPDM.pdf

2. niphm.gov.in/Recruitments/ASO-Pathology.pdf

Course Code	Course Title	L	T	P	S	C
EC301	**FUNDAMENTALS OF FOOD TECHNOLOGY AND PROCESSING** 2 (1+1)	1	-	1	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course provides theoretical and practical knowledge on the basic principles of Food Technology and Food Processing. It covers the composition and properties of major food groups, changes occurring during processing, and the importance of preservation methods. Students will learn about primary and secondary food processing operations, unit operations, and common processing techniques used for cereals, pulses, fruits, vegetables, milk, meat, and bakery products. The course also introduces food quality parameters, food additives, product development basics, and the role of processing in enhancing shelf life, safety, and nutritional value. Emphasis is given to understanding the technological aspects, equipment used, and industrial applications.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1	To understand the fundamental concepts, components, and scope of Food Technology
CO2	To understand the basic principles and unit operations involved in food processing
CO3	To understand different food preservation methods and their impact on product quality
CO4	To understand the processing technologies of major food groups such as cereals, fruits, vegetables, milk, and meat
CO5	To understand the role of food additives, product development basics, and factors affecting food quality and shelf life

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	3	2	-	-	1	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	3	-	2	3	-	3	-	-	-	3
CO3	2	2	-	2	2	-	-	-	-	-	-	2	-	3
CO4	3	3	3	-	3	-	-	-	-	2	-	-	-	3
CO5	3	2	3	-	2	-	-	-	-	-	2	-	-	3
Course correlation mapping	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**3**

Correlation Levels: ***3: High;*** ***2: Medium; 1: Low***

COURSE CONTENT

B.Sc. (Hons) Agriculture

Module 1:	**Food and its function**	***(3 periods)***
Food and its function, physico-chemical properties of foods, food preparation techniques, nutrition, relation of nutrition of good health. Characteristics of well and malnourished population. Energy, definition, determination of energy requirements, food energy, total energy needs of the body		
Module 2:	**Mineral nutrition**	***(3 periods)***
Mineral nutrition: macro and micro-minerals (Ca, Fe and P), function, utilization, requirements, sources, effects of deficiency. Vitamins: functions, sources, effects of deficiency, requirements of water soluble and fat-soluble vitamins.		
Module 3:	**Balanced diet**	***(3 periods)***
Balanced diet: recommended dietary allowances for various age groups, assessment of nutritional status of the population.		
Module 4	**Preservation**	***(3 periods)***
Preservation by sugar and chemicals, candies, crystallized fruits, preserves chemical preservatives, preservation with salt and vinegar, pickling, chutneys and sauces, tomato and mushrooms, freezing preservation		
Module 5:	**Processing**	***(4 periods)***
Processing of plantation crops, products, spoilage in processed foods, quality control of processed products, Govt. policy on import and export of processed fruits. Food laws.		
		Total Periods: 16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
17.	Equipments used in food processing units
18.	Physico-chemical analysis of fruits and vegetables
19.	Water chemical quality analysis
20.	Preparation of NA Media
21.	Preparation of PDA Media
22.	Microbiological examination of different food samples.
23.	Assessment of surface sanitation by swab
24.	Assessment of surface sanitation by rinse method.
25.	Assessment of personal hygiene
26.	Microbial techniques for identification of bacteria

27.	Biochemical tests for identification of bacteria
28.	Scheme for the detection of food borne pathogens
29.	Preparation of plants for Implementation of FSMS-HACCP
30.	Preparation of plants for Implementation of ISO:22000.
31.	Planning diet for various age groups
32.	Visit to processing units

TEXT BOOKS:	
1	Text book of Food Science and Technology: Avantina Sharma
2	Handbook of Food Safety: D.S.L. Khatekar and N. Sarkate. Step Up Academy, 576p.
REFERENCE BOOKS:	
1	Food safety and Quality Control: Pulkit Mathur. The Orient Blackswan.332p.
2 Safe Food Handling: HACCP booklet for Food Handlers. Cletus Fernandes, Notion Press	
VIDEO LECTURES:	
1.	https://www.youtube.com/@fssai_india
2.	https://www.youtube.com/watch?v=kd4eJsgABWA
Web Resources:	
1	https://onlinelibrary.wiley.com/journal/20487177
2	https://www.tandfonline.com/journals/iijf20

Course Code	Course Title	L	T	P	S	C
HORT381	PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAPS, AND LANDSCAPING	1	-	1	-	2

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course is designed to provide an overview of the fundamentals of Production Technology for ornamental crops, medicinal and aromatic plants, and landscaping. The course provides deep insight into various concepts such as cultivation Practices of Various ornamental crops, medicinal and aromatic plants along with knowledge about landscaping.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of production techniques of ornamental crops, medicinal and aromatic plants, and landscaping.

CO2. Importance and scope of ornamental crops, medicinal and aromatic plants, and landscaping. Principles of landscaping. Landscape uses of trees, shrubs, and climbers.

CO3. Cultivation of important cut flowers under protected conditions and cultivation under open conditions.

CO4. Cultivation of major medicinal and aromatic plants. And study of processing and value addition in ornamental crops and MAPs produce.

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Importance and scope (01 Periods)

Importance and scope of ornamental crops, medicinal and aromatic plants, and landscaping. Principles of landscaping. Landscape uses of trees, shrubs, and climbers.

Module 2: Production technology of cut flowers (05Periods)

Production technology of important cut flowers like rose, gerbera, carnation, lilium and orchids under protected conditions and gladiolus, tuberose, chrysanthemum under open conditions

Module 3: Production technology of loose flowers and medicinal plants (05 Periods)

Production technology for loose flowers like marigold and jasmine under open conditions. medicinal plants like ashwagandha, asparagus, aloe, costus, Cinnamomum, periwinkle, isabgol.

Module 4: Crop production techniques of major aromatic plants (05 Periods)

Production technology for aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver. Processing and value addition in ornamental crops and MAPs produce.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification of ornamental plants.
2. Identification of Medicinal and Aromatic Plants.
3. Nursery bed preparation and flower seed sowing.
4. Training and pruning of roses.
5. Planning and layout of ornamental garden.
6. Bed preparation and planting of Medicinal and Aromatic Plants.
7. Protected structures – Care and maintenance.
8. Intercultural operations in flowers crops.
9. Intercultural operations in Medicinal and Aromatic plants.
10. Harvesting and post harvest handling of cut and loose flowers.
11. Floral preservatives to prolong vase-life of cut flowers.

12. Drying / dehydration techniques for flower drying.

13. Processing of Medicinal and Aromatic Plants.

14. Extraction of essential oils.

15. Visit to commercial flower unit.

16. Visit to commercial MAP unit

RESOURCES

TEXT BOOKS:

1. Chattopadhyay, S.K. 2007.Commercial Floriculture. Gene-Tech Books, New Delhi
2. Srivastava, H.C.2014. Medicinal and Aromatic Plants. ICAR, New Delhi.
3. Kumar, N., Abdul Khader, J.B.M, Rangaswamy, P and Irulappan, I. 2004. Introduction to Spices, Plantation Crops, Medicinal and Aromatic Crops. Oxford and IBH publishing Co, New Delhi
4. Handbook of Horticulture Crops. M.S. Dhaliwal, Kalyani Publishers. Ludhiana, 2008.

REFERENCE BOOKS:

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.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=CC-rBOPbS00
2. https://www.youtube.com/watch?v=lB3UCE9TmZw
3. https://www.youtube.com/watch?v=Gu8WkUe_n_w
4. https://www.youtube.com/watch?v=doqPC5SGinU

WEB RESOURCES:

1. https://coabnau.in/uploads/1644384426_Hort4.4Theorynotes.pdf
2. https://jru.edu.in/studentcorner/lab-manual/agriculture/Production%20Technology%20for%20Ornamental%20Crops,%20Maps%20and%20Landscaping.pdf
3. https://courseware.cutm.ac.in/courses/production-technology-for-ornamental-crops-maps-and-landscaping/
4. https://www.agrimly.in/2020/08/production-technology-for-ornamental.html

Course Code	Course Title	L	T	P	S	C
AECO341	ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION	1	-	1	-	2

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course is designed to provide an overview on the concepts of entrepreneur, SWOT, entrepreneurship development, economic reforms, business leadership skills, organizational skills, managerial skills, Problem solving skill, The course also provides insights into various concepts such as supply chain management, total quality management, project planning and report preparation, financing enterprises, opportunities for agri-entrepreneurship and rural enterprises.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the basic concepts of entrepreneur, SWOT.

CO2. Gain knowledge about economic reforms, business leadership skills, organizational skills, managerial skills, Problem solving skill.

CO3. Understand the supply chain management, total quality management, project planning and report preparation.

CO4. Understand the financing enterprises, opportunities for agri-entrepreneurship and rural enterprises.

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Entrepreneurship and SWOT (04 Periods)

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation.

Module 2: Government policy, institutions and reforms (04Periods)

Government policy and programs and institutions for entrepreneurship development, Impact of economic reforms on Agribusiness/ Agrienterprises.

Module 3: Entrepreneurial skills development process (04Periods)

Entrepreneurial Development Process; Business Leadership Skills; Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication, direction and motivation Skills). Problem solving skill.

Module 4: Supply chain and quality management (04Periods)

Supply chain management and Total quality management, Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri-entrepreneurship and rural enterprise.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Assessment of entrepreneurial traits among entrepreneurs
2. Improving management skills (The perfect employee)
3. Improving management skills (The pros and cons)
4. Improving management skills (perfectionism myth)
5. Understanding contextual achievement motivation scale (CAMS)
6. Exercise on creativity
7. Studying time audit through planning using Ivy Lee's time efficiency hacking technique
8. Prioritizing time using Stephen Covey's four quadrant system
9. Monitoring viability of an enterprise
10. Preparation of report based on two records, qualitative and quantitative
11. Identification and selection of business idea

12. Preparation of business plan and proposal writing

13. Preparation of project proposal for the mushroom

14. Preparation of business plan for your idea and proposal writing

15. Visit to entrepreneurship development institute

16. Preparation of tour report on the visit to the entrepreneurs in the locality

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Benjamin MC Donald P, Investment Projects in Agriculture- Principles and Case studies. Longman Group Limited. Essex. UK, 1985.
2. Chole, R. R. Entrepreneurship Development and Communication skills, Scientific publishers, Jodhpur, 2012.

REFERENCE BOOKS:

1. Gittiner, J P., Economic Analysis of Agricultural Projects, The John Hopkins University Press Baltimore, USA, 1982.
2. Hopkins J A and Baker C B Danville, Financial Management in Agriculture, 6th ed Barry P J, IL Interstate Publishers.2009.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=GfWsGN7xNI4
2. https://www.youtube.com/watch?v=qxdoMTJHU0g

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=303
2. https://agrimoon.com/entrepreneurship-development-and-communication-skill/

Course Code	Course Title	L	T	P	S	C
AH301	**LIVESTOCK AND POULTRY MANAGEMENT**	**3**	**-**	**1**	**-**	**4**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide the students with holistic knowledge aboutthe livestock and poultry management so that it can be applied at field level, handsontraining about livestock, poultry-based farming and preparation of dairy products, impartknowledge and latest technologies adopted in livestock industries to infuse entrepreneurial attitude among the students.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Gain knowledge on history of livestock and poultry management in India

CO2. Understand dairy cattle management

CO3. Gain knowledge on modern rearing practices of sheep and goat for meat and milk production

CO4. Gain knowledge on management practices of swine, broiler and layer farming for egg and meat production

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: ***3: High*** ***2: Medium*** ***1: Low***

COURSE CONTENT

Module 1: Introduction to Livestock and Poultry Management **(08 Periods)**

Significance of Livestock and Poultry in Indian Economy – Livestock and Poultry census – Different livestock development programs of Government of India - Zoological classification of livestock and common nomenclatures used in Animal Husbandry practices - Various systems of livestock rearing – extensive - semi intensive -intensive-farming systems - mixed- integrated and specialized farms.

Module 2: Dairy Cattle Management (08Periods)

Breeds – Classification – Breed characteristics – Red Sindhi, Gir, Sahiwal, Tharparkar, Kangayam-exotic-Jersey- Holstein Friesian-Buffalo breeds- Murrah- Surti and Toda - Breeding - Cross breeding- Upgrading - Economic traits– Culling - Estrus Cycle – Artificial Insemination – Housing – floor space requirement for young and adult stock – systems of housing - Care and management of calf, heifer, pregnant and lactating cows – Nutrition – ration – balanced ration - characteristics of ration and classification of feed and fodder – Milking methods - Factors affecting composition of milk - Clean milk production – Pasteurization of milk – Prophylactic and control measures of diseases.

Module 3: Sheep and Goat Management (08Periods)

Breeds - Classification - Economic traits - Systems of rearing – Housingmanagement – Floorspace requirement – Care and management of young and adult stock – Nutrition – Feed and fodder – Flushing – Steaming up - Prophylactic and control measures of diseases.

Module 4: Swine Management and Poultry management (08Periods)

Breeds – Classification – Economic traits - Housing - Nutrition – creep feeding – Care and management of young and adult stock –Prophylactic and control measures of diseases. Breeds – Classification - Commercial strains of broiler and layer – Housing – deep litter and cage system – Brooding – Litter management – Care and management of broiler and layer - Nutrition of chick, grower, layer and broiler – Feed conversion ratio -Prophylactic and control measures of diseases.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

18. Study of external parts of cattle
19. Common methods of restraining in cattle
20. Identification methods of livestock
21. Disbudding and deworming in cattle
22. Determination of age in cattle
23. Study and design of cattle shed
24. Selection of dairy cow by score card method
25. Determination of weight in cattle
26. Determination of specific gravity in milk
27. Demonstration of fat percentage and total solids estimation in milk
28. Demonstration of cream separation

29. Demonstration of ice cream making

30. Identification of feed and fodder

31. Identification of poultry farm equipment's

32. Measures of performance efficiency in broiler and layer

33. Visit to dairy plant, layer and broiler farms

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Gopalakrishnan, C.A and G.M.M, Lall Livestock and Poultry enterprises for rural development, Vikas Publishing House, UP, 1993.
2. Hafez,E.S.E Adaptation of animals, Lea & Febiger, Philadelphia, 1968.

REFERENCE BOOKS:

1. Handbook of Animal husbandry, ICAR, New Delhi, 2002.
2. Ranjan, S.K., Agro Industrial by products and Non-conventional feeds for livestock feeding , ICAR, New Delhi, 1990,

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ycbptlAOYrE
2. https://www.youtube.com/watch?v=xSX5F-IAoAY&list=PLITE3dCbq-vZGJtNSC-f8X1bTEV04iJ1H

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.mrveterinarycollege.edu.in/downloads/files/n5e327ec526cc5.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.researchgate.net/profile/M-Bojiraj/publication/321161489_LIVESTOCK_AND_POULTRY_PRODUCTION_MANAGEMENT/links/5a1288b20f7e9bd1b2c1123b/LIVESTOCK-AND-POULTRY-PRODUCTION-MANAGEMENT.pdf

Course Code	Course Title	L	T	P	S	C
EC383	**PROTECTED CULTIVATION**	**2**	**-**	**1**	**-**	**3**

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course introduces students to the basics of protected cultivation, including its importance, types of structures like polyhouses and greenhouses, and their use in growing high-value crops. Students will learn about climate control, nursery raising, drip irrigation, fertigation, and hydroponics. The course also covers crop management practices and the economics of protected farming, with practical sessions and field visits to enhance hands-on learning.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO28. Understand the concept, scope, and significance of protected cultivation in the Indian and global context.

CO29. Identify and differentiate various types of protected structures and construction materials used.

CO30. Measure and interpret microclimatic parameters and implement climate control mechanisms.

CO31. Apply scientific crop management techniques including nursery raising, fertigation, IPM, and hydroponics under protected environments.

CO32. Analyze the cost economics and value chain of crops cultivated under protected structures.

CO-PO-PSO Mapping Table:

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	2	2	-	-	-	-	3	-	-	-	-
CO2	3	3	2	3	2	-	-	-	-	3	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	3	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	3	2	-	-	-
CO5	2	3	3	3	3	-	-	-	-	3	2	2	-	-

Correlation Levels: (3 – High, 2 – Medium, 1 – Low, - – Not mapped)

Course content

Module 1 Introduction to Protected Cultivation (04 periods)

Definition, scope, importance, and global/national scenario. Advantages and limitations of protected cultivation. Status and potential in India.

Module 2 Types of Protected Structures (08 periods)

Polyhouses (low, medium, and high-tech), Greenhouses (naturally ventilated, fan-pad, and controlled environment), Net houses, shade net houses, poly tunnels, walk-in tunnels, and insect-proof net houses. Design and construction materials.

Module 3 Environment and Climate Control (08 periods)

Microclimate parameters: light, temperature, humidity, and CO_2. Heating and cooling systems, Ventilation and shading, Sensors and automation systems. Soil preparation and management,

Substrate management. Types of benches and containers.

Module 4 Crop Management under Protected Cultivation (08 periods)

Nursery raising of vegetables and flowers, Cultivation practices for tomato, capsicum, cucumber, rose, gerbera, and chrysanthemum, Hydroponics and soilless culture, Fertigation, irrigation, IPM, and nutrient management. Off-season production of flowers and vegetables. Insect pest and disease management.

Module 5 Economics of protected cultivation (04 periods)

Cost economics of high-value crops in protected cultivation, Marketing, and value chain.

Total periods:32

EXPERIENTIAL LEARNING
LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification and study of different types of protected structures.
2. Study of construction materials for greenhouses and polyhouses.
3. Layout planning and design of low-cost and medium-cost polyhouse/net house.
4. Study of shading materials and their effect on crop growth in protected structures.
5. Measurement of microclimatic parameters in protected structures.
6. Study of the operation of drip irrigation systems in a polyhouse.
7. Study of fertigation systems and preparation of fertigation schedules.
8. Study about the raising of nursery seedlings using pro-trays and soilless media.
9. Study of intercultural operations in polyhouses
10. Staking operations in high-value crops in greenhouses.
11. Study of Soil EC and pH measurement in polyhouses
12. Study of biological and mechanical pest control methods.
13. Study the hydroponic system setup in the greenhouse/polyhouse.
14. Study of the harvesting and yield estimation of high-value crops.
15. Economic analysis of crops cultivated under protected structures.
16. Visit to a commercial protected cultivation unit and report preparation.

RESOURCES / STUDY MATERIALS

TEXT BOOKS

1. Singh, B. (2014). *Protected Cultivation of Horticultural Crops*. Kalyani Publishers.
2. Reddy, S. M. (2019). *Greenhouse Technology and Management*. Scientific Publishers.
3. Raviv, M., & Lieth, J. H. (2008). *Soilless Culture: Theory and Practice*. Elsevier.
4. Sharma, V. P. (2012). *Protected Cultivation for Food and Nutritional Security*. Daya Publishing House.
5. Rajasekar, M., Arumugam, T., & Kumar, T. S. (2010). *Protected Cultivation of Horticultural Crops*. New India Publishing Agency.

VIDEO LECTURES/WEB SOURCES:

1. ICAR-IARI Protected Cultivation Series
   https://www.iari.res.in
2. YouTube – ICAR-IARI Division of Protected Cultivation
   https://www.youtube.com/@IARIofficial
3. E-Learning Portal of MANAGE, Hyderabad
   https://elearning.manage.gov.in
4. National Horticulture Board – Protected Cultivation Guidelines
   http://nhb.gov.in
5. YouTube Channel – AgriTech Guruji
   Practical greenhouse videos: https://www.youtube.com/@AgriTechGuruji

6. TNAU Agritech Portal – Greenhouse Technology
   http://agritech.tnau.ac.in

B.Sc. Hons. (Agri) – VI Semester

S.	Course Code	Course Title	Contact Periods

No.			per Week			
			L	T	P	Total
1.	AGRO304	Rainfed Agriculture and Watershed Management	1	-	1	2
2.	AGRO305	Practical Crop Production –II (Rabi crops)	0	-	2	2
3.	AGRO306	Principles of Organic Farming	1	-	1	2
4.	EXTN392	Communications Skills and Personality Development	1	-	1	2
5.	AECO342	Farm Management, Production and Resource Economics 2(1+1)	1	-	1	2
6.	AENG351	Protected Cultivation and Secondary Agriculture	1	-	1	2
7.	PATH372	Diseases of Field and Horticultural Crops and Their Management - II 3(2+1)	2	-	1	3
8.	HORT382	Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)	1	-	1	2
9.	FN301	Principles of Food Science and Nutrition 2(2+0)	2	-	-	2
10.	EC302	Fundamentals of Animal Product Technology	2	-	1	3
Total			**12**	**-**	**10**	**22**

Course Code	Course Title	L	T	P	S	C
AGRO304	**RAINFED AGRICULTURE AND WATERSHED MANAGEMENT**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to Systems of rainfed agriculture, land suitability, and farming practices in rainfed regions, Adaptation and mitigation strategies, crop planning and crop management techniques and the concepts, principles and components of water conservation and management

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand sustainable agriculture practices under rainfed conditions

CO2. Remember soil and climatic conditions of rainfed areas

CO3. Formulate contingent water planning for aberrant weather conditions

CO4. Apply knowledge of different water conservation methods and effective water utilization through use of watershed management

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Rainfed Agriculture (04 Periods)

Rainfed agriculture: Introduction, types, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India

Module 2: Soil and water harvesting techniques (04 Periods)

Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques, Drought: types, effect of water deficit on physio-morphological characteristics of the plants, Crop adaptation and mitigation to drought

Module 3: Water Harvesting (04 Periods)

Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

Module 4: Contingent crop planning for aberrant weather conditions (04 Periods)

Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Studies on climate classification, studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.
2. Studies on cropping pattern of different rainfed are as in the country and demarcation of rainfed area on map of India.
3. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops
4. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation
5. Studies on cultural practices for mitigating moisture stress.
6. Characterization and delineation of model watershed.
7. Field demonstration on soil & moisture conservation measures
8. Field demonstration on construction of water harvesting structures
9. Visit to rainfed research station/watershed.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Dhruva Narayana, Soil and Water Conservation Research in India, ICAR, New Delhi, 1993.
2. Rayees Ahmed, Rainfed Agriculture and Watershed Management, Kushal Publications, 2017.

REFERENCE BOOKS:

1. Suresh, Soil and Water Conservation Engineering, New Delhi, 2016
2. Ranjan, S.K., Agro Industrial by products and Non-conventional feeds for livestock feeding, ICAR, New Delhi, 1990,

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ycbptlAOYrE
2. https://www.youtube.com/watch?v=xSX5F-IAoAY&list=PLITE3dCbq-vZGJtNSC-f8X1bTEV04iJ1H

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.mrveterinarycollege.edu.in/downloads/files/n5e327ec526cc5.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.researchgate.net/profile/M-Bojiraj/publication/321161489_LIVESTOCK_AND_POULTRY_PRODUCTION_MANAGEMENT/links/5a1288b20f7e9bd1b2c1123b/LIVESTOCK-AND-POULTRY-PRODUCTION-MANAGEMENT.pdf

Course Code	Course Title	L	T	P	S	C
AGRO305	**PRACTICAL CROP PRODUCTION – II (RABI CROPS)**	**0**	**-**	**2**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overviewknowledge about cultivation of rabi crop in different ecosystem, Students will acquire skill on different nursery techniques, trained to treat the seeds with biofertilizers and fungicides, aware about different methods of planting techniques, and learn about harvesting methods and processing

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO2. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	-	-	-	-	-	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of rabi crop ecosystems, climate, weather, seasons and varieties of Andhra Pradesh

2. Acquiring skills in selection of nursery area and preparation of different types of nurseries.

3. Acquiring skills in seed treatment, seed soaking and incubation, nursery sowing and management and calculation of seed requirement.

4. Study and practice of main field preparation and bio-fertilizer application in rabi crop
5. Study of different growth stages of rabi crop.
6. Study and practice of transplanting techniques in rabi crop
7. Study of methods of planting in rabi crop
8. Bio- metric observations and estimation of plant population and acquiring skills in cultural operations.
9. Study of weeds and weed management .
10. Acquiring skill in nutrient management, calculation on fertilizer requirementand practicing top dressing techniques.
11. Study of water management practices.
12. Observation of insect pests and diseases and their management.
13. Yield parameters and estimation of yield.
14. Post harvesttechniques, value addition and by products utilization in rabi crop.
15. Working out cost of cultivation and economics.
16. Visit to any research stations or kvk.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Chidda Singh, 1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. ICAR 2006. Hand book of Agriculture. Indian Council of Agricuture, New Delhi.

REFERENCE BOOKS:

1. Crop Production Guide. 2005. Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore.
2. Rajendra Prasad. 2004. Text Book on Field Crop Production, Indian Council of Agrl. Research, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=zLTd7b4F20E
2. https://www.youtube.com/watch?v=aeR8Jmf6aII

WEB RESOURCES:

1. http://nsdl.niscair.res.in/123456789/524RICE - FORMATTED.pdf
2. http://farmer.gov.in/imagedefault/pestanddiseasescrops/rice.pdf
3. http://www.knowledgebank.irri.org/images/docs/12-Steps-Required-for-Successful-Rice-Production.pdf

Course Code	Course Title	L	T	P	S	C
AGRO306	**PRINCIPLES OF ORGANIC FARMING**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide the students with the fundamental principles and practices of organic farming, emphasizing sustainable and environmentally-friendly agricultural methods. Participants will gain a deep understanding of the ecological, economic, and social aspects of organic agriculture, equipping them with the knowledge and skills necessary to engage in or support organic farming endeavors.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Gain knowledge on history of livestock and poultry management in India

CO2. Understand dairy cattle management

CO3. Gain knowledge on modern rearing practices of sheep and goat for meat and milk production

CO4. Gain knowledge on management practices of swine, broiler and layer farming for egg and meat production

CO5. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Organic farming - Introduction **(03 Periods)**

Organic farming, principles and its scope in India

Module 2: Government Initiation- NGO- Promotions (03 Periods)

Initiatives taken by Government (central/state), NGOs and other organizations for promotion of organic agriculture

Module 3: Nutrient resources (04 Periods)

Organic ecosystem and their concepts; Organic nutrient resources and its fortification; Restrictions to nutrient use in organic farming; Choice of crops and varieties in organic farming.

Module 4: Pest and weed management- Organic farming (03 Periods)

Fundamentals of insect, pest, disease and weed management under organic mode of production; Operational structure of NPOP.

Module 5: Certifications and standards- organic farming (03 Periods)

Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit to organic farm to study the various components, identification and utilization of organic products
2. Compost making- aerobic and anaerobic methods
3. Vermicompost preparation
4. Preparation of enriched farm yard manure
5. Visit to organic clusters and bio control lab to study the maintenance of biofertilizers/bio-inoculant cultures
6. Biological nitrogen fixers.
7. Methods of application of Bio-pesticides (Trichocards, BT, NPV)
8. Preparation of neem products and other botanicals for pest and disease control
9. Preparation of green pesticides (panchagavya, beezamrutam,jeevamrutam, ghanajeevamrutam, dravajeevamrutam).
10. Different methods of biofertiliser applications.
11. Quality analysis of biofertilisers/bioinoculants and compost
12. Case studies of Indigenous Technical knowledge (ITK) for nutrient , insect, pest, disease and weed management
13. Economic analysis of organic production system
14. Study of post-harvest management in organic farming

15. Study of quality parameters of organic produce

16. Visit to organic farms to study the various components and their utilization

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Palaniappan, S.P and Annadurai, K.1999. Organic farming-Theory and Practice. Scientific publishers, Jodhpur,India. 257p.

2. Mukund Joshi and Prabhakarasetty, T.K. 2006. Sustainability through organic farming. Kalyani publishers, New Delhi. 349p.

REFERENCE BOOKS:

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

2. Tiwari, V.N., Gupta, D.K., Maloo, S.R and Somani, L.L. 2010. Natural, organic, biological, ecological and biodynamic farming. Agrotech Publishing Academy, Udaipur. 420p.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=e7PUdGqBCVE&list=PLFy5rRD1MJCFb1kLqJ2fYtwh-Um1FYN4D
2. https://www.youtube.com/watch?v=AVie5cvIeMw&list=PLFy5rRD1MJCFb1kLqJ2fYtwh-Um1FYN4D&index=2

WEB RESOURCES:

1. https://agritech.tnau.ac.in/org_farm/orgfarm_principles.html

2. https://www.agricorn.in/2023/03/principles-of-organic-farming-unit-4.html

Course Code	Course Title	L	T	P	S	C
EXTN392	**COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview of

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Know importance of communication for personality development

CO2. Get knowledge on verbal and non-verbal communications

CO3. Get knowledge on field dairy and lab record

CO4. Know reading and comprehension knowledge

CO5. Get knowledge on abstracting

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Communication Skills **(02 Periods)**

Communication Skills: Structural and functional grammar; meaning and process of communication.

Module 2: Verbal and Non-verbal communication (03 Periods)

verbal and nonverbal communication; listening and note taking, writing skills,oral presentation skills;

Module 3: Field dairy and lab record (03 Periods)

Field diary and lab record; indexing, footnote and bibliographic procedures.

Module 4: Reading and comprehension (04 Periods)

Reading and comprehension of general and technical articles, precise writing, summarizing,

Module 5: Abstracting (04 Periods)

Abstracting; individual and group presentations, impromptu presentation, public speaking; Groupdiscussion. Organizing seminars and conferences.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Communication - Meaning and process of communication.
2. Overview of non-verbal communication skills, signs of body language.
3. Nonverbal communication skills - Practicing conscious body postures and movements.
4. Overview of verbal communication skills.
5. Practicing listening and note taking and writing skills.
6. Practicing oral presentation skills.
7. Practicing writing of field diary and lab record - Indexing, footnote and bibliographic procedures.
8. Practicing reading and comprehension of general and technical articles.
9. Practicing precise writing, summarizing, abstracting.
10. Exercise on individual and group presentations.
11. Practicing of extempore, impromptu, impromptu presentation, public speaking.
12. Evaluative exercises on video recorded mock group discussions and interviews.
13. Practical exposure on organizing seminars and conferences.
14. Evaluative exercise on recorded video programme to build the confidence levels of students.
15. Practical exercise on importance of team work.
16. Practical exercise on importance of time management.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

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.

REFERENCE BOOKS:

1. Nirajkumar. 1997. A Genesis of Behavioural Science. Gyan Publishing House, New Delhi.
2. Eric Berne. 1964. Games People Play-The Psychology of Human Relationship. Grove Press Publishers.
3. Thomas Anthony Harris. 1967. I am Ok You are Ok. Harper Publishers. 6. Scott Bill. 1981. Skills of Negotiating.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=srn5jgr9TZo&list=PLOaeOd121eBEEWP14TYgSnFsvaTIjPD22
2. https://www.youtube.com/watch?v=H7QQugwPaPI&list=PLOaeOd121eBEEWP14TYgSnFsvaTIjPD22&index=2

WEB RESOURCES:

1. https://www.udemy.com/course/communication-skills-and-personality-development/
2. https://managementstudyguide.com/communication-skills-and-personality-development.htm

Course Code	Course Title	L	T	P	S	C
GPB311	**PRINCIPLES OF SEED TECHNOLOGY**	**1**	**-**	**2**	**-**	**3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overviewof seed and its importance concepts of seed, its classification, certification, purity and Seed Act, Foundation and certified seed production protocols and procedures of cereals, pulses, oilseeds, fodder and vegetable crops and Seed storage, pest and disease control, seed distribution infrastructure and protocols in India.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Understand the importance of quality seed in agriculture production.

CO2. Gain knowledge on causes of grain deterioration

CO3. Apply seed production techniques in cereals, pulses, and oilseeds and vegetables.

CO4. Understand detection of GM crops and organic seed production

CO5. Gain knowledge on principles of seed treatment process and their storage

CO6. Workindependentlyorinteamtosolveproblemswitheffectivecommunication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO2	3	3	-	2	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO4	3	3	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	3	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	3	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Seed Technology – introduction and importance (01 Periods)

Seed and seed technology: introduction, definition and importance

Module 2: Deterioration and maintenance of genetic purity (02 Periods)

Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed

Module 3: Seed production of different crops and phases of certification, Duties and powers of seed inspector. (08 Periods)

Foundation and certified seed production of important **cereals, pulses, oilseeds, fodder and vegetables**. 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.

Module 4: GM crops and Organic seed production (08 Periods)

Seeds Control Order 1983, 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

Module 5: principles of Seed treatment processing and seed storage. (10 Periods)

Seed drying, processing and their steps, seed testing for quality assessment, 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. Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Seed production in major cereals: Wheat, Rice, Maize.
2. Seed production in major cereals: Sorghum, Bajra and Ragi
3. Seed production in major pulses: Urd, Mung, Pigeon pea, Lentil.
4. Seed production in major pulses: Gram, Field bean, pea
5. Seed production in major oilseeds: Soybean, Sunflower.
6. Seed production in major oilseeds: Rapeseed, Groundnut and Mustard
7. Seed production in important vegetable crops

8. Seed production in important vegetable crops

9. Seed sampling and testing: Physical purity, germination, viability.

10. Seed and seedling vigour test

11 & 12 Genetic purity test: Grow out test and electrophoresis.

13 & 14 Seed certification: Procedure, Field inspection, Preparation of field inspection report

15. Visit to seed production farms, seed testing laboratories and seed processing plant.

16. Visit to seed production farms, seed testing laboratories and seed processing plant.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Khare and Bhale. 2014. Seed Technology, Scientific Publishers, New Delhi.
2. Sharma, J.P. 2011. Quality Seed Production of Vegetable Crops Technological Interventions, Volume 2: Crop Specific Aspect. Kalyani Publishers, Ludhiana.

REFERENCE BOOKS:

1. Agrawal, P.K. and M. Dadlani. 1995. Techniques in seed science and technology. South Asian Publishers, New Delhi.
2. Agrawal, R.L.1996. Seed Technology. Oxford & IBH Publication Co., New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=j6MwsmmYql8&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP
2. https://www.youtube.com/watch?v=AD1PoUJQ_GM&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP&index=2
3. https://www.youtube.com/watch?v=sqR80LdT6UY&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP&index=3

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rvskvv.net/images/II-Year-II-Sem_Seed-Technology_ANGRAU_20.04.2020.pdf
2. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.agrimoon.com/wp-content/uploads/PRINCIPLES-OF-SEED-TECHNOLOGY.pdf

3. https://rlbcau.ac.in/pdf/Agriculture/AST%20241%20%20Principles%20of%20Seed%20Technology.pdf

Course Code	Course Title	L	T	P	S	C
AECO342	FARM MANAGEMENT, PRODUCTION AND RESOURCE ECONOMICS	1	-	1	-	2

Pre-Requisite NA

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course is designed to provide a comprehensive foundation for individuals interested in farm management, agricultural production, and resource economics. It equips students with the skills and knowledge needed to make informed decisions that contribute to the economic viability and sustainability of farming operations.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Gain knowledge on farm management concepts and objectives

CO2. Understand farm management principles

CO3. Gain knowledge on farm income and business

CO4. Gain knowledge important farm records and its types

CO5. Get knowledge on crop insurance concepts and its features

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO6	2	2	1	3	-	-	-	-	-	-	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**1**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Farm Management – Concepts and objectives (03 Periods)

Meaning and concept of farm management, objectives and relationship with other sciences.
Meaning and definition of farms, its types and characteristics, factor determining types and sizeof farms.

Module 2: Principles of Farm Management (03 Periods)

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, productrelationship, law of equi-marginal/or principles of opportunity cost and law of comparativeadvantage. Meaning and concept of cost, types of costs and their interrelationship.

Module 3: Farm Income and Business (03 Periods)

Importance ofcost in managing farm business and estimation of gross farm income, net farm income, familylabour income and farm business income. Farm business analysis: meaning and concept offarm income and profitability, technical and economic efficiency measures in crop and livestockenterprises.

Module 4: Farm Records – Importance and types

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts.Meaning and importance of farm planning and budgeting, partial and complete budgeting, stepsin farm planning and budgeting-linear programming, appraisal of farm resources, selection ofcrops and livestock's enterprises. Concept of risk and uncertainty occurs in agriculture production,nature and sources of risks and its management strategies, Crop/livestock/machinery insurance

Module 5: Crop Insurance – Concepts and features (04 Periods)

Weather based crop insurance, features, determinants of compensation. Concepts of resourceeconomics, differences between NRE and agricultural economics, unique properties of naturalresources. 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.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Different methods Computation of depreciation cost of farm assets.
2. Different methods Computation of depreciation cost of farm assets
3. Determination of most profitable level of inputs use and output in farm production process.
4. Determination of least cost combination of inputs 5
5. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources.
6. Selection of most profitable enterprise combination.

7. Farm holding surveys.

8. Farm holding surveys.

9. Application of cost principles - CACP concepts in the estimation of cost of mono cropping and poly cropping and livestock enterprises.

10. Application of cost principles - CACP concepts in the estimation of cost of mono cropping and poly cropping and livestock enterprises.

11. Farm business analysis - Estimation of different farm income measures, technical and economic efficiency measures and breakeven analysis.

12. Preparation of partial budgets and enterprise budgets.

13. Visit to college farm and study different farm records and accounts and prepare profit and loss account.

14. Collection and analysis of data on various natural resources in India - Land Changes in land use pattern,forests – Water - Changes in ground water and surface water resources - Changes in labour resources - Agricultural workers Pollution and green gas emissions - Biodiversity, etc.

15. Collection and analysis of data on various natural resources in India - Land Changes in land use pattern, forests – Water - Changes in ground water and surface water resources - Changes in labour resources - Agricultural workers Pollution and green gas emissions - Biodiversity, etc.

16. Collection and analysis of data on various natural resources in India - Land Changes in land use pattern, forests – Water - Changes in ground water and surface water resources - Changes in labour resources - Agricultural workers Pollution and green gas emissions - Biodiversity, etc.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

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 AgriculturalProduction and Resource Use. Prentice Hall of India, Private Limited, New Delhi

REFERENCE BOOKS:

1. S.S. Johl, J.R. Kapur. 2006. Fundamentals of Farm Business Management, Kalyani Publishers, New Delhi.
2. Kahlon, A.S. and Karam Singh. 1965. Principles of Farm Business Management. Kalyani Publishers, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=dsk0bp-njck&list=PL62muJtTPK417T5Vhgr3650xUT3XCFCNA

2. https://www.youtube.com/watch?v=Nj3J3DnL4Yw&list=PL62muJtTPK417T5Vhgr3650xUT3XCFCNA&index=2

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rvskvv.net/images/III-Year-II-Sem_Farm-Managment--Production-Economics_ANGRAU_24.04.2020.pdf
2. https://www.agricorn.in/2023/08/farms-and-farm-management-production-function.html

Course Code	Course Title	L	T	P	S	C
AENG351	**PROTECTED CULTIVATION AND SECONDARY AGRICULTURE**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview of the Protected Cultivation and Secondary Agriculture. The course provides deep insight into various concepts of protected cultivation that helps in increase of agricultural produce.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Know the history of green houses and its importance in agriculture.

CO2. Know the types of green houses and their construction based on requirement.

CO3. Understand Planning & construction of green house.

CO4. Know Greenhouse heating and distribution systems

CO5. Know the importance Moisture measurement in grain for storage and seed germination.

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	1	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course Correlation Mapping	**3**	**3**	**-**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Introduction to green houses **(01 Periods)**

History, definition, greenhouse effect, advantages of green houses.

Module 2: Types of green houses (04 Periods)

Greenhouses based on shape, utility, construction, covering materials and cost, shade nets, Plant response to greenhouse environments.

Module 3: Planning & construction of green house (04 Periods)

Site selection and orientation, structural design and covering materials, Materials for construction of green houses, Design criteria and constructional details of greenhouses, Irrigation system used in greenhouses.

Module 4: Greenhouse heating and distribution systems (05 Periods)

Greenhouse utilization - Off-season drying of agricultural produce - Economic analysis of greenhouse production - Capital requirement, economics of production and conditions influencing returns, Important engineering properties, designing post harvest equipment based on physical and thermal properties.

Module 5: Moisture measurement in grain (02 Periods)

Equilibrium moisture content (EMC) – importance - Drying theory - Drying and dehydration, Commercial grain dryers, Material handling equipment.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of different types of greenhouses based on shape, etc.
2. Computing the rate of air exchange in an active summer and winter cooling systems.
3. Feasibility study on drying of agricultural products inside a greenhouse and its calculation.
4. Visit to post harvest technology units and laboratories.
5. Determination of moisture content of various grains by oven drying and infrared methods.
6. Determination of size, space, porosity, bulk density, etc., of grains.
7. Determination of aerodynamic properties of grains.
8. Cleaning and grading of grains, pulses and oilseeds.
9. Drying and dehydration of vegetables (cauliflower).
10. Visit to rice mill.
11. Study of LSU dryer.
12. Study of Bucket elevator and screw conveyor.
13. Visit to dhal mill
14. Visit to oil seed processing plant.

15. Visit to cold storage

16. Practical final examination

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Sahay, K.M. and Singh, K.K. 1994. Unit operations of Agricultural Processing. Vikas Publishing house Pvt. Ltd. New Delhi.
2. Chakraverty, A. Post Harvest Technology of cereals, pulses and oilseeds. Oxford & IBH publishing Co. Ltd., New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=BpaZjnQnLcM&list=PLPzlW6NMlfyjdINYGxG3s9Zh1DGPQCywi
2. https://www.youtube.com/watch?v=-lHY6DiyAZ4&list=PLPzlW6NMlfyjdINYGxG3s9Zh1DGPQCywi&index=2

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://bscagristudy.online/wp-content/uploads/2021/04/ENGG-364-PRINTED-LONG-NOTE.pdf
2. https://www.agricorn.in/p/protected-cultivation.html

Course Code	Course Title	L	T	P	S	C
PATH372	**DISEASES OF FILED AND HORTICULTURAL CROPS AND THEIR MANAGEMENT-II**	**2**	**-**	**1**	**-**	**3**
Pre-Requisite	**NA**					
Anti-Requisite	**-**					
Co-Requisite	**-**					

COURSE DESCRIPTION: This course is designed to provide an overview of major diseases of field and horticultural crops, plant disease causal organisms, etiology, and disease cycle and integrated agricultural approaches for optimum plant pathogen management

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1	Remember different plant pathogenic terminologies and basic ideas of key plant diseases.
CO2	Identify the illness signs of several plant diseases of field and horticultural crops.
CO3	Analyze the impact of host-pathogen interactions on disease development in field and horticultural crops.
CO4	Determine the prevalence, epidemiology, and risk factors for illness development.
CO5	Apply the idea of integrated management approaches to control diseases in field and horticultural crops and suggest disease management measures for various agricultural plants.
CO6	Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	3	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Symptoms and etiology of wheat and sugarcane (7 Periods)

Symptoms, etiology, disease cycle and management of following diseases: Field Crops: Wheat: rusts, loose smut, karnal bunt, powdery mildew, alternaria blight, and earcockle; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng;

Module 2: Symptoms and etiology of sunflower, mustard, gram, lentil and cotton (6 Periods)

Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; Gram: wilt, grey mould and Ascochyta blight; Lentil: rust and wilt; Cotton: anthracnose, vascular wilt and blackarm

Module 3: ETL and methods of control (8 Periods)

Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological and chemical control. Ecological management of crop environment.

Module 4: Symptoms and etiology of Pea and Horticultural crops. (5 Periods)

Pea: downy mildew, powdery mildew and rust. Horticultural Crops Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall;

Module 5: Symptoms and etiology of Peach, strawberry, onions, chilies, turmeric, coriander and rose. (6 Periods)

Peach: leaf curl. Strawberry: leaf spot Potato: early and late blight, black scurf, leaf roll, and mosaic; Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch and Stem phylum blight; Chilies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot Coriander: stem gall Marigold: Botrytis blight; Rose: dieback, powdery mildew and black leafspot.

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification and histopathological studies of selected diseases of field and horticultural
   crops covered in theory.
2. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.
3. Note: Students should submit 50 pressed and well-mounted specimens.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Arjunan, G. Karthikeyan, G, Dinakaran, D. and T. Raguchander. 1999. Diseases of horticultural Crops, AE Publications, Coimbatore.
2. Das Gupta M.K. and W.C. Mandel.1989. Post-harvest pathogens of Perishables. Oxford and IBH Publishing Company, New Delhi.

Reference Books

1 Rangaswamy, C. 2005, Diseases of crop plants in India –. Prentice Hall of India, Pvt. Limited, New Delhi.

2 Dasgupta, M.K. and W.C. Mandal. 1989. Post-harvest pathology of perishables. Oxford IBH publishing Co. New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=hf-0dIVC9tI&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3
2. https://www.youtube.com/watch?v=Xrc2UDiM1KU&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3&index=4

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://agritech.tnau.ac.in/pdf/9.pdf
2. http://www.eagri.org/eagri50/PATH371/index.html

Course Code	Course Title	L	T	P	S	C
HORT382	**POST-HARVEST MANAGEMENT AND VALUE ADDITION OF FRUITS AND VEGETABLES**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide an overview of post-harvest management and value addition in the context of fruits and vegetables. Participants will explore methods and technologies to extend the shelf life, enhance quality, and add value to harvested produce, contributing to reduced losses and increased economic returns for farmers and stakeholders along the supply chain. The course integrates theoretical knowledge with practical applications to develop a comprehensive understanding of post-harvest handling and processing.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO1. Know importance of post-harvest processes

CO2. Get knowledge on factors effecting pre harvesting

CO3. Understand the handling methods in harvesting

CO4. Know principles and methods of preservation

CO5. Understand canning concepts and fermented and un fermented beverages

CO6. Work independently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: Post Harvest Processing– Importance (01 Periods)

Importance of post-harvest processing of fruits and vegetables, extent and possible causesof post-harvest losses.

Module 2: Pre-Harvest- Factors Effecting (04 Periods)

Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate.

Module 3: Harvesting and Field handling (04 Periods)

Harvestingand field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept.

Module 4: Preservation – Principles and methods (05 Periods)

Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade,preserve, candy.

Module 5: Fermented and non-fermented beverages, Canning- Concepts (02 Periods)

Concepts and Standards; Fermented and non-fermented beverages. Tomatoproducts- Concepts and Standards; Drying/ Dehydration of fruits and vegetables - Concept andmethods, osmotic drying. Canning -Concepts and Standards, packaging of products.

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Applications of different types of packaging containers for shelf-life extension
2. Effect of temperature on shelf life and quality of produce
3. Demonstration of chilling and freezing injury in vegetables and fruits
4. Extraction and preservation of pulps and juices
5. Preparation of jam.
6. Preparation of jelly.
7. Preparation of RTS.
8. Preparation of nectar.
9. Preparation of squash.
10. Preparation of osmotically dried products.
11. Preparation of fruit bar and candy.
12. Preparation of tomato sauce.
13. Preparation of tomato ketchup.

14. Preparation of canned products.

15. Quality evaluation of products - (physic-chemical and sensory).

16. Visit to processing unit/ industry.

17. Visit to processing unit/ industry.

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Rathore, N.S., Mathur, G.K., Chasta, S.S. 2012. Post-harvest Management and Processing of Fruits and Vegetables. ICAR, New Delhi.
2. Srivastava, R.P. and Sanjeev Kumar. 2002. Fruit and Vegetable Preservation: Principles and Practices. International Book Distribution Company, Lucknow

REFERENCE BOOKS:

1. Giridharilal, G.S., Siddappa and Tondon, G.L. 2007. Preservation of Fruits and Vegetables. ICAR, New Delhi.
2. Mitra, S.K. 2005. Post Harvest Physiology and Storage of Tropical and Subtropical Fruits. CABI Publishers, Kolkatta.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=UTIo-UfXwLY&list=PLFLM7qfYY44mOByPo46I-ytKONt9xypam
2. https://www.youtube.com/watch?v=X3ZVFqel5eI&list=PLFLM7qfYY44mOByPo46I-ytKONt9xypam&index=2

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rvskvv.net/images/III-Year-II-Sem_PHM--Value-Addition-of-Fruits-and-Vegetables_24.04.2020.pdf
2. https://www.agricorn.in/2023/08/post-harvest-processing-fruits-vegetables-importance.html

Course Code	Course Title	L	T	P	S	C
FN301	PRINCIPLES OF FOOD SCIENCE AND NUTRITION	2	-	0	-	2

Pre-Requisite NA
Anti-Requisite -
Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical knowledge on understanding the basic concepts of food science and nutrition, its scope and importance; composition and chemistry of food, Water, solutions, water balances in body, clinical signs of water depletion, excessive water intake, recommended requirements. And to understand the nutritional importance of proper diet.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO6. To understand the different concepts of food science

CO7. To understand the composition and chemistry of food

CO8. To understand the morphology, cultivation and nutritional importance of food microbes.

CO9. To understand and learn various food processing methods along with preservation techniques. And learn about various malnutrion disorders

CO10. To understand the concept of energy metabolism and importance of proper diet

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	-	1	-	-	-	-	-	-	-	-	3
CO2	3	3	-	-	3	-	-	-	-	-	-	-	-	3
CO3	3	2	-	-	2	-	-	-	-	-	-	-	-	3
CO4	3	3	3	-	3	-	-	-	-	-	-	-	-	3
CO5	3	3	3	-	3	-	-	-	-	-	-	-	-	3
Course correlation mapping	**3**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**

Correlation Levels: 3: High; 2: Medium; 1: Low

COURSE CONTENT

Module 1:		***(7 periods)***
Concepts of Food Science - Definitions, Measurements, Density, Phase change, PH, Osmosis, Surface tension, Colloidal systems etc.		
Module 2:		***(7 periods)***
Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins,		

minerals, flavours, colours, miscellaneous bioactives, important reactions)		
Module 3:		***(6 periods)***
Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods)		
Module 4		***(06 periods)***
Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.Food and nutrition, Malnutrition (over and under nutrition), nutritional disorders		
Module 5:		***(06 periods)***
Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, New trends in food science and nutrition.		
		Total Periods: 32

RESOURCES

TEXT BOOKS:

An Introduction to Nutrition, v. 1.0

L.E. Casida Jr. 1968. Industrial Microbiology. New Age International Publishers, New Delhi.

REFERENCE BOOKS:

Sumati R. Mudambi, Shalini M. Rao and M.V. Rajagopal. 2006. Food Science, 2nd Ed. New Age International (P) Limited, New Delhi.

Martin Eastwood. 2003. Principles of Human Nutrition. Blackwell Science Ltd., Oxford.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=zLZwbOZMesY
2. https://www.youtube.com/watch?v=EwF7u-KAcc4
3. https://www.youtube.com/watch?v=luWf1JF_0mQ

WEB RESOURCES:

https://instr.iastate.libguides.com/c.php?g=49424&p=318464

EC302 **FUNDAMENTALS OF ANIMAL PRODUCT TECHNOLOGY** **2 - 1 - 3**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION:

This course is designed to provide the students with the fundamental principles and practices of milk and meat products, their physical and microbiological properties, processing of milk and meat products and various government regulations to maintain them.

COURSE OUTCOMES: After successful completion of the course, students will be able to:

CO6. Gain knowledge on milk and its physiochemial and microbial properties of milk

CO7. Understanding processing of milk and pestiside residues in milk and milk products

CO8. Gain knowledge on organic milk products, and maintenance standards of milk

CO9. Gain knowledge on prospects of meat industry and its physio-chemial and microbial properties of meats

CO10. Understanding government guidelines for meat and various animal products.

CO11. Work independently or in teams to solve problems with effective communication

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Correlation Levels: *3: High* *2: Medium* *1: Low*

COURSE CONTENT

Module 1: **INTRODUCTION TO MILK AND ITS COMPOSITION** **(07 Periods)**

Composition and nutritive value of milk and factors effecting composition of milk; Physiochemical properties of milk; Determination of microbial load in milk and milk products

Module 2: **PROCESSING OF MILK AND ITS PRODUCTS** **(05 Periods)**

Milk Processing: Collection, chilling, standardization, pasteurization and homogenization; Toxins and pesticide residues in milk and milk products

Module 3: ORGANIC MILK PRODUCTS AND MAINTENANCE STANDARDS (04 Periods)

Organic milk food products; Bureau of Indian Standards for milk and milk products; Sanitation in milk plant.

Module 4: MEAT AND MEAT PRODUCTS (08 Periods)

Retrospect and prospects of meat industry in India; Structure and composition of muscle (including poultry), nutritive value of meat, Meat adulteration, preservation of meat, Physico – chemical and microbiological quality of meat and meat products.

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Module 5: GOVERNMENT GUIDELINES (08 Periods)

Laws governing national, international trade in meat and meat products, organic meat food products, food products of genetically modified animals

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. External examination of milk and meat
2. Sampling of milk
3. Estimation of fat in Milk
4. Estimation of solids not fat (SNF) in milk
5. Estimation of total solids in milk
6. Platform tests for milk
7. Cream separation in milk
8. Estimation of Microbiological quality of milk
9. Estimation of Microbiological quality of meat.
10. Estimation of Microbiological quality of meat products
11. Chilling/freezing of meat
12. Chilling/freezing meat products
13. Preservation of meat
14. Preservation of meat products.
15. Visit to modern milk unit.
16. Visit to meat processing units

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Aberle ED, Forrest JC, Gerrard DE & Mills EW. 2012. Principles of Meat Science.5th Eds.
2. Kendall Hunt Publishing y Ledward DA & Lawrie RA. 2006.Lawrie's Meat Science, 7th Eds. Woodhead Publishing

REFERENCE BOOKS:

1. Sharma BD.1999. Meat and Meat Products Technology: Including Poultry Products Technology. Jaypee Bros. Medical Publishers
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2. https://youtu.be/9uAUOnjI4Gk

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