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 2023-24 Admitted Students)

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 & 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 & diseases, public health, safety, society, and environment.

PO4. **Tools & 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 & 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 & 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.	AGRO 101	Fundamentals of Agronomy 4(3+1)	3	-	1	4
2.	AGRO 102	Introductory Agro-meteorology & Climate Change 2(1+1)	1	-	1	2
3.	GPB 111	Fundamentals of Genetics 3(2+1)	2	-	1	3
4.	SSAC 121	Fundamentals of Soil Science 3(2+1)	2	-	1	3
5.	HORT 181	Fundamentals of Horticulture 2(1+1)	1	-	1	2
6.	EXTN 191	Rural Sociology and Educational Psychology 2(2+0)	2	-	-	2
7.	CS 101	Comprehension and Communication Skills in English 2(1+1)	1	-	1	2
8.	MATH 101	Elementary Mathematics* 2(2+0)	2	-	-	2
9.	AGR0 103	Agricultural Heritage* 1(1+0)	1	-	-	1
10.	CS 102	Human Values and Ethics (non gradial) ** 1(1+0)	1	-	-	1
11.	NSS/NCC 101	NSS/NCC/Physical Education and Yoga Practices** 2(0+2)	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.	AGRO 104	Introduction to Forestry 2(1+1)	1	-	1	2
2.	BICM 101	Fundamentals of Plant Biochemistry and Biotechnology 3(2+1)	2	-	1	3
3.	ENTO 131	Fundamentals of Entomology 4(3+1)	3	-	1	4
4.	AECO 141	Fundamentals of Agricultural Economics 3(3+0)	3	-	0	3
5.	AENG 151	Soil and Water Conservation Engineering 2(1+1)	1	-	1	2
6.	PPHY 161	Fundamentals of Plant Physiology 3(2+1)	2	-	1	3
7.	HORT 182	Production Technology for Vegetables and Spices 2(1+1)	1	-	1	2
8.	EXTN 192	Fundamentals of Agricultural Extension Education 3(2+1)	2	-	1	3
9.	AMBE 101	Agricultural Microbiology 2(1+1)	1	-	1	2
		Total	**16**	**-**	**08**	**24**

B.Sc. Hons. (Agri) – III Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO 201	Crop Production Technology – I (Kharif Crops) 2(1+1)	1	-	1	2
2.	GPB 211	Fundamentals of Plant Breeding 3(2+1)	2	-	1	3
3.	AECO 241	Agricultural Finance and Cooperation 3(2+1)	2	-	1	3
4.	AENG 251	Farm Machinery and Power 2(1+1)	1	-	1	2
5.	PATH 271	Fundamentals of Plant Pathology 4(3+1)	3	-	1	4
6.	HORT 281	Production Technology for fruits and plantation crops 2(1+1)	1	-	1	2
7.	EXTN 291	Communication Skills and Personality Development 2(1+1)	1	-	1	2
8.	AH 201	Livestock and Poultry Management 4(3+1)	3	-	1	4
9.	MATH 201	Statistical Methods 2(1+1)	1	-	1	2
		Total	**15**	**-**	**9**	**24**

B.Sc. Hons. (Agri) – IV Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO 202	Crop Production Technology –II (Rabi Crops) 2(1+1)	1	-	1	2
2.	AGRO 203	Farming System and Sustainable Agriculture 1(1+0)	1	-	0	1
3.	GPB 212	Crop Improvement-I (Kharif crops) 2(1+1)	1	-	1	2
4.	SSAC 221	Manures, Fertilizers and Soil Fertility Management 3(2+1)	2	-	1	3
5.	ENTO 231	Pests of Crops and Stored Grain and their Management 3(2+1)	2	-	1	3
6.	AECO 242	Agricultural Marketing Trade and Prices 3(2+1)	2	-	1	3
7.	AENG 252	Renewable Energy and Green Technology 2(1+1)	1	-	1	2
8.	PATH 272	Diseases of Field and Horticultural Crops and their Management -I 3(2+1)	2	-	1	3
9.	MATH 202	Agri- Informatics 2(1+1)	1	-	1	2
10.	EC 272/282	Elective Course 3(2+1)	2	-	1	3
		Total	**15**	**-**	**9**	**24**

B.Sc. Hons. (Agri) – V Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO 301	Geoinformatics and Nano-technology and Precision Farming 2(1+1)	1	-	1	2
2.	AGRO 302	Practical Crop Production – I (Kharif crops) 2(0+2)	0	-	2	2
3.	GPB 311	Crop Improvement-II (Rabi crops) 2(1+1)	1	-	1	2
4.	SSAC 321	Problematic Soils and their Management 2(2+0)	2	-	0	2
5.	ENTO 331	Management of Beneficial Insects 2(1+1)	1	-	1	2
6.	AECO 341	Intellectual Property Rights 1(1+0)	1	-	0	1
7.	PPHY 361	Environmental Studies and Disaster Management 3(2+1)	2	-	1	3
8.	PATH 371	Diseases of Field and Horticultural Crops and their Management-II 3(2+1)	2	-	1	3
9.	HORT 381	Production Technology for Ornamental Crops, MAP and Landscaping 2(1+1)	1	-	1	2
10.	AEXT 391	Entrepreneurship Development and Business Communication 2(1+1)	1	-	1	2
11.	EC 305/333/ 342/362/382	Elective Course 3(2+1)	2	-	1	3
		Total	**14**	**-**	**10**	**24**

B.Sc. Hons. (Agri) – VI Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	AGRO 303	Practical Crop Production –II (Rabi crops) 2(0+2)	0	-	2	2
2.	AGRO 304	Rainfed Agriculture and Watershed Management 2(1+1)	1	-	1	2
3.	AGRO 305	Principles of Organic Farming 2(1+1)	1	-	1	2
4.	GPB 312	Principles of Seed Technology 3(1+2)	1	-	2	3
5.	AECO 342	Farm Management, Production and Resource Economics 2(1+1)	1	-	1	2
6.	AENG 351	Protected Cultivation and Secondary Agriculture 2(1+1)	1	-	1	2
7.	PATH 372	Principles of Integrated Pest and Disease Management 3(2+1)	2	-	1	3
8.	HORT 382	Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)	1	-	1	2
9.	FN 301	Principles of Food Science and Nutrition 2(2+0)	2	-	-	2
10.	EC 306/315 /334/383/392	Elective Course 3(2+1)	2	-	1	3
		Total	**12**	**-**	**11**	**23**

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 & AIA) 20(0+20)	-	-	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.	ELP	Experiential Learning Programme 10 (0+10)	-	-	10	10
2.	ELP	Experiential Learning Programme 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.	EC 342	Agribusiness management 3(2+1)	2	-	1	3
2.	EC 334	Agrochemicals 3(2+1)	2	-	1	3
3.	EC 315	Commercial Plant Breeding 3(1+2)	1	-	2	3
4.	EC 382	Landscaping 3(2+1)	2	-	1	3
5.	EC 272	Food Safety and Standards 3(2+1)	2	-	1	3
6.	EC 333	Biopesticides and Biofertilizers 3(2+1)	2	-	1	3
7.	EC 383	Protected Cultivation 3(2+1)	2	-	1	3
8.	EC 362	Micro propagation Technologies 3(1+2)	1	-	2	3
9.	EC 282	Hi-tech. Horticulture 3(2+1)	2	-	1	3
10.	EC 306	Weed Management 3(2+1)	2	-	1	3
11.	EC 305	System Simulation and Agro-advisory 3(2+1)	2	-	1	3
12.	EC 392	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.	ELP 1	Production Technology for Bioagents and Biofertilizer	-	-	10	10
2.	ELP 2	Seed Production and Technology	-	-	10	10
3.	ELP 3	Mushroom Cultivation Technology	-	-	10	10
4.	ELP 4	Soil, Plant, Water and Seed Testing	-	-	10	10
5.	ELP 5	Commercial Beekeeping	-	-	10	10
6.	ELP 6	Poultry Production Technology	-	-	10	10
7.	ELP 7	Commercial Horticulture	-	-	10	10
8.	ELP 8	Floriculture and Landscaping	-	-	10	10
9.	ELP 9	Food Processing	-	-	10	10
10.	ELP 10	Agriculture Waste Management	-	-	10	10
11.	ELP 11	Organic Production Technology	-	-	10	10
12.	ELP 12	Commercial Sericulture	-	-	10	10

Course Code	Course Title	L	T	P	S	C
AGRO 101	**FUNDAMENTALS OF AGRONOMY 4(3+1)**	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	-	-	-	-	-	3	-	-	-	-
CO4	3	2	3	3	2	1	-	-	-	3	-	-	-	-
CO5	3	-	3	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**3**	**3**	**2**	**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**

PRACTICALS/ EXPERIENTIAL LEARNING

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

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=echf4TCgR5g&list=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1
2. https://www.youtube.com/watch?v=JYVIInPt9e8&list=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1&index=2
3. https://www.youtube.com/watch?v=xgkHuEra3Hs&list=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1&index=3
4. https://www.youtube.com/watch?v=r5qbr4SYRwU&list=PLAPqOo95tIYfu1ILnzCUO1PNPswg8O-E1&index=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
AGRO 102	**INTRODUCTORY AGRO-METEOROLOGY AND CLIMATE CHANGE 2(1+1)**	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/ EXPERIENTIAL LEARNING

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

REFERENCE BOOKS:

1. G.S. and Kingra, P.K, Comprehensive Agrometeorology Mahi, Kalyani publisher,2008.
2. Reddy, S. R, Introduction to Agriculture and Agrometeorology, Kalyani Publishers New Delhi, 2014.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=yafA8sHJPCk&list=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLL
2. https://www.youtube.com/watch?v=ZNIZ4W5sFTQ&list=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLL&index=2
3. https://www.youtube.com/watch?v=cXJW6LnQvC0&list=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLL&index=3
4. https://www.youtube.com/watch?v=UAdeeCGBpyM&list=PLg6dY4ATfXEsxfKgRkZs2veUPpDpHRfLL&index=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
GPB 111	**FUNDAMENTALS OF GENETICS 3(2+1)**	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 & its branches, structure and function of cell, cell division, structure, types & composition of chromosomes, chromosomal aberrations and polyploid.

CO2. Analyse the pre mendelian, mendelian law of inheritance & 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/ EXPERIENTIAL LEARNING

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

REFERENCE BOOKS:

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

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
SSAC 121	**FUNDAMENTALS OF SOIL SCIENCE 3(2+1)**	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: PEDOLOGIC AND EDAPHOLOGIC CONCEPTS *(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: SOIL PHYSICAL PROPERTIES *(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: SOIL PHYSICO CHEMICAL PROPERTIES *(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: SOIL ORGANIC MATTER *(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/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Methods of chemical analysis, principles, techniques and calculations
2. Study of soil sampling tools, collection of representative soil sample, its Processing and storage.
3. Description of soil profile in the field.
4. Studies of capillary rise phenomenon of water in soil column and water movement in soil.
5. Determination of texture by feel method.
6. Determination of mechanical composition of soil using Bouyoucos Hydrometer.
7. Determination of bulk density and particle density of soil and porosity.
8. Determination of soil moisture content by gravimetric method.
9. Determination of infiltration rate.
10. Determination of soil strength by cone penetrometer
11. Aggregate analysis by wet sieving method.
12. Determination of soil pH & EC of soil.

13. Determination of cation exchange capacity of soil.
14. Determination of soil colour & study of soil map.
15. Estimation of organic matter content in soil.
16. Determination of heat transfer in soil

RESOURCES

TEXT BOOKS:

1. Indian Society of Soil Science, Fundamentals of Soil Science, IARI, New Delhi, 2012.
2. Das, D.k, Introductory Soil Science, Kalyani Publishers, New Delhi, 4th Edition, 2015.

REFERENCE BOOKS:

1. Sehgal. J, A Text Book of Pedology – Concepts and Applications, Kalyani Publishers, New Delhi, 2015.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=-ZN1xaCxNkg&list=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Yko
2. https://www.youtube.com/watch?v=-_qdLgPYP0c&list=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Yko&index=3
3. https://www.youtube.com/watch?v=xbDgJznPxCs&list=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Yko&index=4
4. https://www.youtube.com/watch?v=Z5ofyRN6lbo&list=PLGz7Ss7gqnwuHj-qm_PgyLp5RPmXR3Yko&index=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
HORT 181	**FUNDAMENTALS OF HORTICULTURE 2(1+1)**	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 & asexual), Propagating structures (separation, division, grafting, budding, layering), High density planting, use of rootstocks, Orchard establishment, (Principle & Layout) Principles and methods of training and pruning, juvenility and flower bud differentiation, unfruitfulness, pollination, pollinizers and pollinations, fertilization and parthenocarpy, vegetable gardens & 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 ***(04 Periods)***

Origin of horticulture–history–evolution–definitions –scope and importanceofhorticulture–divisionandclassificationofhorticulturalcrops–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 & 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. Root stock influence–stock/scion relationship in fruit crops. Scope and importance of micro propagation in horticultural crops. Direct and indirect organogenesis – media for micropropagation and hardening.

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

Principles of orchard establishment - Methods of planting systems including HDP and UHDP in horticultural crops–crop regulatory practices for horticultural crops–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. Fertilization and parthenocarpy.

Module 4: MEDICINAL, AROMATIC PLANTS AND PRINCIPLES & TYPES OF GARDENS **(04 Periods)**

Medicinal and aromatic plants; importance of plant bio-regulators in horticulture. Irrigation – methods, Fertilizer application in horticultural crops Principles and types of the garden–principles and types of parks–principles of herbal garden

Total Periods:16

PRACTICALS/ EXPERIENTIAL LEARNING

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. Chadha, K.L, Handbook of Horticulture, ICAR, New Delhi, 2001.
2. Jitendra Singh, Basic Horticulture, Kalyani Publishers. New Delhi, 2012.

REFERENCE BOOKS:

1. Randhawa, G.S. and Mukhopadhyaya, Floriculture in India by A. Allied Publishers Pvt. Ltd, New Delhi, 1994.
2. Kumar, N. Rajyalakshmi, Introduction to Horticulture, Nagorcoil, Tamilnadu, 1997.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=s-VLvtirppw&list=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK
2. https://www.youtube.com/watch?v=bWPBB-B2Sf0&list=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK&index=2
3. https://www.youtube.com/watch?v=jYACmgbVoKQ&list=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK&index=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
EXTN 191	**RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY 2(2+0)**	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, Introductory Rural Sociology, J.B. Wiley Eastern Limited, New Delhi, 1997.

REFERENCE BOOKS:

1. Adivi Reddy, Extension Education, A. Sri Lakshmi Press, Bapatla, 2001.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=Y9jpQkJXGKQ&list=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIH
2. https://www.youtube.com/watch?v=LyPCdnNhtvg&list=PLBHH7-69I-

lryXz7pBve1HeP2MdFfRzIH&index=2

3. https://www.youtube.com/watch?v=2lps-AEmb_I&list=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIH&index=3
4. https://www.youtube.com/watch?v=a1mkz4DyOhY&list=PLBHH7-69I-lryXz7pBve1HeP2MdFfRzIH&index=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
CS 101	COMPREHENSION AND COMMUNICATION SKILLS IN ENGLISH 2(1+1)	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: COMMUNICATION SKILLS ***(03 Periods)***

Communication Skills: Structural and functional grammar; meaning and process of communication.

Module 3: VERBAL AND NON-VERBAL COMMUNICATIONS ***(03 Periods)***

Verbal and nonverbal communication; listening and note taking, writing skills, oral presentation skills; field diary and lab record; indexing, footnote and bibliographic procedures.

Module 4: READING AND COMPREHENSION ***(03 Periods)***

Reading and comprehension of general and technical articles, precise writing, summarizing, abstracting; individual and group presentations, impromptu presentation

Module 5: INTERVIEWS SKILLS ***(03 Periods)***

Public speaking; Group discussion. Organizing seminars and conferences.

Total Periods: 16

PRACTICALS/ 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

TEXT BOOK:

1. N.P. Sudharshana &C.Savitha,English for Technical Communication by 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. by Kuiper,*S, Contemporary business report writing* Cincinnati OH: Thomson/South, Western, 3rd Edition, 2007.
3. McGraw Hill *by Business communication*: *Building critical skills* by Locker, K. O. & Kaczmarek, 3rd Edition, 2007.
4. Mascull, *B, Business vocabulary in use: Advanced. Cambridge*, Cambridge University Press, 2004.
5. Marsh, C. *Strategic writing: Multimedia writing for public relations, advertising, sales and marketing, and business communication*, Pearson, 2005.

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
MATH 101	**ELEMENTARY MATHEMATICS* 2(2+0)**	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 (x_1, y_1) & (x_2, y_2), 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 $x_2 + y_2 = a_2$.

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 & 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

1. MVSL DN Raju and Dr. K.V. Ramana, Engineering Mathematics-1, Kalyani publishers,2002
2. MVSL DN Raju and Dr. K.V. Ramana, Engineering Mathematics-2, Kalyani publishers,2002

REFERENCE BOOKS:

3. Text Book for A.P Intermediate Mathematics – Paper (IA & IIB).
4. MVSL DN Raju and K.V. Ramana, Agricultural Mathematics, Kalyani publishers,2002

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
AGRO 103	**AGRICULTURAL HERITAGE* 1(1+0)**	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 & 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; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.

Module 2: ANCIENT SOIL MANAGEMENT ***(04 Periods)***

Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge;

Module 3: INDIGENOUS KNOWLEDGE IN AGRICULTURE ***(04 Periods)***

Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India

Module 4: INDIAN CIVILIZATION AND AGRICULTURE BY TRAVELLERS ***(04 Periods)***

Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

Total Periods: 16

RESOURCES

TEXT BOOKS:

1. SR Reddy, Agriculture Heritage Kalayani publishers, 2016.

REFERENCE BOOKS:

1. Dr. D. Kumari Manimuthu Veeral, Text book on agricultural heritage of India, Kalyani publishers, 2018.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=2raJ2u0OX5Y
2. https://www.youtube.com/watch?v=leU03xclsOs&list=PLLtcxq1-RGPsQAiHItPMv_JeZTgaT1Gm7

Web Resources:

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

Course Code	Course Title	L	T	P	S	C
CS 102	**Human Values and Ethics 1(1+0)** 1(1+0)**	1	-	-	-	1

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of Human Values & Ethics course explores the interplay between personal values, ethics, spirituality, and the broader societal context. It delves into the understanding of positive spirit, spirituality, and the recognition and mitigation of social evils. Through critical inquiry, introspection, and discussion, students examine the role of individual and collective values in shaping attitudes, behaviors, and societal structures.

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

CO1. Get knowledge on human aspirations

CO2. Understand the fundamental values of the humans

CO3. Get knowledge on positive spirit

CO4. Understand the value of spirituality

CO5. Get knowledge on 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	-	2	-	-	-	-	-	-	3	-
CO2	3	3	-	3	-	3	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	2	-	-	-	-	-	-	3	-
CO4	3	3	-	3	-	2	-	-	-	-	-	-	3	-
CO5	3	3	-	3	-	2	-	-	-	-	-	-	3	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**

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

COURSE CONTENT

Module 1: HUMAN ASPIRATIONS (02 Periods)

Values and Ethics-an Introduction.

Module 2: FUNDAMENTALS VALUES AND VISION OF LIFE (03 Periods)

Goal and Mission of Life. Vision of Life. Principles and Philosophy.

Module 3: POSITIVE SPIRIT (03 Periods)

Self Exploration, Self Awareness, Self Satisfaction, Decision Making. Motivation.

Module 4: SPIRITUALITY (04 Periods)

Sensitivity. Success. Selfless Service. Case Study of Ethical Lives.

Module 5: SOCIAL EVILS (04 Periods)

Positive Spirit. Body, Mind and Soul. Attachment and Detachment. Spirituality Quotient. Examination

Total Periods:16

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=VtafwtI-7xc&list=PL2MikKrtvk-memQJ4YgbDiwSxFOob6X7P
2. https://www.youtube.com/watch?v=na-zvYUP1Do&list=PL2MikKrtvk-memQJ4YgbDiwSxFOob6X7P&index=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/NCC 101	**NATIONAL SERVICE SCHEME 1(0+1)**	-	-	1	-	1

Pre-Requisite **-**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an introduction to students to the principles, values, and practices of community engagement and social responsibility through the framework of the National Service Scheme (NSS). The course aims to foster a sense of civic consciousness, leadership, and empathy among students while empowering them to contribute meaningfully to societal development.

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

CO1. Gain hands-on experience by participating in community service projects and activities

CO2. Develop problem-solving skills by addressing real-life community needs

CO3. Build relationships with community members and understand their needs and perspectives

CO4. 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	PSO6
CO1	-	-	2	-	-	-	3	3	-	3	-	-	-	-	-
CO2	2	-	1	-	-	-	3	3	-	3	-	-	-	-	-
CO3	3	-	2	-	-	-	3	3	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	3	3	-	3	-	-	-	-	-
Course Correlation Mapping	-	-	-	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction and basic components of NSS
2. History, objectives, principles, symbol, badge; regular programmes under NSS,
3. Organizational structure of NSS, code of conduct for NSS volunteers, points to be considered by NSS volunteers' awareness about health
4. Concept of regular activities, special camping, day camps, basis of adoption of village/slums,
5. Conducting survey, analysing guiding financial patterns of scheme, youth programme/ schemes of GOI, coordination with different agencies and maintenance of diary
6. Definition, profile, categories, issues and challenges of youth
7. Opportunities for youth who is agent of the social change
8. Mapping of community stakeholders, designing the message as per problems and their culture
9. Identifying methods of mobilisation involving youth-adult partnership
10. Indian history and culture, role of youth in nation building, conflict resolution and peacebuilding
11. Indian tradition of volunteerism, its need, importance, motivation and constraints;
12. Shramdan as part of volunteerism
13. Basic features of constitution of India, fundamental rights and duties,
14. Human rights, consumer awareness and rights and rights to information
15. Concept of family, community (PRIs and other community-based organizations) and society
16. Concept of family, community (PRIs and other community-based organizations) and society

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

1. R. Gupta' s*, NCC* (National *Cadet Corps*) A concise Handbook of *NCC* Cadets for ' A', 'B' & 'C' Certificate Examinations

REFERENCE BOOKS:

1. R. Gupta' s, NCC (National Cadet Corps) A concise Handbook of NCC Cadets for ' A', 'B' & 'C' Certificate Examinations

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=M1XCjrAI_qY
2. https://www.youtube.com/watch?v=14Pgi7PXpsA

Web Resources:

1. https://nss.gov.in/sites/default/files/manualNss2006.pdf
2. https://nssmu.in/wp-content/uploads/2020/07/NSS-Manual.pdf

Course Code	Course Title	L	T	P	S	C
NSS/NCC 101	**NATIONAL CADET CORPS 1(0+1)**	-	-	1	-	1

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide values of leadership, discipline, patriotism, and social responsibility among students through military-oriented training and community service activities. The course aims to develop well-rounded individuals capable of contributing positively to society while fostering a sense of national pride and unity.

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

CO1. Understand and identify various social, environmental, and community issues

CO2. Enhance skills in leadership, teamwork, and communication through active participation in NSS activities

CO3. Foster a sense of responsibility and commitment towards community service

CO4. 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	PSO6
CO1	2	1	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	3	3	-	3	-	-	-	-	-
Course Correlation Mapping	-	-	-	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Aims, objectives, organization of NCC and NCC song. DG's cardinals of discipline.
2. Drill- aim, general words of command, attention, stands at ease, stand easy and turning.
3. Sizing, numbering, forming in three ranks, open and close order march and dressing
4. Saluting at the halt, getting on parade, dismissing and falling out.
5. Marching, length of pace, and time of marching in quick/slow time and halt. Side pace, pace forward and to the rear.
6. Turning on the march and wheeling. Saluting on the march.
7. Marking time, forward march and halt
8. Changing step, formation of squad and squad drill.
9. Command and control, organization, badges of rank, honours and awards
10. Nation Building- cultural heritage, religions, traditions and customs of India. National integration.
11. Values and ethics, perception, communication, motivation, decision making, discipline and duties of good citizen.
12. Leadership traits, types of leadership. Character/personality development.
13. Civil defense organization, types of emergencies, fire fighting, protection,
14. Maintenance of essential services, disaster management, aid during development projects.
15. Basics of social service, weaker sections of society and their needs, NGO's and their contribution, contribution of youth towards social welfare and family planning.
16. Structure and function of human body, diet and exercise, hygiene and sanitation.
17. Preventable diseases including AIDS, safe blood donation, first aid, physical and mental health.
18. Adventure activities
19. Basic principles of ecology, environmental conservation, pollution and its control.
20. Precaution and general behaviour of girl cadets, prevention of untoward incidents, vulnerable parts of the body, self defense

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. *NCC* (National *Cadet Corps*) A concise Handbook of *NCC* Cadets for ' A', 'B' & 'C' Certificate Examinations by R. Gupta' s

REFERENCE BOOKS:

1. *NCC* (National *Cadet Corps*) A concise Handbook of *NCC* Cadets for ' A', 'B' & 'C' Certificate Examinations by R. Gupta' s

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=M1XCjrAI_qY
2. https://www.youtube.com/watch?v=14Pgi7PXpsA

Web Resources:

1. https://ncc.gov.in/sites/default/files/manualNss2006.pdf
2. https://nccmu.in/wp-content/uploads/2020/07/NCC-Manual.pdf

Course Code	Course Title	L	T	P	S	C
NSS/NCC 101	**PHYSICAL EDUCATION AND YOGA PRACTICES 1(0+1)**	-	-	1	-	1

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide foundational course that promotes lifelong physical activity, health, and wellness through structured exercise, sports, and recreational activities. This course provides students with the knowledge, skills, and attitudes necessary to develop and maintain healthy lifestyles while fostering a love for physical activity and sport.

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

CO1. Understand and apply principles of physical conditioning, including strength, flexibility, endurance, and cardiovascular health

CO2. Understand the benefits of yoga for physical, mental, and emotional health

CO3. Gain knowledge about different physical activities, sports, and their rules and strategies

CO4. 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	PSO6
CO1	2	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	2	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	2	-	-	-	-	-	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	-	-	-	-	-	-	**3**	**3**	-	**3**	-	-	-	-	-

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Teaching – Meaning, Scope and importance of Physical Education
2. Teaching – Definition, Type of Tournaments
3. Teaching – Physical Fitness and Health Education
4. Teaching of skills of Hockey – demonstration practice of the skills and correction.
5. Teaching of skills of Football – demonstration practice of the skills and correction. And involvement of skills in games situation
6. Teaching of advance skills of Basketball – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
7. Teaching of skills of Kabaddi – demonstration practice of the skills and correction.
8. Teaching of skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of the skills in games situation
9. Teaching of advance skills of Kho-Kho – demonstration practice of the skills and correction. Involvement of all the skills in games situation with teaching of rules of the game
10. Teaching of different track events – demonstration practice of the skills and correction.
11. Teaching of different field events – demonstration practice of the skills and correction with competition among them.
12. Teaching of skills of Table Tennis – demonstration, practice of skills, correction and practice and involvement in game situation
13. Teaching of different asanas – demonstration practice and correction.
14. Teaching of different asanas – demonstration practice and correction.
15. Teaching of different asanas – demonstration practice and correction
16. Teaching of different asanas – demonstration practice and correction.
17. Teaching of different asanas – demonstration practice and correction.
18. Teaching of weight training – demonstration practice and correction.
19. Teaching of circuit training – demonstration practice and correction.
20. Teaching of calisthenics – demonstration practice and correction

RESOURCES

TEXT BOOKS:

1. Resource management in physical education, by Dr. N Govindarajulu, friends publication, 2002.

REFERENCE BOOKS:

1. Physical education today and tomorrow, by Dr. Gangopadhyay, friends publication, 2012.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=fx4Ur8TWBAY
2. https://www.youtube.com/watch?v=1V_llLIBzys

Web Resources:

1. https://ncert.nic.in/textbook.php?kehp1=0-11

Course Code	Course Title	L	T	P	S	C
AGRO 104	**INTRODUCTION TO FORESTRY 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	2	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	-	2	3	-	2	-	-	-	3	-	-	-	-
CO3	2	-	1	3	-	2	-	-	-	3	-	-	-	-
CO4	2	-	-	3	-	2	-	-	-	3	-	-	-	-
CO5	3	-	1	3	-	1	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**-**	**2**	**3**	**-**	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: INTRODUCTION TO FORESTRY AND THEIR BASIC CONCEPTS (04 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 (03 Periods)

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

Module 3: FOREST MENSURATION (03 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 (03 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 (03 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

PRACTICALS/ 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. Nursery technology
7. seed sowing

8. vegetative propagation techniques
9. Forest plantations and their management
10. Agri-silvicultural systems
11. Silvo pastoral systems
12. Agro silvi 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

TEXT BOOKS:

1. V.K. MISHRA, S.K. CHAUHAN, NIRAKAR BHOL, 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, Jugal Kishore and Company, in India, Dehradun, 1980.
2. Negi, S.S., Dehradun, International book distributor, Agroforestry hand book, 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
BICM 101	**FUNDAMENTALS OF PLANT BIOCHEMISTRY AND BIOTECHNOLOGY 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides theoretical and practical knowledge on understanding the basic concepts of biochemistry and biotechnology in the field of agriculture, its scope and importance; structures and properties of various molecules like carbohydrates, proteins, amino acids, lipids, enzymes and nucleic acids etc., and metabolism of carbohydrates and lipids for better understanding of plants.

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

CO1. To understand the importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.

CO2. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes

CO3. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

CO4. 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;

CO5. 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.

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	2	1	-	-	3	-	-	-	-	3	3	-	-	-
CO2	2	2	-	2	3	-	-	-	-	3	3	-	-	-
CO3	3	1	-	3	3	-	-	-	-	3	3	-	-	-
CO4	2	2	-	1	3	-	-	-	-	3	3	-	-	-
CO5	1	3	-	-	3	-	-	-	-	3	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**2**	**-**	**2**	**3**	**-**	**3**	**3**	**-**	**3**	**3**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: BIOCHEMISTRY-INTRODUCTION AND IMPORTANCE *(07 periods)*

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids.

Module 2: PROTEINS – IMPORTANCE AND CLASSIFICATION *(06 periods)*

Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes.

Module 3: NUCLEIC ACIDS – IMPORTANCE AND CLASSIFICATION *(06 periods)*

Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids.

Module 4 PLANT BIOTECHNOLOGY – CONCEPTS AND APPLICATIONS *(06 periods)*

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

Module 5: RECOMBINANT DNA METHODS – INTRODUCTION AND ITS IMPORTANCE *(07 periods)*

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/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Preparation of solution, pH & buffers
2. Qualitative tests of carbohydrates and amino acids
3. Qualitative tests for proteins
4. Quantitative estimation of glucose
5. Quantitative estimation of proteins
6. Titration methods for estimation of amino acids
7. Effect of pH, temperature, and substrate concentration on enzyme action
8. TLC demonstration for separation of amino acids
9. Biotechnology Laboratory Visit
10. Sterilization techniques
11. Composition of various tissue culture media and preparation of MS nutrient medium
12. Callus induction from various explants.
13. Micro-propagation, hardening, and acclimatization.
14. Demonstration on isolation of DNA
15. Demonstration of gel electrophoresis techniques.
16. DNA fingerprinting

RESOURCES

TEXT BOOKS:

1. David L. Nelson, Michael M.Cox; W.H. Freeman Principles of Biochemistry, Lehninger, 6th Edition
2. Dr.U.Satyanarayana, Dr.U. Chakrapani, Biochemistry,Books and Allied(P) Ltd, Kolkata

REFERENCE BOOKS:

1. Biochemistry, S.N.Gupta, Rastogi Publications, First Edition, 2011
2. Introduction to Plant Biotechnology by HS Chawla (3rd Edition), Oxford & IBH Publishing Co. Pvt Ltd., New Delhi,2002.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=pKoqUn4tAmc&list=PLWtvMsK8gLU1SYog__nz2iQ-WFNP1GAP9
2. https://www.youtube.com/watch?v=JId3c9Mkvec

3. https://www.youtube.com/watch?v=rhTh8LYYBcQ

Web Resources:

1. https://www.agrimoon.com/wp-content/uploads/Fundamentals-of-Biochemistry.pdf

Course Code	Course Title	L	T	P	S	C
ENTO 131	**FUNDAMENTALS OF ENTOMOLOGY 4(3+1)**	3	-	1	-	4

Pre-Requisite **-**
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 such importance 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 up to 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 control importance, 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**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) 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, Oxford, Biology of insects, IBH Publishing Co. Pvt. Ltd., 1992. New Delhi.
2. Srivastava, P.D. and R.P.Singh, An introduction to entomology, Concept Publishing Company, New Delhi, 1997.
3. Tembhare, D.B,Modern Entomology, Himalaya Publishing House, Mumbai, 1997..

REFERENCE BOOKS:

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

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
AECO 141	**FUNDAMENTALS OF AGRICULTURAL ECONOMICS 3(3+0)**	3	-	-	-	3

Pre-Requisite -
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	2	1	-	-	-	-	-	-	-	-	-	-	3	-
CO2	2	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 (09 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 (09 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 (09 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 (09 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 (12 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: 48

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=wlmifvc0tDA&list=PL62muJtTPK40OLjcn9e2r8SGUG0oTSNgw
2. https://www.youtube.com/watch?v=obmStIEWxh0&list=PL62muJtTPK40OLjcn9e2r8S

GUG0oTSNgw&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
AENG 151	**SOIL AND WATER CONSERVATION ENGINEERING 2(1+1)**	1	-	1	-	2

Pre-Requisite **-**

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	2	-	-	-	-	-	-	-	-	3
CO4	3	2	-	3	2	-	-	-	-	-	-	-	-	3
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**-**	**2**	**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

PRACTICALS/ EXPERIENTIAL LEARNING

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

REFERENCE BOOKS:

1. Mutreja, K.N. Applied Hydrology. Tata McGraw-Hill Publishing Co., New Delhi., 1990.
2. Raghunath, H.M. Hydrology, Principles Analysis and Design, Revised 2nd Edition, New Age International (P) Limited Publishers, New Delhi., 2006.
3. Subramanya.k, Engineering Hydrology, 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
PPHY 161	**FUNDAMENTALS OF PLANT PHYSIOLOGY 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide 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 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 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	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**

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

COURSE CONTENT

Module 1: INTRODUCTION TO CROP PHYSIOLOGY AND ITS IMPORTANCE IN AGRICULTURE AND PLANT WATER RELATIONSHIP (06 Periods)

Introduction to Crop Physiology and importance of Crop Physiology in Agriculture – Plant cell: 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, anti-transparent.

Module 2: MINERAL NUTRITION OF PLANTS (08 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 (06 Periods)

Photosynthesis: Light and dark reactions, Photosystems, red drop and Emerson enhancement effect, Photolysis of water and photophosphorylation, Z scheme, C3, C4 and CAM plants; Photosynthetic pathways of C3, C4 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 (06 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 (06 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

PRACTICALS/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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

Web Resources:

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

Course Code	Course Title	L	T	P	S	C
HORT 182	**PRODUCTION TECHNOLOGY FOR VEGETABLES AND SPICES 2(1+1)**	1	-	1	-	1

Pre-Requisite **-**

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	-	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	-	-	1	-	-	-	-	-	3	-	-	-	-
CO4	3	-	-	2	-	-	-	-	-	3	-	-	-	-
CO5	3	-	-	2	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	-	**-**	**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, Perennial vegetables – 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**

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) 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. S. Thamburaj, Textbook of vegetable, tuber crops, and Spices, ICAR, New Delhi, 2014.
2. B.R. Choudhary, A Textbook on the production technology of vegetables, Kalyani Publishers. Ludhiana, 2009.
3. T.K. Bose, Nayaprakash, Vegetable Crops. Kolkata, 2002.
4. P. Hazra, Modern Technology in Vegetable Production. New India Publishing Agency. New Delhi, 2011.
5. Shanmugavelu, K.G., N. Kumar and K.V. Peter Production Technology of Spices and Plantation Crops. Agrobios (India), Jodhpur, 2005.
6. Handbook of Vegetable Crops. M.S. Dhaliwal, Kalyani Publishers. Ludhiana, 2008.

REFERENCE BOOKS:

1. Dhaliwal M.S, Vegetable crops: production technology, Kalyani Publishers, Ludhiana, 2001
2. B.R. Choudhary, A Textbook on the production technology of vegetables, 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
EXTN 192	**FUNDAMENTALS OF AGRICULTURAL EXTENSION EDUCATION 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts of extension education, extension program planning, program development, extension systems in India, extension/ agriculture development program launched by ICAR/Govt. of India, new trends in agricultural extension. The course also provides insights into various concepts such as rural development, rural leadership, monitoring and evaluation of extension programs, 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. 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	2	2	-	1	-	-	-	-	-	-	-	-	3	-
CO2	2	3	-	3	-	-	-	-	-	-	-	-	3	-
CO3	2	3	-	3	3	-	-	-	-	-	-	-	3	-
CO4	2	3	-	3	3	2	-	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course Correlation Mapping	**2**	**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 PROGRAMS 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 programs 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 programs

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. To get acquainted with university extension system.
2. To study about the group discussion
3. Handling and use of audio-visual equipment's
4. Handling of liquid crystal display (LCD) projector
5. Preparation and use of audio-visual aids
6. Preparation of extension literature – leaflets and pamphlets
7. Preparation of extension literature – folders and booklets/bulletins

8. Preparation of extension literature – news stories and success stories
9. Visit to a village to understand the problems being encountered by the villagers/ farmers
10. Planning and preparation of micro teaching skill
11. Study of the organization and functioning of DRDA
12. Awareness about the ATMA programme
13. Study about the script writing for television and radio
14. Understanding PRA techniques and their application in village development planning
15. Exposure to mass media: visit to community radio and television studio for understanding the process of programme production
16. Visit to a KVK and NGO to study about its functions and activities

RESOURCES

TEXT BOOKS:

1. Adivi Reddy, A., Sree Lakshmi, Extension Education by, press, Bapatla, 2001.
2. Dahama, O. P. Education and Communication for Development, Bhatnagar, O.P., Oxford and IBH publishing Co. Pvt. Ltd., New Delhi, 1998.

REFERENCE BOOKS:

1. Fundamentals of Extension Education and Management in Extension, Concept publishing company, New Delhi, 2018.
2. Muthaiah Manoharan, P. and Arunachalam, R., Agricultural Extension, Himalaya, Publishing House (Mumbai), 2018.

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
AMBE 101	**AGRICULTURAL MICROBIOLOGY 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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

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	2	3	-	-	-	-	-	-	-	3	-	-	-	-
CO2	2	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	2	2	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: HISTORY OF MICROBIOLOGY (4 Periods)

Introduction to microbial 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, blue green algae and mycorrhiza. Rhizosphere and phyllo sphere

Module 5: MICROBES IN HUMAN WELFARE (3 Periods)

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

Total Periods: 16

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction to microbiology laboratory and its equipment's
2. Microscope- parts, principles of microscopy, resolving power and numerical aperture
3. Methods of sterilization
4. Nutritional media and their preparations.
5. Enumeration of microbial population in soil- bacteria.
6. Enumeration of microbial population in soil- fungi.
7. Enumeration of microbial population in soil- actinomycetes.
8. Methods of isolation and purification of microbial cultures
9. Isolation of Rhizobium from legume root nodule.
10. Isolation of Azotobacter from soil
11. Isolation of Azospirillum from roots

12. Isolation of BGA
13. Staining and microscopic examination of microbes
14. Staining and microscopic examination of biofertilizer organisms.
15. Isolation of VAM from soil by wet sieving and decantation technique.
16. Determination of VAM root colonization by staining the infected roots.

RESOURCES

TEXTBOOKS:

1. N. S. Subba Rao, Agricultural Microbiology, Kalyani publishers, 2020.
2. N. S. Subba Rao, Soil Microbiology, Kalyani publishers, 2020.

REFERENCE BOOKS:

1. Mark Coyne,Industrial Microbiology, Kalyani publishers, 2016.
2. Mahendra Rai, Hand book of Microbial Bio fertilizers Kalyani publishers, 2018.

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

Course Code	Course Title	L	T	P	S	C
AGRO 201	**CROP PRODUCTION TECHNOLOGY – I (KHARIF CROPS) 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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 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 of food grain requirement and cultivation of major cereal crops

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

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

CO4. To get knowledge on growing of legume and perennial 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	-	-	-	-	-	-
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 (04 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 (03 Periods)

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

Module 3: AGRONOMY OF PULSES (03 Periods)

Red gram, Black gram, green gram, Bengal gram, Horse gram, Cowpea, Soybean and Lentil - Origin, geographic distribution, economic importance, soil and climatic requirement, 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 (03 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 climatic requirement, varieties, cultural practices and yield. Fodder preservation techniques

Module 5: AGRONOMY OF GREEN MANURES (03 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:16

PRACTICALS/EXPERENTIAL LEARING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification of cereals, millets, pulses, green manures, and forage crops in the crop 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 pure and 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

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, PHI ,2015,.

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
GPB211	**FUNDAMENTALS OF PLANT BREEDING 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide knowledge on comprehensive understanding of the principles and practices involved in breeding plants for desired traits. This course explores the foundational concepts in plant genetics, breeding methodologies, and the application of breeding techniques to improve crop yield, quality, and resilience.

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

CO1. Explain the fundamental principles of plant breeding with its historical view and realize the value of its scope.

CO2. Comprehend the conventional and modern plant breeding techniques to boost the crop productivity.

CO3. Determine the gene combinations in plant breeding techniques, procedure and process for developing varieties in self- and cross-pollinated crops.

CO4. Explain the mechanism of apomixes and study the exploitation of apomixis in crop improvement

CO5. Develop plant breeding solutions for yield increment and stress tolerance

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	-	-	-	-	-	-	-	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: PLANT BREEDING – HISTORY, ROLES AND ACHIEVEMENTS ***(04 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: REPRODUCTION AND APOMIXIS ***(08 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: PLANT INTRODUCTION ***(08 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 CONCEPTS ***(06 Periods)***

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 CROPS – ASEXUAL PROPAGATION ***(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.

Total Periods:32

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

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, red gram.
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 each crop and extent of natural out crossing

RESOURCES

TEXT BOOKS:

1. B.D. Singh, Plant breeding – Principles and methods by Singh, Kalyani Publishers, New Delhi, 2018.
2. Allard, Principles of Plant breeding, John Wiley and Sons, New Delhi, R. 2019.
3. Phundan Singh, Essentials of Plant Breeding, Kalyani Publishers, 2018.

REFERENCE BOOKS:

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

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:

3. http://ecoursesonline.iasri.res.in/course/view.php?id=134

4. https://plantreeding.ncsu.edu/academics/plant-breeding-lectures/

Course Code	Course Title	L	T	P	S	C
AECO 241	AGRICULTURAL FINANCE AND CO-OPERATION 3(2+1)	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts of agricultural finance and its role in Indian agriculture. The course provides insights into 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 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	-	-	-	-	-	-
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

PRACTICALS/ EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Determination of most profitable level of capital use
2. Optimum allocation of limited amount of capital among different enterprises
3. Analysis of progress and performance of cooperatives using published data
4. Analysis of progress and performance of commercial banks and RRBs using published data
5. Visit to a commercial bank, cooperative bank and cooperative society to acquire first hand knowledge of their management, schemes and procedures
6. Visit to a district central cooperative bank (DCCB) to study its role, functions and procedures for availing loan - fixation of scale of finance
7. Estimation of credit requirement of farm business - A case study
8. Preparation and analysis of balance sheet and cash flow statement - A case study
9. Preparation and analysis of income statement - A case study

10. Exercise on financial ration analysis, appraisal of loan proposal - A case study
11. Estimation of undiscounted methods
12. Estimation of discounted methods
13. Preparation of repayment plans
14. Preparation of bankable projects/farm credit proposals and appraisal
15. Techno-economic parameters for preparation of projects for various agricultural products and its value-added products
16. Seminars on selected topics

RESOURCES

TEXT BOOKS:

1. Subba Reddy, Raghuram, P., Neelakanta Sastry, T.V. and Bhavani Devi, Agricultural Economics, Oxford and IBH Pub Co. Pvt. Ltd., New Delhi (2nd Edition), 2005.
2. Subba Reddy and Raghuram, P., Agricultural Finance and Management, Oxford and IBH Publishing Co. Private Ltd., New Delhi, 2005.
3. Amarjit Singh, A N Sadhu and Jasbir Singh, Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai (11th edition), 2018.

REFERENCE BOOKS:

1. Subba Reddy and Raghuram, P., Agricultural Finance and Management, Oxford and IBH Publishing Co. Private Ltd., New Delhi, 2005.
2. Amarjit Singh, A N Sadhu and Jasbir Singh, Fundamentals of Agricultural Economics, Himalaya Publishing House, Mumbai (11th edition), 2018.

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
AENG 251	**FARM MACHINERY AND POWER 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	-	-	1	-	-	-	-	-	-	-	-	-	3
CO2	3	2	-	3	-	-	-	-	-	-	-	-	-	3
CO3	3	2	-	3	-	-	-	-	-	-	-	-	-	3
CO4	3	2	-	3	-	1	-	-	-	-	-	-	-	3
CO5	3	3	-	3	-	-	-	-	-	-	-	-	-	3
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**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

PRACTICALS/ EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Familiarization with tractor components and their working principles
2. Exploring the clutch and brakes with working principles and their types.
3. Exploring the steering system of tractor and types of steering system
4. Exploring of periodical maintenance of tractor and storage of tractor
5. Different Type of Tractors Available in India/abroad
6. Driving of Tractor and power tiller.
7. Attachment of an implement by using a Drawbar and 3-point hitch system of a tractor.
8. Tractor tyres terminology, types, and their importance in agricultural fields.
9. Familiarization with primary tillage implements like an indigenous plough, M. B. Plough, disc plough, and its adjustments.

10. Ploughing of land and exploring methods of ploughing

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

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

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

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

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

16. Familiarization with tractor components and their working principles

RESOURCES

TEXT BOOKS:

1. T. P. Ojha and A.M. Michael, Principles of Agricultural Engineering (Volume - 1), Jain Brothers, 2005.

2. Surendra Singh, Farm Machinery Principles and Applications. ICAR Publications, 2007.

3. Surendra Singh & Verma. 2009. Farm Machinery Maintenance & Management. ICAR Publication.

4. M.M. Pandey & Others,Handbook of Agricultural Engineering. ICAR publication yyJagadishwar Sahay.1992. Elements of Agricultural Engineering. Agro Book Agency, Patna, 2012.

REFERENCE BOOKS:

1. Kepner RA Roy Bainer and Barger BL,Principles of Farm Machinery. CBS Publisher and Distributors, Delhi, 1978.

2. Jain S C, Farm Machinery- An approach. Standard Publishers and Distributors, New Delhi , 2003.

3. Klein, N.I. Popov, I.F. and Sakun, V.A., Agricultural Machines. Amerind publishing Co. Pvt. Ltd., New Delhi, 1985.

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
PATH 271	**FUNDAMENTALS OF PLANT PATHOLOGY 4(3+1)**	3	-	1	-	4

Pre-Requisite -

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.
- **CO2.** Analyze the General characters and taxonomy to identify the abiotic disorders of Fungi, Bacteria & Mollicutes.
- **CO3.** Analyze the General characters and taxonomy to identify the abiotic disorders of viruses &Nematodes.
- **CO4.** Understand the Reproduction and Pathogenesis to develop defense mechanisms in plants.
- **CO5.** Apply Fungicides and Antibiotics in plant disease management.
- **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	-	1	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	1	-	1	-	-	-	-	-	3	-	-
CO5	3	-	1	3	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	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. (12 Periods)

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. (12 Periods)

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

Module 3: GENERAL CHARACTERS, TAXONOMY AND ABIOTIC DISORDERS OF VIRUSES AND NEMATODES (12 Periods)

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 (06 Periods)

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 (06 Periods)

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 PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Acquaintance with light microscope- preparation of media for isolation of plant pathogens and proving Koch's postulates
2. General characters of fungi – Types of mycelia -Types of vegetative, asexual, and sexual spores - asexual and sexual fruiting bodies
3. Study of important taxonomic characters and symptoms produced by *Plasmodiophora*, *Pythium,* and *Phytophthora*
4. Study of important taxonomic characters and symptoms produced by *Sclerospora, Plasmopara*and *Albugo*
5. Study of Important Taxonomic Characters and Symptoms Produced by *Rhizopus, Taphrina, Capnodium, Mycosphaerella, Cochliobolus, Lewia, Botryosphaeria* and *Macrophomina*
6. Study of Important Taxonomic Characters and Symptoms Produced by *Eurotium, Talaromyces, Erysiphe, Golovinomyces, Leveillula,* and *Phyllactinia*
7. Study of Important Taxonomic Characters and Symptoms Produced by *Claviceps, Ustilaginoidea, Gibberella, Verticillium* and *Sarocladium*
8. Study of Important Taxonomic Characters and Symptoms Produced by *Glomerella, Pestalosphaeria*and *Magnaporthe*
9. Study Of Important Taxonomic Characters and Symptoms Produced by *Puccinia, Uromyces* and *Hemileia*
10. Exposure Field Visit to Understand Different Crop Diseases
11. Study of Important Taxonomic Characters and Symptoms Produced by *Ustilago,*

Sporisorium, Moesziomyces and Exobasidium

12. Study of Important Taxonomic Character of *Agaricus, Pleurotus, Calocybe*and *Volvariella*
13. Study of Important Taxonomic Character and Symptoms produced by *Athelia, Thanetephorus*and *Ganoderma*
14. Symptoms of Bacterial Diseases: Leaf Spot, Leaf Blight, Leaf Streak, Canker, Scab, Crown Gall, Wilt, Soft Rot and Yellow Ear Rot
15. 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
16. 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, 2009.
2. Ravichandra N. G., Fundamentals of Plant Pathology, PHI, 2011

REFERENCE BOOKS:

1. A.V.S.S. Samba Murty, A Textbook of Plant Pathology, Dream tech press, 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
HORT 281	**PRODUCTION TECHNOLOGY FOR FRUIT AND PLANTATION CROPS 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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. Work independently or in team 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	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	2	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	3	-	-	-	-
CO5	3	2	-	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: 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

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) 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, Text book on pomology , Kalyani Publishers, New Delhi, 1997,
2. Chadha,K.L, Hand book of Horticulture, (ICAR) ICAR, New Delhi, 2001,
3. Shanmugavelu, K.G. Kumar, N and Peter,Production technology of spices and plantation crops, K.V.,Agrosis, Jodhpur, 2005.

REFERENCE BOOKS:

1. Radha T and Mathew L., Fruit crops, New India Publishing Agency, 2007.
2. Mitra S.K, Rathore D.S and Bose T .K. Temperate Fruit Crops, Horticulture and Allied Publishers, Calcutta, 1992.
3. Kumar, N.J.B. M. Md. Abdul Khaddar, Ranga Swamy, P. and rrulappan,Introduction to spices, Plantation crops and Aromatic plants by I. Oxford & IBH, New Delhi, 1997.

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
EXTN 291	**COMMUNICATION SKILLS AND PERSONALITY DEVELOPMENT 2(1+1)**	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview to the students with essential communication techniques and personal development strategies to enhance their professional and interpersonal effectiveness. Through a combination of theoretical insights, practical exercises, and interactive sessions, students will develop the communication proficiency and self-awareness necessary for success in various personal and professional contexts.

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	-	-	-	-	-	-
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; Group discussion. Organizing seminars and conferences.

Total Periods:16

PRACTICALS/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

TEXT BOOKS:

1. Dangi K.L., S.S. Sisoda, Pravesh Singh Chauhan and Yogita Ranavat. A Text Book of Communication Skills. Agrotech Publications, 2012.
2. Mangal S.K. Essentials of Educational Psychology. PHI Learning Private Ltd., 2016. New Delhi.

REFERENCE BOOKS:

1. Nirajkumar. A Genesis of Behavioural Science. Gyan Publishing House, New Delhi, 1997.
2. Eric Berne, Games People Play-The Psychology of Human Relationship. Grove Press Publishers,1964.
3. Thomas Anthony Harris, I am Ok You are Ok. Harper Publishers. 6. Scott Bill. 1981.

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
AH 201	**Livestock and Poultry Management 4(3+1)**	3	-	1	-	4

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide the students with holistic knowledge about the livestock and poultry management so that it can be applied at field level, hands on training about livestock, poultry-based farming and preparation of dairy products, impart knowledge 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	2	2	-	2	-	2	-	-	-	3	-	-	-	-
CO2	2	3	-	2	-	2	-	-	-	3	-	-	-	-
CO3	2	3	-	3	-	3	-	-	-	3	-	-	-	-
CO4	3	3	-	2	2	2	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**3**	**2**	**2**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: INTRODUCTION TO LIVESTOCK AND POULTRY MANAGEMENT (10 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 (14 Periods)

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 (12 Periods)

Breeds - Classification - Economic traits - Systems of rearing – Housing management – 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 (12 Periods)

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: 48

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of external parts of cattle
2. Common methods of restraining in cattle
3. Identification methods of livestock
4. Disbudding and deworming in cattle
5. Determination of age in cattle
6. Study and design of cattle shed

7. Selection of dairy cow by score card method
8. Determination of weight in cattle
9. Determination of specific gravity in milk
10. Demonstration of fat percentage and total solids estimation in milk
11. Demonstration of cream separation
12. Demonstration of ice cream making
13. Identification of feed and fodder
14. Identification of poultry farm equipment's
15. Measures of performance efficiency in broiler and layer
16. Visit to dairy plant, layer and broiler farms

RESOURCES

TEXT BOOKS:

1. Gopalakrishnan, G.M.M and Lall, Livestock and Poultry enterprises for rural development, Vikas Publishing House, UP, 1993.
2. Hafez,E.S.E , Lea & Febiger, Adaptation of animals, 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 by 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
MATH 201	**STATISTICAL METHODS 2(1+1)**	1	-	1	-	2

Pre-Requisite -
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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF EXERCISES: LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) 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/ STUDY MATERIALS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

Course Code	Course Title	L	T	P	S	C
AGRO 202	**CROP PRODUCTION TECHNOLOGY – II (*RABI* CROPS) 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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:

CO1. To understand the importance of food grain requirement and cultivation of major cereal crops

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

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

CO4. To get knowledge on growing of legume and perennial 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	2	2	-	1	-	-	-	-	-	3	-	-	-	-
CO2	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	2	2	-	3	-	-	-	-	-	3	-	-	-	-
CO4	2	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: CEREALS- WHEAT AND BARLEY (03 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 (04 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 (03 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 (03 Periods)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of sugar crops-sugarcane and sugar beet

Module 5: MEDICINAL AND AROMATIC CROPS (03 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:16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF EXERCISES: LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

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

TEXT BOOKS:

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

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

Course Code	Course Title	L	T	P	S	C
AGRO 203	**FARMING SYSTEM AND SUSTAINABLE AGRICULTURE 1(1+0)**	**1**	**-**	**0**	**-**	**1**

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide students a comprehensive overview of agricultural practices that promote environmental stewardship, economic viability, and social equity. By integrating ecological principles, agricultural economics, and social perspectives, this course equips students with the knowledge and skills necessary to design and manage farming systems that are both productive and sustainable.

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

CO1. To understand the importance of food grain requirement and cultivation of major cereal crops

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

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

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

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

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	2	-	-	-	-	-	-	-	3	-	-	-	-
CO2	2	2	-	-	-	2	-	-	-	3	-	-	-	-
CO3	2	3	-	-	-	1	-	-	-	3	-	-	-	-
CO4	2	3	-	-	-	2	-	-	-	3	-	-	-	-
CO5	2	3	-	-	-	-	-	-	-	3	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**-**	**-**	**2**	-	-	**-**	**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 system and 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 their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system.

Module 3: SUSTAINABLE AGRICULTURE (03 Periods)

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

Module 4: INTEGRATED FARMING SYSTEMS (03 Periods)

Integrated farming system-historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones.

Module 5: RESOURCE USE EFFICIENCY (03 Periods)

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

Total Periods:16

RESOURCES

TEXT BOOKS:

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

2 Jayanthi C, Devasenapathy P and Vinnila, C, Satish,Farming systems principles and practice, serial publishing house, Delhi, 2008.

REFERENCE BOOKS:

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

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

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
GPB 212	**CROP IMPROVEMENT-I (KHARIF CROPS) 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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:

CO1. Get knowledge about distribution of cereals, pulses, oil seeds, fibers, fodders, cash crops and horticultural crops

CO2. Understand the plant genetic resource, its utilization and conservation

CO3. Get knowledge on different breeding techniques

CO4. Impart knowledge on different modern breeding techniques for development of hybrids

CO5. Understand different hybrid seed production technology in different crops

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	2	3	-	1	-	-	-	-	-	-	3	-	-	-
CO2	2	3	-	2	-	-	-	-	-	-	3	-	-	-
CO3	2	3	-	2	3	-	-	-	-	-	3	-	-	-
CO4	2	3	-	2	3	2	-	-	-	-	3	-	-	-
CO5	2	3	-	2	2	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**2**	**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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Pollination and reproduction in plants - Alternation of generation and life cycle.
2. Description and drawing different pollination systems - Mechanisms enforcing self and cross pollination in crops; Pollen morphology. Fertility and sterility in A, B, R and TGMS lines.
3. Breeder kit and its components – uses; Basic steps of selfing and crossing techniques.
4. Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi.
5. Floral biology, emasculation and hybridization techniques in different crop species Pigeon pea, and Cowpea Urd bean, Mungbean,
6. Floral biology, emasculation and hybridization techniques in different crop species Tobacco, Brinjal, Okra and Cucurbitaceous crops
7. Floral biology, emasculation and hybridization techniques in Soybean, Groundnut, Sesame, Caster, Cotton,
8. Studies on segregating generation and maintenance of records.

9. Maintenance breeding of different *kharif* crops

10. Handling of germplasm and segregating populations by different methods like pedigree, bulk and single seed decent methods

11. Study of field techniques for seed production and hybrid seeds production in *Kharif* crops

12. Estimation of heterosis, inbreeding depression and heritability

13. Layout of field experiments

14. Study of quality characters, donor parents for different characters

15. Visit to seed production plots

16. Visit to AICRP plots of different field crops

RESOURCES

TEXT BOOKS:

1. Singh, B.D, Plant breeding - Principles and methods. Kalyani Publishers, New Delhi, 2005.

2. Allard, R, Princples of Plant breeding. John Wiley and Sons, New Delhi, 1989.

REFERENCE BOOKS:

1. D.N. Bharadwaj, Breeding Field Crops. Agrobios (India), Jodhpur, 2012.

2. Chahal, G.S. and S.S.Gosal, Principles and Procedures of plant breeding: biotechnological and conventional Approaches. Narosa Publishing House (India), 2002.

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
SSAC 221	**MANURES, FERTILIZERS AND SOIL FERTILITY MANAGEMENT 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts of manures, fertilizers and soil fertility management. The course provides deep insights into 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:

CO1. 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.

CO2. Understand chemical fertilizers with their classification, composition, and properties. Understand about soil amendments - fertilizer storage and Fertilizer Control Order. Biofertilizers – classification – Types- importance

CO3. Gaining knowledge about the basic concepts of organic manures- green and green leaf manures- integrated nutrient management.

CO4. 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.

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	-	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	3	-	1	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation	**3**	**3**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Mapping														

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

COURSE CONTENT

Module 1: SOIL FERTILITY AND PLANT NUTRITION (08 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 (08 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 (08 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 (08 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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction to Colorimetric - principles, calibration, and applications
2. Introduction to flame photometry - principles, calibration, and applications
3. Estimation of soil organic carbon
4. Estimation of Available Nitrogen in soil by alkaline permanganate method
5. Estimation of Available Phosphorus in soil
6. Estimation of Available Potassium in soil
7. Preparation of HCl extract for the estimation of exchangeable Ca and Mg in soil

8. Preparation of Sesquioxide extract for the estimation of exchangeable Ca and Mg.
9. Estimation of exchangeable Ca and Mg in soil
10. Estimation of extractable S in soil
11. Extraction of micronutrients (Fe, Zn, Cu & Mn) in soils soil using DTPA extractant.
12. Estimation of DTPA extractable micronutrients in soil
13. Estimation of total nitrogen in plant sample
14. Estimation of total phosphorus in plant sample
15. Estimation of total potassium in plant sample
16. Estimation of total Sulphur in plant sample

RESOURCES

TEXT BOOKS:

1. Tandon HLS, Fertilizers Guide. Fertilizers Development Consultation Organization, New Delhi, 1994.
2. Ranjan Kumar Basak, Fertilizers: A Text book. Kalyani publishers, New Delhi, 2000.

REFERENCE BOOKS:

1. Brady, N. C. and Weil, R. R., Elements of the Nature and Properties of Soils (3rd Edition.), Pearson Education, New Delhi, 2010.
2. Dilip Kumar Das, Introductory Soil Science, Kalyani Publishers, New Delhi, 2011,
3. The fertilizer Association of India, Fertilizer control order, Shaheed Jit singh marg, New Delhi, 1985.

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
ENTO 231	**PESTS OF CROPS AND STORED GRAIN AND THEIR MANAGEMENT 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an over view of 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. Work independently or in team 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	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	2	-	-	-	-	-	-	-	3	-	-
CO5	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**1**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

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

COURSE CONTENT

Module 1: INTRODUCTION ABOUT ARTHROPODS PEST (05 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. (05 Periods)

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. (07 Periods)

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 (07 Periods)

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 (08 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

PRACTICALS/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 of Narcotics, 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

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
AECO 242	**AGRICULTURAL MARKETING, TRADE AND PRICES 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on the concepts of aagricultural 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 insights into 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. Work independently or in team 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	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**

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

COURSE CONTENT

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 (10 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 (06 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

PRACTICALS/ 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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. McGraw, Projects: Preparation, Appraisal & Implementation, 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/AECO242/Start%20to%20read%20the%20Course.html

2. https://drive.google.com/file/d/1ekXNfABpo6DXjFoWTfsEfEzU5Cf6W10o/view

Course Code	Course Title	L	T	P	S	C
AENG 252	**RENEWABLE ENERGY AND GREEN TECHNOLOGY 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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 get familiarization 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	2	-	2	-	-	-	-	-	-	-	-	-	3
CO2	2	2	-	2	-	2	-	-	-	-	-	-	-	3
CO3	3	2	-	1	-	1	-	-	-	-	-	-	-	3
CO4	3	2	-	2	-	2	-	-	-	-	-	-	-	3
CO5	2	3	-	3	-	-	-	-	-	-	-	-	-	3
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**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 system and their application.

Module 5: WIND ENERGY (03 Periods)

Introduction of wind energy and their application.

Total Periods:16

PRACTICALS/ 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. Wind energy - Advantages, disadvantages, wind mills and types.
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

TEXT BOOKS:

1 Rai, G.D. Non-conventional Energy Sources. Khanna Publishers, New Delhi, 2004.

2 Rajput, R. K., Non-conventional Energy Sources. S. Chand Publishers, 2012.

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.in/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
PATH 272	DISEASES OF FIELD AND HORTICULTURAL CROPS AND THEIR MANAGEMENT -I 3(2+1)	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on etiology, 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. Work independently or in team 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	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,

Note: 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
MATH 202	**AGRI-INFORMATICS 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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:

CO1. Understand the basic in computers

CO2. Demonstrate the computer languages

CO3. Knowledge in IT applications in agriculture

CO4. Apply the decision supporting system in agriculture

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	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 SYSTEMS AND 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

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Study of Computer Components & Accessories
2. Practicing important DOS Commands.
3. Introduction of different operating systems such as Windows, Unix/ Linux, Creating, Files & Folders, and File Management.
4. Use of MS-WORD for creating, editing, and presenting a scientific Document
5. Use of MS PowerPoint for creating, editing and presenting a scientific Document.
6. MS-EXCEL - Creating a spreadsheet, using statistical tools, writing expressions, creating graphs, and analyzing scientific data.
7. Familiarization with Statistic Software such as R, SAS, SPSS, and STATA.
8. E- Agriculture
9. ICT in Agriculture
10. Simulating Crop Yield
11. InfoCrop - Dynamic crop simulation software

12. Smartphone mobile apps in Agriculture
13. Decision support systems -classification and types
14. Expert System in Agriculture – case study
15. Preparation of contingent crop planning/crop calendar
16. IT application for the computation of water and nutrient requirements of crops

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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

Course Code	Course Title	L	T	P	S	C
AGRO 301	**GEOINFORMATICS, NANO-TECHNOLOGY AND PRECISION FARMING 2(1+1)**	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview on cutting-edge technologies and their applications in modern agriculture, with a focus on optimizing farm management practices for increased efficiency, productivity, and sustainability. By integrating geoinformatics, nanotechnology, and precision farming techniques, this course equips students with the knowledge and skills to harness data-driven approaches and advanced tools for precision agriculture.

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

CO1. Gain knowledge on precision agriculture and Geo-informatics-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. Work independently or in team 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	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO3	2	2	-	3	-	-	-	-	-	3	-	-	-	-
CO4	2	3	-	2	-	-	-	-	-	3	-	-	-	-
CO5	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	3	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: PRECISION AGRICULTURE AND GEO-INFORMITCS. (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 (02 Periods)

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

PRACTICALS/ 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 spectral profiles 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/ STUDY MATERIALS

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 SwainA 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
AGRO 302	**PRACTICAL CROP PRODUCTION – I (KHARIF CROPS) 2(0+2)**	0	-	2	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an over view knowledge about cultivation of rice 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:

CO1. Understand the seasonal and climatic conditions favorable for kharif crop production

CO2. Gain practical experience in sowing and planting kharif crops, including seed selection, planting depth, and spacing

CO3. Understand and apply principles of nutrient management, including the use of fertilizers and soil amendments tailored to kharif crops

CO4. Develop skills in monitoring crop growth, identifying problems, and recording observations related to crop health and development

CO5. Work independently or in team 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	2	3	-	-	-	-	-	-	-	3	-	-	-	-
CO2	1	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	3	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	3	-	-	-	-
CO5	2	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	-	-	-	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

PRACTICALS/ EXPERIENTIAL LEARNING

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

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
GPB 311	**CROP IMPROVEMENT-II (RABI CROPS) 2(1+1)**	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide 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. Knowledge on the origins and diversity of different Rabi crops.

CO2. Understand the elements of heredity and different methods of crop improvement for the desirable traits like yield, quality and pest and disease resistance.

CO3. Understand different breeding techniques and achievements pertaining Rabi crops like wheat, barley, chickpea, fruit crops like banana and orange, bean, brinjal etc.,

CO4. Analyze 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. Knowledge on praise 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.

CO7. Work independently or in team 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	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	3	2	-	-	-	-	3	-	-	-
CO7	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation	**3**	**3**	**-**	**3**	**3**	**2**	**3**	**3**	**-**	-	**3**	**-**	**-**	**-**

Mapping														

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

COURSE CONTENT

Module 1: 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 (6 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 (6 Periods)

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 (6 Periods)

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 (4 Periods)

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 COMMERCIAL AND HORTICULTURAL CROPS (5 Periods)

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

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

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

TEXT BOOKS:

1 Singh, B.D, Plant breeding - Principles and methods. Kalyani Publishers, New Delhi, 2005.

2 David A.sleper and John Milton Poehlmen, Breeding of Field Crops, 2006.

REFERENCE BOOKS:

1 D.N. Bharadwaj, Breeding Field Crops. Agrobios (India), Jodhpur, .2012.

2 Chahal, G.S. and S.S.Gosal. Principles and Procedures of plant breeding: biotechnological and conventional Approaches. Narosa Publishing House (India), 2002.

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
SSAC 321	**PROBLEMATIC SOILS AND THEIR MANAGEMENT 2(2+0)**	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 bio remediation 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 agro ecosystems.

***Total Periods:*32**

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. D.K. Das, Problematic soils and Their Management,Kalyani Publishers, 2012
2. G.L. Maliwal, L. L. Somani, Soil Technology Agrotech Publications, 2019

REFERENCE BOOKS:

1. P.P. Mahendra, S. Pandian, P. Balasubramanian, A. Saravanan, Soil Resource Inventory & Management of Problematic Soils, Agrotech Publishing Academy,2017
2. Dilip Kumar Das, Introductory Soil Science by Kalyani Publications, New Delhi,2016

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
ENTO 331	**MANAGEMENT OF BENEFICIAL INSECTS 2(1+1)**	1	-	1	-	2

Pre-Requisite **-**

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. Work independently or in team 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	PSO 5
CO1	2	3	-	1	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	2	-	2	-	-	-	-	-	3	-	-
CO3	3	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	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 (02 Periods)

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 (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

TEXT BOOKS:

1. David B. Vasanthraj, Elements of Economic Entomology, Kalyani publishers, 1975.
2. K.N. Ragumoorthi, V. Balasubramani, M.R. Srinivasan, Natarajan by Insecta An Introduction by, AE Publications, 2014.

REFERENCE BOOKS:

1. M. Madan Mohan Rao by An Introduction to Sericulture by B.S. Publications, 2019.
2. Dr. Ashok Kumar Koshariya, Management of beneficial insects , Dr. Somnath Maruti Jadhav, 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

Course Code	Course Title	L	T	P	S	C
AECO 341	**INTELLECTUAL PROPERTY RIGHTS 1(1+0)**	**1**	**-**	**0**	**-**	**1**

Pre-Requisite -

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.

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	2	-	-	-	-	-	-	-	3	-	-	-	-
CO2	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO3	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	3	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: TREATISE FOR IPR PROTECTION (02 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 (04 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/ STUDY MATERIALS

TEXT BOOKS:

1. V K Ahuja, Law Relating to Intellectual Property Rights, Kalyani publishers, 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
PPHY 361	**Environmental Studies and Disaster Management 3(2+1)**	2	-	1	-	3

Pre-Requisite -

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 pollution and 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.

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	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO2	2	3	-	2	-	-	-	-	-	-	-	3	-	-
CO3	2	2	-	3	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO5	2	2	-	2	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**2**	**-**	**-**	**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 associated problems. a) Forest resources: Use and over-exploitation, deforestation, case studies. Timber extraction, 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 sustainable lifestyles.

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 and local 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 4: SOCIAL ISSUES, ENVIRONMENT AND WASTE LAND RECLAMATIONS (06 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: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in Environment and human health.

Total Periods: 32

PRACTICALS/ EXPERENTIAL LEARNING

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/ STUDY MATERIALS

TEXT BOOKS:

1. Ahluwalia VK & Malhotra S, Environmental Science. Ane Books India, 2006.
2. Anjaneyulu Y, Introduction to Environmental Science. BS Publications, 2004.
3. Chauhan AS, Environmental Studies. 3rd Edition. Jain Brothers, 2009.

REFERENCE BOOKS:

1. Das RC & Behera DK, Environmental Science - Principles and Practice. Prentice –Hall of India Pvt Ltd, 2008.
2. GS & Kukal SS. Essentials of Environment Science. Kalyani Publishers, 2005.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=C9VFsrt4YPc&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7
2. https://www.youtube.com/watch?v=PwmSa09Cl6E&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7&index=2
3. https://www.youtube.com/watch?v=RE2I_7M7Pi8&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7&index=3
4. https://www.youtube.com/watch?v=n3VTOwqT_RI&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7&index=4

Web Resources:

1. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/EVS-DM-E-Material.pdf
2. http://www.jnkvv.org/PDF/2104202013132520420181l.pdf
3. https://courseware.cutm.ac.in/wp-content/uploads/2020/06/EVS-DM-E-Material.pdf

Course Code	Course Title	L	T	P	S	C
PATH 371	**DISEASES OF FILED AND HORTICULTURAL CROPS AND THEIR MANAGEMENT II 3(2+1)**	2	-	1	-	3

Pre-Requisite -

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	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	-	3	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	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

TEXT BOOKS:

1. Arjunan, G. Karthikeyan, G, Dinakaran, D. and T. Raguchander, Diseases of horticultural Crops, AE Publications, Coimbatore, 1999.
2. Das Gupta M.K. and W.C. Mandel, Post-harvest pathogens of Perishables. Oxford and IBH Publishing Company, New Delhi, 1989.

Reference Books

1 Rangaswamy, C., Diseases of crop plants in India –. Prentice Hall of India, Pvt. Limited, New Delhi, 2005

2 Dasgupta, M.K. and W.C. Mandal, Post-harvest pathology of perishables. Oxford IBH publishing Co. New Delhi, 1989.

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

Course Code	Course Title	L	T	P	S	C
HORT 381	**PRODUCTION TECHNOLOGY FOR ORNAMENTAL CROPS, MAP AND LANDSCAPING 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	3	2	-	2	-	-	-	-	-	3	-	-	-	-
CO3	2	3	-	3	-	-	-	-	-	3	-	-	-	-
CO4	2	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

PRACTICALS/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/ STUDY MATERIALS

TEXT BOOKS:

1. Chattopadhyay, S.K, Commercial Floriculture. Gene-Tech Books, New Delhi,2007.
2. Srivastava, H.C. Medicinal and Aromatic Plants. ICAR, New Delhi, 2014.
3. Kumar, N., Abdul Khader, J.B.M, Rangaswamy, P and Irulappan, I. Introduction to Spices, Plantation Crops, Medicinal and Aromatic Crops. Oxford and IBH publishing Co, New Delhi, 2004.
4. Handbook of Horticulture Crops. M.S. Dhaliwal, Kalyani Publishers. Ludhiana, 2008.

REFERENCE BOOKS:

1. Bose, T.K. Floriculture and Landscaping. Naya Prakash, Kolkatta, 1999.
2. Bose, T.K. and Yadav, L.P. Commercial Flowers. Naya Prakash, Kolkatta, 1992.
3. Randhawa, G.S. and Mukhopadhyaya, A. Floriculture in India. Allied Publishers Pvt. Ltd., New Delhi, 1994.

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
AEXT 391	**Entrepreneurship Development and Business Communication 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	PSO 5
CO1	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO2	2	3	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	2	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course Correlation Mapping	**3**	**3**	**-**	**2**	**-**	**-**	**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

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
AGRO 303	**PRACTICAL CROP PRODUCTION – II (*RABI* CROPS) 2(0+2)**	0	-	2	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

This course is designed to provide an over view knowledge 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:

CO1. Understand the climatic conditions and soil types best suited for rabi crop production

CO2. Implement practices to improve soil health and structure in preparation for rabi crop planting

CO3. Gain practical experience in the sowing and planting of rabi crops, including seed selection, planting depth, and spacing requirements

CO4. Understand and apply principles of nutrient management, including the formulation and application of fertilizers tailored to rabi crops

CO5. Work independently or in team 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	2	-	-	-	-	3	3	-	3	-	-	-	-
CO3	3	2	-	-	-	-	3	3	-	3	-	-	-	-
CO4	2	2	-	-	-	-	3	3	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	-	-	-	-	-	**-**	**3**	**3**	**-**	3	**-**	**-**	**-**	**-**

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

EXPERIENTIAL LEARNING

Crop planning, raising field crops in multiple cropping systems: Field preparation, seed, treatment, nursery raising, sowing, nutrient, water and weed management and management of insect-pests diseases of crops, harvesting, threshing, drying winnowing, storage and marketing of produce. The emphasis will be given to seed production, mechanization, resource conservation and integrated nutrient, insect-pest and disease management technologies. Preparation of balance sheet including cost of cultivation, net returns per student as well as per team of 8-10 students.

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Crop Production Guide, Directorate of Agriculture, Chennai and Tamil Nadu Agricultural University, Coimbatore, 2005.
2. Text Book on Field Crop Production by Rajendra Prasad, Indian Council of Agrl. Research, New Delhi2004.

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
AGRO 304	**RAINFED AGRICULTURE AND WATERSHED MANAGEMENT 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	-	-	-	-	-	-
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 based on 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

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
AGRO 305	**PRINCIPLES OF ORGANIC FARMING 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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 organic farming concepts

CO2. Understand different NGO initiations and government polices to promote organic farming

CO3. Gain knowledge on different nutrient sources

CO4. Gain fundamental knowledge on the organic weed and pest management in organic farming

CO5. Understand the steps in the organic certification and standards

CO6. Work independently or in team 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	PSO 5
CO1	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	2	3	3	2	-	-	-	-	-	3	-	-	-	-
CO3	2	3	3	3	-	1	-	-	-	3	-	-	-	-
CO4	3	3	-	2	-	1	-	-	-	3	-	-	-	-
CO5	3	3	2	2	-	1	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**3**	**-**	**1**	**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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit to organic farm to study the various components, identification and utilisation 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, ghana jeevamrutam, drava jeevamrutam).

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

TEXT BOOKS:

1. Palaniappan, S.P and Annadurai, K. Organic farming-Theory and Practice. Scientific publishers, Jodhpur,India, 1999.

2. Mukund Joshi and Prabhakarasetty, T.K. Sustainability through organic farming. Kalyani publishers, New Delhi, 2006.

REFERENCE BOOKS:

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

2. Tiwari, V.N., Gupta, D.K., Maloo, S.R and Somani, L.L. Natural, organic, biological, ecological and biodynamic farming. Agrotech Publishing Academy, Udaipur, 2010.

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
GPB 312	**PRINCIPLES OF SEED TECHNOLOGY 3(1+2)**	1	-	2	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an over view of 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. Work in dependently or in team 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	2	2	-	2	-	-	-	-	-	-	3	-	-	-
CO2	2	2	-	2	-	-	-	-	-	-	3	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO4	3	2	-	2	-	-	-	-	-	-	3	-	-	-
CO5	3	3	-	3	-	-	-	-	-	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**-**	**2**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: Seed Technology – introduction and importance (03 Periods)

Seed and seed technology: introduction, definition and importance

Module 2: Deterioration and maintenance of genetic purity (03 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. (03 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 (03 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. (04 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:16

PRACTICALS/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

TEXT BOOKS:

1. Khare and Bhale Seed Technology, Scientific Publishers, New Delhi, 2014.
2. Sharma, J.P, Quality Seed Production of Vegetable Crops Technological Interventions, Volume 2: Crop Specific Aspect. Kalyani Publishers, Ludhiana, 2011.

REFERENCE BOOKS:

1. Agrawal, P.K. and M. Dadlani, Techniques in seed science and technology, South Asian Publishers, New Delhi, 1995.
2. Agrawal, R.L, Oxford, Seed Technology, IBH Publication Co., New Delhi, 1996.

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
AECO 342	**FARM MANAGEMENT, PRODUCTION AND RESOURCE ECONOMICS 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	-
CO5	2	2	1	3	-	-	-	-	-	-	-	-	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 size of 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, product relationship, law of equi-marginal/or principles of opportunity cost and law of comparative advantage. Meaning and concept of cost, types of costs and their interrelationship.

Module 3: FARM INCOME AND BUSINESS (03 Periods)

Importance of cost in managing farm business and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

Module 4: FARM RECORDS – IMPORTANCE AND TYPES (03 Periods)

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, steps in farm planning and budgeting-linear programming, appraisal of farm resources, selection of crops 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 resource economics, differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water,pasture and forest resources etc.

Total Periods:16

PRACTICALS/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

TEXT BOOKS:

1. Bishop, C.E. and W. D. Toussaint, Introduction to Agricultural Economic Analysis. John Wiley and Sons, London, 1958.
2. Heady, Earl O. Economics of Agricultural Production and Resource Use. Prentice Hall of India, Private Limited, New Delhi, 1964.

REFERENCE BOOKS:

1. S.S. Johl, J.R, Kapur, Fundamentals of Farm Business Management, Kalyani Publishers, New Delhi, 2006.
2. Kahlon, A.S. and Karam Singh, Principles of Farm Business Management. Kalyani Publishers, New Delhi, 1965.

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
AENG 351	**PROTECTED CULTIVATION AND SECONDARY AGRICULTURE 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	-	-	-	-	-	-
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

PRACTICALS/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

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. Unit operations of Agricultural Processing. Vikas Publishing house Pvt. Ltd. New Delhi, 1994.
2. Chakraverty, A. Post Harvest Technology of cereals, pulses and oilseeds. Oxford & IBH publishing Co. Ltd., New Delhi,2017.

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
PATH 372	**PRINCIPLES OF INTEGRATED PEST AND DISEASE MANAGEMENT 3(2+1)**	2	-	1	-	3

Pre-Requisite -

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	PSO5
CO1	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	2	3	-	3	-	-	-	-	-	-	-	3	-	-
CO4	2	2	-	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	-	1	-	-	3	3	-	-	-	3	-	-
CO6	3	3	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**

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

COURSE CONTENT

Module 1: INTRODUCTION, IMPORTANCE AND CONCEPTS OF IPM (08 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

PRACTICALS/ 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, Pseudomonas*, *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

TEXT BOOKS:

1. Integrated Pest Management: Principles and Applications by Singh, Vol. 1: Volume 1: Principles, CBS HB, 2005

2. Integrated Pest Management by D.V. Bhagat, HSBC,2018

REFERENCE BOOKS:

1. Dictionary of Integrated Pest Management: Insect Disease And Week Management by Prem Kishore, Westvill Publishing House, 2004.

2. Integrated Pest Management: Concepts, Tactics, Strategies and Case Studies by Edward B. Radcliffe (Editor), Rafael E. Cancelado (Editor), , 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
HORT 382	**Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)**	1	-	1	-	2

Pre-Requisite -

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	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO2	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO3	2	2	-	2	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	3	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**2**	**-**	**-**	**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 causes of 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)

Harvesting and 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. Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning -Concepts and Standards, packaging of products.

Total Periods:16

PRACTICALS/ 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.

RESOURCES

TEXT BOOKS:

1. N.S., Mathur, G.K., Chasta, Post-harvest Management and Processing of Fruits and Vegetables, ICAR, New Delhi,2012.
2. Srivastava, R.P. and Sanjeev Kuma ,Fruit and Vegetable Preservation: Principles and Practices, International Book Distribution Company, Lucknow,2002.

REFERENCE BOOKS:

1. Giridharilal, G.S., Siddappa and Tondon Preservation of Fruits and Vegetables, G.L. ICAR, New Delhi by 2007.
2. Mitra, S.K.Post Harvest Physiology and Storage of Tropical and Subtropical Fruits CABI Publishers, Kolkatta, 2005.

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
FN 301	**PRINCIPLES OF FOOD SCIENCE AND NUTRITION 2(2+0)**	2	-	-	-	2

Pre-Requisite -

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:

CO1. To understand the different concepts of food science

CO2. To understand the composition and chemistry of food

CO3. To understand the morphology, cultivation, and nutritional importance of food microbes.

CO4. To understand and learn various food processing methods along with preservation techniques. And learn about various malnutrition disorders

CO5. 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: FOOD SCIENCE – DEFINITION AND MEASUREMENTS ***(7 periods)***

Concepts of Food Science - Definitions, Measurements, Density, Phase change, PH, Osmosis, Surface tension, Colloidal systems etc.

Module 2: FOOD COMPOSITION AND CHEMISTRY ***(7 periods)***

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bioactives, important reactions).

Module 3: FOOD MICROBIOLOGY ***(6 periods)***

Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, Production of fermented foods).

Module 4 FOOD PROCESSING – PRINCIPLES AND METHODS ***(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: ENERGY AND ITS METABOLISMS ***(06 periods)***

Energy metabolism (carbohydrate, fat, proteins); Balanced/ modified diets, Menu planning, new trends in food science and nutrition.

Total Periods: 32

RESOURCES/STUDY MATERIALS

TEXT BOOKS:

1. Industrial Microbiology by L.E. Casida Jr, New Age International Publishers, New Delhi, 1968.

REFERENCE BOOKS:

1. Sumati R. Mudambi, Shalini M. Rao and M.V. Rajagopal, Food Science, 2nd Ed. New Age International (P) Limited, New Delhi, 2006.

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:

1. https://instr.iastate.libguides.com/c.php?g=49424&p=318464

Course Code	Course Title	L	T	P	S	C
EC 342	**AGRI-BUSINESS MANAGEMENT 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of Agribusiness management. The course provides a deep insight into various concepts such as Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries, Agri-value chain, Consumer behavior analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods, etc. it applies business theories and practices to the agricultural industry to make it cost effective, enhance profits and ensure that farm products are grown and distributed efficiently.

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

CO1. Understand the meaning and scope of various agribusiness concepts and management functions.

CO2. To analyze the need and importance of HR management and Decision making in organizational Management.

CO3. To understand the meaning and various concepts of Production, inventory and Marketing Management.

CO4. Understand the meaning and various concepts of Capital, Financial and Strategic management.

CO5. Understand the need and importance and problems in setting up of Agrobased industries and to understand how to create a project proposal and concepts of project appraisal and evaluation methods.

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	PSO6
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	3	-	-

CO5	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**-**	**-**

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

COURSE CONTENT

Module 1: AGRIBUSINESS- MEANING, SCOPE, CONCEPTS AND VARIOUS MANAGEMENT FUNCTIONS. (06 Periods)

Agribusiness – Meaning, scope and structure and dimensions (Agricultural input sector - Agricultural production sector - Agricultural processing sector and Marketing and trade sector) - Importance of agribusiness in Indian economy, - Distinctive features of agribusiness. Management – Definitions and concepts - Pipeline diagram - Agribusiness Management – Meaning and definitions and salient features. Management functions – Wheel diagram, planning, its importance - Types of plans - Structure of planning - Goals or objectives - Strategies, policies, procedures, rules, programmes – Characteristics of good plan - Steps in planning. Organizing– Meaning, purpose, staffing – Definition - Staffing process. Directing – Motivation – Ordering – Leading – Supervision, coordination, communication and control – Meaning and definitions, purpose.

Module 2: DECISION MAKING, ORGANIZATIONAL MANAGEMENT AND HUMAN RESOURCE MANAGEMENT (04 Periods)

Decision making – Organizational culture – Management of organizational conflicts – Managing change – Leadership styles – Group dynamics – Motivation. Managing human resources in agribusinesses - HR Functions - Role of HR managers – Human resource planning. Human resource training and development – Participative management, labour management relations, conflict management.

Module 3: PRODUCTION, INVENTORY AND MARKETING MANAGEMENT – MEANING AND THEIR CONCEPTS. (08 Periods)

Production management - Production, plant layout and material handling, operations planning and control - Inventory management - Inventory – Meaning – Definition – Objectives of inventories - Quality management production control – Scheduling methods (Net working methods – PERT & CPM) - Quality control. Marketing management in agribusiness – New product development, consumer behavior and the buying process. Developing marketing strategies - Four Ps of marketing and planning, marketing mix. Market segmentation - Meaning, types, and importance. Product concept – Product line and mix - Branding agricultural products. Packaging, its functions - Physical distribution. Selling, advertising, marketing research, marketing extension, rural retailing supply chain management for agribusiness.

Module 4: CAPITAL, FINANCIAL AND STRATEGIC MANAGEMENT. (06 Periods)

Capital management in agribusiness – Fixed capital and working capital - Meaning, types, operating cycle and working capital importance. Financial management – Importance of financial statements – Balance sheet and profit and loss statement, cash flow statement - Meaning, components and formats of financial statements. Analyzing financial statements –

Liquidity ratios – Leverage ratios – Activity ratios – Turnover ratios – Profitability ratios. Strategic management – Meaning, concept and scope – External and internal environmental factors influencing strategy – Scanning the external and internal environment – Strategy formulation - SWOT analysis of agribusiness enterprise

Module 5: AGROBASED INDUSTRIES- NEED AND IMPORTANCE. PROJECT- MEANING, GUIDELINES, AND VARIOUS EVALUATION TECHNIQUES (08 Periods)

Agro based industries – Importance, need – Institutional arrangements for the promotion of agro-based industries – Procedure to be followed to set up agro based industries – Constraints in establishing agro-based industries. Project – Meaning – Definition – Project cycle – Guidelines for preparation of project reports. Project appraisal and evaluation techniques – Undiscounted measures and decision rules - PBP ROR, and discounted measures and decision rules – NPW, BCR, IRR, N/K ratio, Sensitivity analysis.

Total Periods: 32

PRACTICALS/EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1	Study of agri-input markets: Seed, fertilizers, pesticides.
2	Study of output markets: grains, fruits, vegetables, flowers.
3	Study of product markets, retails trade commodity trading, and value-added products
4&5	Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD.
6	Preparations of projects and Feasibility reports for agribusiness entrepreneur.
7&8	Appraisal/evaluation techniques of identifying viable project- non-discounting techniques.
9	Balance sheet analysis
10	Analysis of profit and loss statement
11	Analysis of Net present worth technique for selection of viable project & Internal rate of return
12	To analyze trend and growth rate of prices of agricultural commodities
13	Preparing Viable Agri business plans
14	Case study -1: Visit and study of profile of Agro-based industries
15&16	Case study -2: Formulation of project feasibility report of agribusiness enterprise.

RESOURCES

TEXT BOOKS:

1. Abraham Koshy and Mithileswar Jha, Marketing Management: A South Asian Perspective. International 13th edition. Pearson Prentice Hal, 2009.

2. Aswathappa, K and Sridhar K Production and Operations Management, Kalyani publishers, 2015

REFERENCE BOOKS:

1. Harsh, S.B. Conner, U.J. and Schwab G.D, Management of the Farm Business,Prentice Hall Inc., New Jersey, USA, 1981.

2. Pandey, Financial management , I M,2001

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=DUSE7FkD_Ug
2. https://www.youtube.com/watch?v=alI1UPOGzm8
3. https://www.youtube.com/watch?v=DUSE7FkD_Ug

Web Resources:

1. https://libguides.smsu.edu/c.php?g=432807&p=2951375
2. https://uaeu.libguides.com/agribusines/WebResources

Course Code	Course Title	L	T	P	S	C
EC 334	**AGROCHEMICALS 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of various agrochemicals. The course provides a deep insight into various concepts such as introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits, and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.

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

CO1. Understand the various types and role of agrochemicals in agriculture

CO2. To gain knowledge on different herbicides, fungicides and organic fungicides

CO3. To gain knowledge on various systemic fungicides

CO4. To gain knowledge on various fertilizers and types.

CO5. To gain knowledge on various mixed and complex fertilizers.

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	PSO6
CO1	2	3	-	-	-	-	-	-	-	3	-	3	-	-	-
CO2	2	3	-	-	-	-	-	-	-	3	-	3	-	-	-
CO3	2	3	-	-	-	-	-	-	-	3	-	3	-	-	-
CO4	2	3	-	-	-	-	-	-	-	3	-	3	-	-	-
CO5	3	3	-	-	-	-	-	-	-	3	-	3	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: AGROCHEMICALS- INTRODUCTION, TYPES AND THEIR ROLE IN AGRICULTURE. (06 Periods)

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, management of agrochemicals for sustainable agriculture.

Module 2: HERBICIDES AND FUNGICIDES (04 Periods)

Herbicides-Major classes, properties and important herbicides. Fate of herbicides. Fungicides - Classification – Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action-Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action-Dithiocarbamates-characteristics, preparation and use of Zineb and maneb..

Module 3: SYSTEMIC FUNGICIDES (08 Periods)

Systemic fungicides- Benomyl, carboxin, oxycarboxin, Metalaxyl, Carbendazim, characteristics and use. Introduction and classification of insecticides: inorganic and organic insecticides Organochlorine, Organophosphates, Carbamates, Synthetic pyrethroids Neonicotinoids, Biorationals, Insecticide Act and rules, Insecticides banned, withdrawn and restricted use, Fate of insecticides in soil & plant. IGRs Biopesticides, Reduced risk insecticides, Botanicals, plant and animal systemic insecticides their characteristics and uses.

Module 4: FERTILIZERS- THEIR IMPORTANCE AND TYPES. (06 Periods)

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate, ammonium nitrate, ammonium chloride, urea. Slow-release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate

Module 5: MIXED AND COMPLEX FERTILIZERS (08 Periods)

Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitrophosphates and NPK complexes. Fertilizer control order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Total Periods: 32

PRACTICALS/ EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1	Sampling of fertilizers and pesticides
2&3	Study of pesticides application technology to study about various pesticides appliances.
4&5	Quick tests for identification of common fertilizers.
6	Identification of anion and cation in fertilizer.
7	Calculation of doses of insecticides to be used.
8&9	To study and identify various formulations of insecticide available in market.
10	Estimation of nitrogen in Urea
11	Estimation of water soluble P2 O5 and citrate soluble P2 O5 in single super phosphate
12	Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer.
13	Determination of copper content in copper oxychloride
14	Determination of sulphur content in sulphur fungicide
15	Determination of purity of thiram content.
16	Determination of purity of ziram content.

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

1. Vasantharaj David, B and Ramamurthy V V. Namuratha Elements of Economic Entomology. Np Publications, Chennai, 2016.
2. Srivastava R P and Saxena R C A text book of Insect toxicology. Himanshu Publications, Udaipur, 1989.
3. Sita raman, S., Biswal, B.C., Maheswari, S and Yadav, D.S. Hand book on fertilizer usage. The Fertilizer Association of India by, New Delhi, 1996.

REFERENCE BOOKS:

1. S Sriramulu, Methods of Pesticide analysis, Oxford IBH, New Delhi, 1979.
2. Nene YL and Thapliyal PN Fungicides in Plant Disease Control, Oxford IBH, New Delhi, 2001

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=YaCZl0DSDR4
2. https://www.youtube.com/watch?v=Eb-7r8EEH1k
3. https://www.youtube.com/watch?v=PZsHB9MtRQQ

Web Resources:

1. https://guides.lib.montana.edu/c.php?g=221822&p=1493257
2. https://www.vedantu.com/biology/agrochemicals

Course Code	Course Title	L	T	P	S	C
EC 315	**COMMERCIAL PLANT BREEDING 3(1+2)**	1	-	2	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of various concepts of commercial plant breeding. The course provides a deep insight into various concepts such as modes of plant reproduction, Genetic purity test of commercial hybrids, haploid inducer, tissue culture techniques and biotechnological tools., etc., which will in turn helps to gain effective knowledge on commercial plant breeding.

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

CO1. Understand the various types of plant reproduction, genetic purity test

CO2. To understand advances in hybrid seed production of various field crops

CO3. To understand techniques for development of line and cultivars, IPR issues in plant breeding.

CO4. To understand seed production- Types, principles and techniques.

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	PSO6
CO1	2	3	2	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	3	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**2**	**2**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: TYPES OF PLANT REPRODUCTION, GENETIC PURITY TEST (04 Periods)

Types of crops and modes of plant reproduction. Line development and maintenance breeding in self- and cross-pollinated crops (A/B/R and two-line system) for development of hybrids and seed production. Genetic purity test of commercial hybrids.

Module 2: ADVANCES IN HYBRID SEED PRODUCTION OF VARIOUS FIELD CROPS (04 Periods)

Advances in hybrid seed production of rice, maize, sorghum, pearl millet, castor, sunflower, cotton and pigeon pea. Quality seed production of vegetable crops under open and protected environment.

Module 3: TECHNIQUES FOR DEVELOPMENT OF LINE AND CULTIVARS, IPR ISSUES IN PLANT BREEDING (06 Periods)

Alternative strategies for the development of the line and cultivars: haploid inducer, tissue culture techniques and biotechnological tools. IPR issues in commercial plant breeding: DUS testing and registration of varieties under PPV & FR Act. Variety testing, release and notification systems in India

Module 4: SEED PRODUCTION- TYPES, PRINCIPLES AND TECHNIQUES (02 Periods)

Principles and techniques of seed production, types of seeds, quality testing in self- and cross-pollinated crops.

Total Periods: 16

PRACTICALS/ EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1 & 2.	Floral biology in self-pollinated species and cross-pollinated species.
3	Selfing techniques.
4	Crossing techniques
5-7.	Techniques of seed production in self- and cross-pollinated crops using A/B/R and two-line system.
8	Learning techniques in hybrid seed production using male-sterility in field crops.
9	Understanding the difficulties in hybrid seed production
10	Tools and techniques for optimizing hybrid seed production
11	Concept of rouging in seed production plot
12	Concept of line and its multiplication in hybrid seed production.

13	Line purification in hybrid seed production.
14	Role of pollinators in hybrid seed production
15-24	Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops.
25-26	Sampling and analytical procedures for purity testing and detection of spurious seed Seed drying.
27	Seed drying
28	Seed storage structure in quality seed management
29&30	Screening techniques during seed processing viz., grading and packaging
31 & 32	Visit to public and private seed production and processing plants

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. Agarwal, R.L, Seed Technology,Oxford and IBH Publication Co., New Delhi, 2015.
2. Khare, Dhirendra and Bhala, M.S. Seed Technology second revised edition. Scientific Publishers. Jodhpur, 2014.

REFERENCE BOOKS:

1. Phundan Singh, Essentials of Plant Breeding. Kalyani Publishers, New Delhi, 2014.
2. Singh, B.D. Plant Breeding: Principles and Methods. Kalyani Publishers, New Delhi, 2015.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=9cL8ghSss7Y
2. https://www.youtube.com/watch?v=dj6fZ6RbQFI
3. https://www.youtube.com/watch?v=OacYElNeYII

Web Resources:

1. https://www.plantbreeding.org/education/online-resources-for-plant-breeding-education
2. https://cals.ncsu.edu/horticultural-science/research/global-plant-breeding/

Course Code	Course Title	L	T	P	S	C
EC 382	**Landscaping 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about

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

CO1. Understand the basic knowledge on principles of landscaping, garden styles and types.

CO2. Knowledge on trees and their selection processes.

CO3. Understand the concepts of Climbers and creepers.

CO4. Analyze and planning of bio aesthetics and its importance

CO5. Understand various principles and practices of landscaping and its management

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: LANDSCAPING – PRINCIPLES, IMPORTANCE AND SCOPE ***(06 Periods)***

Importance and scope of landscaping. Principles of landscaping, garden styles and types, terrace gardening, vertical gardening, garden components, adornments, lawn making, rockery, water garden, walk-paths, bridges, other constructed features etc. gardens for special purposes.

Module 2: TREES AND HERBACEOUS PERENNIALS- SELECTION, PROPAGATION, PLANTING SCHEMES, ARCHITECTURE ***(06 Periods)***

Trees: selection, propagation, planting schemes, canopy management, shrubs and herbaceous perennials: selection, propagation, planting schemes, architecture.

Module 3: CLIMBERS AND CREEPERS- IMPORTANCE ***(08 Periods)***

Climber and creepers: importance, selection, propagation, planting, Annuals: selection, propagation, planting scheme, other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management.

Module 4: IMPORTANCE OF BIO- AESTHETIC ***(06 Periods)***

Bio-aesthetic planning: definition, need, planning; landscaping of urban and rural areas, Peri-urban landscaping.

Module 5: LANDSCAPING PRINCIPLES AND MANAGEMENT ***(06 Periods)***

Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai: principles and management, lawn: establishment and maintenance. CAD applications.

Total Periods: **32**

EXPERIENTIAL LEARNING

LIST OF EXERCISES:

1. Identification of avenue trees.
2. Identification of shrubs.
3. Identification of annuals.
4. Identification of pot plants.
5. Propagation of ornamental trees.
6. Propagation of shrubs.
7. Propagation of annuals, care and maintenance of plants.
8. Potting and repotting of ornamentals.
9. Identification of tools and implements used in landscape design.
10. Training and pruning of plants for special effects.
11. Lawn establishment and maintenance.
12. Study of planning, designing and layout of formal gardens and informal gardens.
13. Layout of special type of gardens (sunken garden, terrace garden, rock garden).
14. Designing of conservatory and lath house.
15. Use of computer software.
16. Visit to important gardens/ parks/ institutes.

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

1. Bhattacharjee, S. K., Aavishkar Landscape Gardening and Design with plants Publishers and Distributers, Jaipur, 2004.
2. Bose, T.K. Naya Prakash,Floriculture and Landscaping Kolkatta, 1999.
3. Chadha K.L and Choudhary, B. Ornamental Horticulture in India ICAR, New Delhi.

REFERENCE BOOKS:

1. G.S. and Mukhopadhyay,Floriculture in India by Randhawa, A. Allied Publishers Pvt. Ltd., New Delhi, 1998.
2. S.K. Gene, Commercial Floriculture by Chattopadhyay, Tech Books, New Delhi, 2007.
3. Bose T.K., B. Chowdhury and S.P. Sharma. Tropical garden plants in colour Horticulture and Allied Publishers, Kolkata, 2001.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=638PZqS7H-g
2. https://www.youtube.com/watch?v=v_vsZEvtbLk
3. https://www.youtube.com/watch?v=ONIpzoDOr6Y

Web Resources:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=152
2. https://www.researchgate.net/publication/378268492_LANDSCAPING_AND_ORNAMENTAL_HORTICULTURE

Course Code	Course Title	L	T	P	S	C
EC272	**Food Safety and Standards 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of various concepts of food safety and standards. The course intends to educate learners with basic food hygiene standards, risk factors and healthy practices so that they take precautions while handling food and related products.

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

CO1. Understand the various food safety and Hazards and risks-Definition, importance, scope and types

CO2. To understand management of Hazards, Hygiene and sanitation in food

CO3. To understand various food safety management tools

CO4. To understand different food laws and standards.

CO5. To gain knowledge on recent concerns in food safety and standards

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	PSO6
CO1	3	2	-	2	-	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	2	-	2	-	-	-	-	-	-	-	-	-	3	-
CO5	3	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: FOOD SAFETY AND HAZARDS AND RISKS-DEFINITION, IMPORTANCE, SCOPE AND TYPES (06 Periods)

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards and Risks, Types of hazards - Biological, Chemical, Physical hazards.

Module 2: MANAGEMENT OF HAZARDS, HYGIENE AND SANITATION IN FOOD (06 Periods)

Management of hazards - Need. Control of parameters. Temperature control. Food storage. Product design. Hygiene and Sanitation in Food Service Establishments- Introduction. Sources of contamination and their control. Waste Disposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures.

Module 3: FOOD SAFETY MANAGEMENT TOOLS (06 Periods)

Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series. TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis

Module 4: FOOD LAWS AND STANDARDS (06 Periods)

Accreditation and Auditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and StandardsIndian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards related to food.

Module 5: RECENT CONCERNS IN FOOD SAFETY AND STANDARDS (08 Periods)

Recent concerns- New and Emerging Pathogens. Packaging, Product labeling and Nutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks. Indian and International Standards for food products.

Total Periods: 32

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1 & 2. Water quality analysis physico-chemical and microbiological.

3&4 Preparation of different types of media.

5&6 Microbiological Examination of different food samples

7&8 Assessment of surface sanitation by swab/rinse method.

9&10 Assessment of personal hygiene.

11&12 Biochemical tests for identification of bacteria.

13&14 Scheme for the detection of food borne pathogens

15&16 Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

RESOURCES

TEXT BOOKS:

1. Inteaz Alli, Food Quality Italics Assurance: Principles and Practices, CRC Press, Boca Raton, Ronald, H. Schmidt and Gary E. Rodrick. 2003.
2. Hester, R.E. and Harrison R.M, Food Safety and Food Quality. Royal Society of Chemistry, Cambridge, UK, 2001.

REFERENCE BOOKS:

1. Michael,Food Plant Sanitation: Design, Maintenance, and Good Manufacturing Practices, M. Cramer,CRC Press, Boca Raton, FL, USA,2002
2. Norman, G. Marriott, and Robert, Principles of Food Sanitation, B. Gravani. 5th Ed. Springer Science+Business Media, Inc., NY, USA, 2006.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=rNqFsZvICvk
2. https://www.youtube.com/watch?v=WYosZ4zru5Y
3. https://www.youtube.com/watch?v=D6W-GvgG6Z4

Web Resources:

1. https://www.fssai.gov.in/cms/food-safety-and-standards-regulations.php
2. https://fssai.gov.in/cms/about-fssai.php

Course Code	Course Title	L	T	P	S	C
EC 333	**BIOPESTICIDES AND BIOFERTILIZERS 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about

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

CO1. Knowledge on history and concept of biopesticides
CO2. Understand on mass production technology of bio-pesticides
CO3. Understand structure and characteristic features of bacterial biofertilizers
CO4. Knowledge on production technology of biofertilizers
CO5. Understand application technology of biofertilizers
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: BIOPESTICIDES- HISTORY, CONCEPT, IMPORTANCE AND SCOPE ***(06 Periods)***

History and concept of biopesticides. Importance, scope and potential of biopesticide. Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and bio rationales. Botanicals and their uses.

Module 2: BIOPESTICIDES- MASS PRODUCTION AND METHODS OF APPLICATION ***(07 Periods)***

Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and Techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

Module 3: BIOFERTILIZERS- INTRODUCTION, STATUS AND SCOPE ***(09 Periods)***

Biofertilizers - Introduction, status and scope. Structure and characteristic features of bacterial biofertilizers- Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium and Frankia; Cynobacterial biofertilizers- Anabaena, Nostoc, Hapalosiphon and fungal biofertilizers- AM mycorrhiza and ectomycorhiza. Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K solubilization.

Module 4: PRODUCTION TECHNOLOGY ***(06 Periods)***

Production technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid biofertiizers. FCO specifications and quality control of biofertilizers.

Module 5: APPLICATION TECHNOLOGY- BIOFERTILIZERS – STORAGE, FACTORS INFLUENCING THE EFFICACY OF BIOFERTILIZERS ***(04 Periods)***

Application technology for seeds, seedlings, tubers, sets etc. Biofertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of biofertilizers.

Total Periods: **32**

PRACTICALS/EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study on preparation or mass production technology of important biopesticides – bacteria Bacillus thuringiensis
2. Study on preparation or mass production technology of important biopesticides – Entomopathogenic virus - Sl NPV and Ha NPV
3. Study of mass production technology of important biopesticides – Entomopathogenic fungi - Beauveria bassiana, Metarhizium anisopliae, Nomuraea rileyi
4. Study of mass production technology of important biopesticides – EPN (Steinernema carpocapsae); Isolation and identification of soil borne EPNs (Galleria larval bait/trap technique)
5. Identification and preparation of important botanical insecticides (NSKE; Tobacco decoction, Pongamia and Annona leaf extracts)
6. Visit to nearby biopesticide laboratory.
7. Field visit to explore naturally infected cadavers of Bt, Virus, Fungus.

8. Identification of potential entompathogenic entities in the field - from soil and plants & Studies on quality control of biopesticides
9. Isolation of Rhizobium from soil and root nodules
10. Isolation and purification of Azospirillum and Azotobacter from rhizosphere soil
11. Isolation and purification of P and K solubilizers from rhizosphere soil
12. Mass production technology of BGA (Blue Green Algae)
13. Production Technology of Azolla
14. Isolation of and purification of VAM (Vascular Arbiscular Mycorrhiza) fungi from rhizosphere soil by wet sieving and decantation and sucrose gradient method
15. Mass multiplication and inoculums production of biofertilizers
16. Quality assessment of different biofertilizers (both carrier and liquid based) including plant infection test

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. BS Parmar and C. Deva Kumar, Botanical and Bio pesticides, West Will Publishing House, New Delhi, 1993.
2. Srivastava, K. P. and Dhaliwal, Applied Entomology. Vol I & II , G.S Kalyani Publishers, New Delhi, 2015.
3. S., K. Kumar and K. Govindarajan, Biofertilizers Technology Kannaiyan, Scientific Pub., Jodhpur, (2004).

REFERENCE BOOKS:

1. M.R., P.Bhattacharya and Beena Srivastava, Biofertilizer Technology, Marketing and Usage- A Source by Bookcum-Glossary Motsora, FDCO, New Delhi, 1995.
2. Subbarao,Biofertilizers in Agriculture and Forestry, Oxford and IBH Pub. Co., New Delhi,1993.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=_udxmWE1Hbk&list=PLPzlW6NMlfyjqWXMJsBfk9ZpTFVoYZl_Y
2. https://www.youtube.com/watch?v=7RfGS4o-wS8

Web Resources:

1. https://www.manage.gov.in/nf/pptspdfs/Biofertilizers%20and%20Biopesticides-Balaraju.pdf
2. https://www.studocu.com/in/document/hemvati-nandan-bahuguna-garhwal-central-university/biopesticides-biofertilizers/biopesticides-and-biofertilizers/48321076

Course Code	Course Title	L	T	P	S	C
EC 383	**PROTECTED CULTIVATION 3(2+1)**	2	-	1	-	3

Pre-Requisite **-**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of various concepts of protected cultivation. The course intends to educate learners with basic understanding of the concept and importance of protected cultivation in modern agricultural practices. Familiarize with different types of protected structures such as greenhouses, polyhouses, and shade net houses. Learn about the design, construction, and management of protected structures for optimal plant growth and yield.

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

CO1. Understand protected cultivation- Importance, Scope, types and status in India

CO2. To understand greenhouse- Design and development measures

CO3. To understand various management practices of Greenhouse cultivation

CO4. To understand the methods of propagation of planting material, IPD management.

CO5. To gain knowledge on greenhouse cultivation of various horticultural crops

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	PSO6
CO1	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	3	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	3	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	3	-	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: PROTECTED CULTIVATION- IMPORTANCE, SCOPE, TYPES AND STATUS IN INDIA (06 Periods)

Protected cultivation- importance and scope, Status of protected cultivation in India and World types of protected structure based on site and climate.

Module 2: GREENHOUSE- DESIGN AND DEVELOPMENT MEASURES (06 Periods)

Cladding material involved in greenhouse/ poly house. Greenhouse design, environment control, artificial lights, Automation.

Module 3: MANAGEMENT PRACTICES OF GREENHOUSE CULTIVATION (06 Periods)

Soil preparation and management, Substrate management. Types of benches and containers. Irrigation and fertigation management.

Module 4: PROPAGATION OF PLANTING MATERIAL, IPD MANAGEMENT (06 Periods)

Propagation and production of quality planting material of horticultural crops. Off-season production of flowers and vegetables. Insect pest and disease management.

Module 5: GREENHOUSE CULTIVATION OF HORTICULTURAL CROPS (08 Periods)

Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc. Cultivation of economically important medicinal and aromatic plants.

Total Periods: 32

PRACTICALS/EXPERIANTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of different types of greenhouses based on shape.
2. Study of different types of greenhouses based on construction
3. Study of different types of greenhouses based on cladding material.
4. Study of materials for construction of greenhouses.
5. Study of construction of pipe framed green house.
6. Measurement of environmental parameters inside greenhouse.
7. Calculation of ventilation rates in active summer cooling system.
8. Calculation of rate of air exchange in active winter cooling system.
9. Field visit to green house.
10. Raising of seedlings and saplings under protected conditions.
11. Use of portrays in quality planting material production.

12. Bed preparation and planting of crop for production.
13. Intercultural operations.
14. Soil EC and pH measurement.
15. Regulation of irrigation.
16. Fertilizers through drip, fogging ad misting

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

1. Vilas M. Salone and Ajay K. Sharm, Greenhouse Technology and Applications , Agrotech Publishers. New Delhi, 2012
2. Greenhouse Management of Horticultural Crops. Second edition, Agrobios , New Delhi, 2012.

REFERENCE BOOKS:

1. S. Prasad and U. Kumar Green houses: Advanced Technology for Protected Horticulture, Joe.J.Hanan, CRC Press, LLC. Florida, 1998.
2. K.Radha Manohar and C. Igathinathane, Greenhouse Technology and Management, BS Publications, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=6LZymD3tPX0
2. https://www.youtube.com/watch?v=thOkBGTtiUU
3. https://m.youtube.com/playlist?list=PLPzlW6NMlfyjdINYGxG3s9Zh1DGPQCywi

Web Resources:

1. https://ncert.nic.in/vocational/pdf/kepc101.pdf
2. https://www.researchgate.net/topic/Protected-Cultivation/publications

Course Code	Course Title	L	T	P	S	C
EC 282	**HITECH HORTICULTURE 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the global horticulture industry and its significance in addressing food security, nutrition, and environmental challenges. Students will examine the role of hi-tech solutions in revolutionizing traditional horticultural practices and meeting the growing demand for fresh produce.

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

CO1. Understand nursery management techniques

CO2. To understand greenhouse- Design and development measures

CO3. To gain knowledge on various concepts of precision farming and its components

CO4. To understand the DGPS and VRA and its applications

CO5. To know about the mechanized harvesting of various crops

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	3	-	-	-	-	-	-	-	3	-	-	-	-
CO2	3	3	-	-	-	-	-	-	-	3	-	-	-	-
CO3	3	2	-	-	-	-	-	-	-	3	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: NURSERY MANAGEMENT – INTRODUCTION AND IMPORTANCE **(06 Periods)**

Introduction & importance; Nursery management and mechanization; Micro propagation of horticultural crops; Modern field preparation and planting methods,

Module 2: PROTECTED CULTIVATION – ADVANTAGES, METHODS AND TECHNIQUES **(06 Periods)**

Protected cultivation: advantages, controlled conditions, method and techniques, Micro irrigation systems and its components; EC, pH-based fertilizer scheduling, canopy management, high density orcharding.

Module 3: PRECISION FARMING – COMPONENTS **(06 Periods)**

Components of precision farming: Remote sensing, Geographical Information System (GIS),

Module 4: DGPS-VRA- APPLICATIONS **(06 Periods)**

Differential Geo-positioning System (DGPS), Variable Rate applicator (VRA), application of precision farming in horticultural crops (fruits, vegetables and ornamental crops);

Module 5: MECHANIZED HARVESTINGS **(08 Periods)**

Mechanized harvesting of produce

Total Periods: 32

PRACTICALS/ EXPERIANTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Types of polyhouses.
2. Shade net houses.
3. Intercultural operations.
4. Identification and application of tools and equipment's.
5. Micro propagation.
6. Nursery raising in portrays.
7. Study of Micro-irrigation system and its components.
8. Problems of micro irrigation system.
9. Estimation of EC of soil and water.
10. Estimation of pH in soil and water.
11. Fertilizer scheduling.
12. Canopy management in Mango.
13. Canopy management in Guava.
14. Canopy management in Grapes.
15. Visit to Hi-Tech orchard.

16. Visit to Hi-Tech nursery

RESOURCES

TEXT BOOKS:

1. Vilas M. Salone and Ajay K. Sharma Greenhouse Technology and Applications, Agrotech Publishers. New Delhi, 2012.
2. S. Prasad and U. Kumar Greenhouse Management of Horticultural Crops, Second edition, Agrobios. New Delhi, 2012.

REFERENCE BOOKS:

1. Joe.J.Hanan Greenhouses: Advanced Technology for Protected Horticulture, CRC Press, LLC. Florida,1998.
2. K.Radha Manohar and C. Igathinathane Greenhouse Technology and Management , BS Publications, 2013.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=6LZymD3tPX0
2. https://www.youtube.com/watch?v=thOkBGTtiUU
3. https://m.youtube.com/playlist?list=PLPzlW6NMlfyjdINYGxG3s9Zh1DGPQCywi

Web Resources:

1. https://ncert.nic.in/vocational/pdf/kepc101.pdf
2. https://www.researchgate.net/topic/Protected-Cultivation/publications

Course Code	Course Title	L	T	P	S	C
EC 306	**WEED MANAGEMENT 3(2+1)**	2	-	1	-	3

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

COURSE DESCRIPTION: This course is designed to provide an overview about an in-depth understanding of weed management strategies and techniques within agricultural and ecological systems. Weeds pose significant challenges to crop productivity, ecological balance, and human health. Therefore, effective weed management is crucial for sustainable agriculture and ecosystem conservation. The course covers various aspects of weed biology, ecology, and control measures. Students will learn about the identification and classification of weeds, their life cycles, reproductive strategies, and ecological interactions. Emphasis will be placed on understanding the factors contributing to weed infestation, including environmental conditions, agricultural practices, and human activities.

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

CO1. Understand the basic concepts and components weeds and their classification
CO2. Knowledge on the different methods of herbicide applications.
CO3. Understand the concepts of allelopathy in weed management, bio herbicides and herbicides mixtures.
CO4. Analyze the herbicides compatibility
CO5. Understand various herbicides integration and herbicides resistance.
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: WEEDS AND THEIR CLASSIFICATION ***(06 Periods)***

Introduction to weeds, characteristics of weeds their harmful and beneficial effects on ecosystem. Classification, reproduction, and dissemination of weeds.

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

Herbicide classification, concept of adjuvant, surfactant, herbicide formulations and their use. Introduction to mode of action of herbicides and selectivity.

Module 3: ALLELOPATHY AND BIOHERBICIDES ITS APPLICATIONS. ***(08 Periods)***

Allelopathy and its application in weed management. Bio-herbicides and their application in agriculture. Concept of herbicide mixture and utility in agriculture.

Module 4: HERBICIDES COMPATIBILITY ***(06 Periods)***

Herbicide compatibility with nutrients and their application.

Module 5: INTEGRATED WEED MANAGEMENT TECHNIQUES ***(06Periods)***

Integration of herbicides with non-chemical methods of weed management. Herbicide resistance and its management.

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Techniques of weed preservation
2. Weed identification
3. Survey of weeds in different crop ecosystems.
4. Field study of crop-weed association and determination of critical period of crop weed competition
5. Estimation of weed flora in different crops
6. Estimation of yield losses due to weeds in ongoing field experiments
7. Biology of important weeds in different ecosystems
8. Herbicide label information for different herbicides and mixtures
9. Study of herbicide and nutrient compatibility
10. Shift in weed flora in long-term field experiments
11. Participation in different methods of herbicide application and precautionary measures
12. Spraying equipment’s and their calibration for herbicide application
13. Calculations of herbicide doses
14. Study of phytotoxicity symptoms of herbicides in different crops
15. Calculations of weed control efficiency and weed index
16. Economic analysis of weed control practices in crops and cropping systems

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. Gupta, O.P, Modern Weed Management (4th edition), Agrobios (India) Ltd, Jodhpur, 2012.
2. Rao, V.S, Principles of Weed Science (2nd edition), Oxford& IBH Publishing Co. Pvt Ltd, New Delhi 1992.

REFERENCE BOOKS:

1. O. P. Gupta, Weed management- Principles and practices, Agrobios publishers, 2019.
2. Ross, M.A and Lembi, Applied Weed Science. (2nd editio, C.A., Prentice Hall of India Pvt Ltd, New Delhi, 1999.
3. Saraswat, V.N., Bhan, V.M. and Yaduraju Weed management –ICAR Publication, N.T. (eds.), 1998.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=mAKcoOUb4pI
2. https://www.youtube.com/watch?v=DT7VSTLJowk
3. https://www.youtube.com/watch?v=MMIE1_Du5TA
4. https://www.youtube.com/watch?v=fIhwwXhRsnY

Web Resources:

1. https://agrimoon.com/wp-content/uploads/Weed-Management.pdf
2. https://ipm.ifas.ufl.edu/resources/success_stories/t&pguide/pdfs/Chapter6/Weed_Mgmt.pdf

Course Code	Course Title	L	T	P	S	C
EC 305	**SYSTEM SIMULATIONS AND AGRO-ADVISORY 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the principles and applications of simulation modeling in agriculture. Students will learn about different types of simulation models, including crop growth models, hydrological models, nutrient cycling models, and socio-economic models. Emphasis will be placed on understanding the theoretical foundations of simulation modeling and their practical implications for agricultural management.

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

CO1. Understand nursery management techniques

CO2. Understand greenhouse- Design and development measures

CO3. Gain knowledge on various concepts of precision farming and its components

CO4. Understand the DGPS and VRA and its applications

CO5. Know about the mechanized harvesting of various crops

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	2	3	3	-	-	-	-	-	-	3	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	3	-	-	-	-
CO3	2	3	3	-	-	-	-	-	-	3	-	-	-	-
CO4	2	2	3	-	-	-	-	-	-	3	-	-	-	-
CO5	3	3	3	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: SOIL – PLANT- ATMOSPHERE CONTINUUM (06 Periods)

System Approach for representing soil-plant-atmospheric continuum, system boundaries, Crop models, concepts & techniques, types of crop models, data requirements, relational diagrams.

Module 2: CROP RESPONSE TO WEATHER ELEMENTS (06 Periods)

Evaluation of crop responses to weather elements; Elementary crop growth models; calibration, validation, verification and sensitivity analysis.

Module 3: CROP PRODUCTION- CONCEPT AND MODELLING TECHNIQUES (06 Periods)

Potential and achievable crop production- concept and modelling techniques for their estimation. Crop production in moisture and nutrients limited conditions; components of soil water and nutrients balance.

Module 4: WEATHER FORECASTING- TYPES, METHODS, AND TECHNIQUES (06 Periods)

Weather forecasting, types, methods, tools & techniques, forecast verification; Value added weather forecast, ITK for weather forecast and its validity;

Module 5: CROP WEATHER CALENDARS (08 Periods)

Crop-Weather Calendars; Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Total Periods: **32**

PRACTICALS/EXPERIANTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Preparation of crop weather calendars.
2. Preparation of agro-advisories based on weather forecast using various approaches and synoptic charts.
3. Working with statistical and simulation models for crop growth.
4. Potential & achievable production; yield forecasting, insect & disease forecasting models.
5. Potential & achievable production; yield forecasting, insect & disease forecasting models.
6. Simulation with limitations of water and nutrient management options.
7. Sensitivity analysis of varying weather and crop management practices.
8. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast.
9. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast.
10. Feedback from farmers about the agroadvisory.

RESOURCES/ STUDY MATERIAL

TEXT BOOKS:

1. Chauhan, J K, Handbook on Mobile Based Agro-advisory System: Experiences from North-East India,2001.

REFERENCE BOOKS:

1. Chauhan, J K, Handbook on Mobile Based Agro-advisory System: Experiences from North-East India,2001

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=96U3SQFAqXk&list=PLnI1zSpX4B-C7i16Tf8aMPxRSOwo4YRPX
2. https://www.youtube.com/watch?v=DbtO5iaRxmg&list=PLnI1zSpX4B-C7i16Tf8aMPxRSOwo4YRPX&index=2

Web Resources:

1. https://bscagristudy.online/wp-content/uploads/2021/06/ELE-AGM-361-FULL-PRINTED-NOTES.pdf
2. https://www.researchgate.net/publication/365129649_TOOLS_FOR_PREPARATION_OF_AGROMET_ADVISORY_BULLETINS

Course Code	Course Title	L	T	P	S	C
EC392	**AGRICULTURAL JOURNALISM 3(2+1)**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the detailed study of Agricultural journalism. The course provides a deep understanding of Agriculture Economy, Contemporary Debates and Information World. Gain knowledge about Agriculture Journalism in India, diffusion process and theories. Have an insight about Farm communication as different from field journalism, Information and Opinions, Audience responses. Observe information transfer process of farm practices and policies, agriculture policies and crop safety measures.

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

CO1. Understand the nature, scope and types of agricultural journalism

CO2. To analyze the communication media- characteristics, kinds and functions

CO3. To understand the agricultural stories- Types, Information gatherings.

CO4. Understand the Story- writing, organizing and treatment

CO5. Understand the development of agricultural stories- editorial mechanics.

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	2	3	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	2	-	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO4	2	2	-	3	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	3	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	-	**-**	**-**	**3**	**-**

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

COURSE CONTENT

Module 1: NATURE, SCOPE AND TYPES OF AGRICULTURAL JOURNALISM **(06 Periods)**

Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist, how agricultural journalism is similar to and different from other types of journalism.

Module 2: COMMUNICATION MEDIA **(04 Periods)**

Newspapers and magazines as communication media: Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines: Style and language of newspapers and magazines, parts of newspapers and magazines.

Module 3: AGRICULTURAL STORIES- TYPES, INFORMATION GATHERINGS **(08 Periods)**

The agricultural story: Types of agricultural stories, subject matter of the agricultural story, structure of the agricultural story. Gathering agricultural information: Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, other agricultural news.

Module 4: STORY- WRITING, ORGANIZING AND TREATMENT **(06 Periods)**

Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, readability measures.

Module 5: DEVELOPMENT OF AGRICULTURAL STORIES- EDITORIAL MECHANICS **(08 Periods)**

Illustrating agricultural stories: Use of photographs, use of artwork (graphs, charts, maps, etc.), writing the captions. Editorial mechanics: Copy reading, headline and title writing, proofreading, lay outing.

Total Periods: 32

PRACTICALS/ EXPERENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1 Practice in interviewing.

2 Covering agricultural events

3-4 Abstracting stories from research and scientific materials and from wire services.

5-6 Writing different types of agricultural stories.

7-8 Selecting pictures and artwork for the agricultural story.

9-14 Practice in editing, copy reading, headline and title writing, proofreading, layouting.

15 Testing copy with a readability formula

16 Visit to a publishing office

RESOURCES/ STUDY MATERIALS

TEXT BOOKS:

1. Philip Kotler, Kevin Lane Keller, Abraham Koshy and Mithileswar Jha. Marketing Management: A South Asian Perspective. International 13th edition. Pearson Prentice Hal, 2009.
2. Aswathappa, K and Sridhar K. Production and Operations Management, 2002
3. Harsh, S.B. Conner, U.J. and Schwab G.D, Management of the Farm Business. Prentice Hall Inc., New Jersey, USA, 1981.

REFERENCE BOOKS:

1. David Downey, and John Ericson.Agribusiness Management, PHI publishers,2002.
2. Pandey, I M. Financial management, Kalyani publishers, 2023.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=EeHnz2aFiYk
2. https://www.youtube.com/watch?v=eSNG18ln-LM
3. https://www.youtube.com/watch?v=PdMfH176vnA

Web Resources:

1. https://www.slideshare.net/DrVReetaRao/agricultural-journalism-introduction
2. https://ebooks.inflibnet.ac.in/hsp13/chapter/agriculture-journalism-farm-mags/