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

(From 2024-25 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.	24AGDR101	Deeksharambh-Induction cum Foundation course	-	-	2	2(NG)
2.	24SKIL101	Skill Enhancement in Biofertilizer and biopesticide production	-	-	2	2
3.	24SKIL102	Skill Enhancement in Beneficial insect farming	-	-	2	2
4.	24EXTN102	Communication Skills	1	-	1	2
5.	24AGRN102	Farming based livelihood systems	2	-	1	3
6.	24EXTN101	Rural Sociology and Educational Psychology	2	-	-	2
7.	24AGRN101	Fundamentals of Agronomy	2	-	1	3
8.	24SSAC101	Fundamentals of Soil Science	2	-	1	3
9.	24HORT101	Fundamentals of Horticulture	2	-	1	3
10.	24AGAB101	National Service Scheme (NSS-I)	-	-	1	1
11.	24STAT101	Introductory mathematics (Non Gradial)	2	-	-	2(NG)
		Total	**13**	**-**	**12**	**25**

B.Sc. Hons. (Agri) – II Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL103	Skill Enhancement in Seed Production Technology	-	-	2	2
2.	24SKIL104	Skill Enhancement in Post harvest processing technology	-	-	2	2
3.	24EXTN103	Personality Development	1	-	1	2
4.	24AMET101	Environmental Studies and Disaster Management	2	-	1	3
5.	24SSAC102	Soil Fertility Management	2	-	1	3
6.	24ENTM101	Fundamentals of Entomology	2	-	1	3
7.	24VETY101	Livestock and Poultry Management	1	-	1	2
8.	24PATH101	Fundamentals of Plant Pathology	2	-	1	3
9.	24LANG101	Regional Language – Telugu (NG)	1(NG)	-	-	1(NG)
10.	24AGAB103	National Service Scheme (NSS-II)	-	-	1	1
		Total	**11**	**-**	**11**	**22**

B.Sc. Hons. (Agri) – III Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL105	Skill Enhancement in Mushroom Production Technology	-	-	2	2
2.	24AECO101	Entrepreneurship Development and Business Communication	2	-	1	3
3.	24PHED101	Physical Education, First Aid, Yoga Practices and Meditation	-	-	1	1
4.	24GPBR101	Principles of Genetics	2	-	1	3
5.	24AGRN103	Crop Production Technology-I (*Kharif* crops)	1	-	2	3
6.	24HORT102	Production Technology of Fruit and Plantation Crops	1	-	1	2
7.	24EXTN104	Fundamentals of Extension Education	2	-	1	3
8.	24NEMA101	Fundamentals of Nematology	1	-	1	2
9.	24AGRN104	Principles and Practices of Natural Farming	1	-	1	2
		Total	**10**	**-**	**11**	**21**

B.Sc. Hons. (Agri) – IV Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL106	Skill Enhancement in Horticulture Nursery Management	-	-	2	2
2.	24STAT102	Agricultural Informatics and Artificial Intelligence	2	-	1	3
3.	24HORT103	Production Technology of Vegetables and Spices	1	-	1	2
4.	24AECO102	Principles of Agricultural Economics and Farm Management	2	-	-	2
5. s	24AGRN105	Crop Production Technology-II (*Rabi* Crops)	1	-	2	3
6.	24AENG101	Farm Machinery and Power	1	-	1	2
7.	24AGRN106	Water Management	1	-	1	2
8.	24SSAC103	Problematic Soils and their management	1	-	1	2
9.	24GPBR102	Basics of Plant Breeding	2	-	1	3
		Total	**11**	**-**	**10**	**21**

B.Sc. Hons. (Agri) – V Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24AECO103	Agricultural Marketing and Trade	2	-	1	3
2.	24AMET102	Introduction to Agro-meteorology	1	-	1	2
3.	24CPHY101	Fundamentals of Crop Physiology	2	-	1	3
4.	24ENTO102	Pest management in Crops and Stored Grains	2	-	1	3
5.	24PATH102	Diseases of Field Crops and their Management	1	-	1	2
6.	24GPBR103	Crop Improvement -I (*kharif* crops)	1	-	1	2
7.	24AGRN107	Weed Management	1	-	1	2
8.	24HORT104	Ornamental Crops, MAPs and Landscaping	1	-	1	2
9.	24AGRN108	Introductory Agro forestry	1	-	1	2
10.	24TOUR101	Study Tour (NG)	-	-	2(NG)	2(NG)
		Total	**12**	**-**	**11**	**23**

B.Sc. Hons. (Agri) – VI Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24BIOT101	Fundamentals of Agricultural Biotechnology	2	-	1	3
2.	24STAT103	Basic and Applied Agricultural Statistics	2	-	1	3
3.	24GPBR104	Crop Improvement - II (*Rabi* crops)	1	-	1	2
4.	24AENG102	Renewable energy in Agriculture and Allied Sector	1	-	1	2
5.	24AGRN109	Dryland agriculture/Rainfed agriculture and watershed management	1	-	1	2
6.	24PATH103	Diseases of Horticultural Crops and their Management	1	-	1	2
7.	24PATH104	Agricultural Microbiology and Phyto - remediation	1	-	1	2
8.	24AECO104	Agricultural Finance and Cooperation	1	-	1	2
9.	24BCHE101	Essentials of Plant Biochemistry	2	-	1	3
10.	24GPBR105	Fundamentals of Seed Science & Technology	1	-	1	2
		Total	**13**	**-**	**10**	**23**

B.Sc. Hons. (Agri) – VII Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24ELCT 101-120	Any Five (5) Elective Courses (major or minor) each of 4 (3+1) credits from the list	15	-	5	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.	24RAEL101	RAWE/ Industrial Attachment /Experiential Learning / Hands-on Training/ Project Work / Internship	-	-	20	20
		Total	**-**	**-**	**20**	**20**

B.Sc. Hons. (Agri) – ELECTIVE COURSES

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24ELCT101	Agrochemicals	3	-	1	4
2.	24ELCT102	Agricultural Journalism	3	-	1	4
3.	24ELCT103	Landscaping	3	-	1	4
4.	24ELCT104	Commercial Plant breeding	3	-	1	4
5.	24ELCT105	Food safety and standards	3	-	1	4
6.	24ELCT106	Bio formulation and Nano formulation	3	-	1	4
7.	24ELCT107	Bio pesticides and Bio fertilizers	3	-	1	4
8.	24ELCT108	System Simulation and Agro advisory	3	-	1	4
9.	24ELCT109	Hi-tech Horticulture	3	-	1	4
10.	24ELCT110	Protected cultivation	3	-	1	4
11.	24ELCT111	Climate Resilient Agriculture	3	-	1	4
12.	24ELCT112	Biotechnology of Crop Improvement	3	-	1	4
13.	24ELCT113	Geoinformatics and Remote Sensing, precision farming	3	-	1	4
14.	24ELCT114	Micro-propagation Technologies	3	-	1	4
15.	24ELCT115	Commercial Seed Production	3	-	1	4
16.	24ELCT116	Principles and Practices of Organic Farming/ Conservation Agriculture	3	-	1	4
17.	24ELCT117	Food Science and Nutrition	3	-	1	4
18.	24ELCT118	Post-Harvest Technology and Value Addition	3	-	1	4

19.	24ELCT119	Agrochemicals	3	-	1	4
20.	24ELCT120	Agricultural Journalism	3	-	1	4

B.Sc. Hons. (Agri) – Skill enhancement courses

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL101	SEC-I (Biofertilizer and biopesticide production)	-	-	2	2
2.	24SKIL105	SEC-II (Mushroom production technology)	-	-	2	2
3.	24SKIL103	SEC-III (Seed Production Technology)	-	-	2	2
4.	24SKIL104	SEC-IV (Post harvest processing technology)	-	-	2	2
5.	24SKIL102	SEC-V (Beneficial insect farming)	-	-	2	2
6.	24SKIL106	SEC-VI (Horticulture nursery management)	-	-	2	2
7.	24SKIL107	SEC-VII (Plantation crops production and management)	-	-	2	2

B.Sc. Hons. (Agri) – I Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Credits
1.	24AGDR101	Deeksharambh-Induction cum Foundation course	-	-	2	2(NG)
2.	24SKIL101	Skill Enhancement in Biofertilizer and biopesticide production	-	-	2	2
3.	24SKIL102	Skill Enhancement in Beneficial insect farming	-	-	2	2
4.	24EXTN102	Communication Skills	1	-	1	2
5.	24AGRN102	Farming based livelihood systems	2	-	1	3
6.	24EXTN101	Rural Sociology and Educational Psychology	2	-	-	2
7.	24AGRN101	Fundamentals of Agronomy	2	-	1	3
8.	24SSAC101	Fundamentals of Soil Science	2	-	1	3
9.	24HORT101	Fundamentals of Horticulture	2	-	1	3
10.	24AGAB101	National Service Scheme (NSS-I)	-	-	1	1
11.	24STAT101	Introductory mathematics (Non Gradial)	2	-	-	2(NG)
		Total	**13**	**-**	**12**	**25**

B.Sc. Hons. (Agri) – I Semester

Course Code	Course Title	L	T	P	S	C
24AGDR101	DEEKSHARAMBH (INDUCTION-CUM-FOUNDATION PROGRAMME) 2(0+2)	0	-	2	-	2
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION:

Deeksharambh of two weeks' duration in the 1st semester. The course will include, but not restricted to, discussions on operational framework of academic process in university, interactions with alumni, business leaders, scientists and perspective employers, University academic and research managers and classes on personality development and communication skills. Steps will be taken to identify the strength and weakness of students (with remedial measures) and diverse potentialities and to enhance cultural Integration of students from different backgrounds. It will also create a platform for students to learn from each other's life experiences.

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

CO1. To give a broad view and application areas of the subject of study

CO2. Helping students from different backgrounds for cultural Integration

CO3. Knowing about the operational framework of academic process in university

CO4. Instilling life and social skills, leadership qualities, team working spirit

CO5. Developing social awareness, ethics and values, creativity

CO6. Helping students to identify the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario.

CO-PO-PSO Mapping Table:

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

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

COURSE CONTENT

Module 1: Operational framework of academic process (06Periods)

Discussions on operational framework of academic process , as well as interactions with academic and research managers of the University

Module 2: Creating awareness on the subject (06 Periods)

Creating awareness on the subject of study, and the traditional values and indigenous cultures along with diverse potentialities both in indigenous and developed scenario

Module 3: Interaction with Alimini (06 Periods)

Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields, and people with inspiring life experiences

Module 4: Activities to identify Strength and Weakness of Students (07 Periods)

Group activities to identify the strength and weakness of students (with expert advice for their improvement) as well as to create a platform for students to learn from each other's life experiences

Module 5: Field visits and Sessions on personality development (07Periods)

Field visits to related fields/ establishments. Sessions on personality development (instilling life and social skills, social awareness, ethics and values, team work, leadership, etc.) and communication skills

Total Periods:32

Course Code	Course Title	L	T	P	S	C
24SKIL101	SKILL ENHANCEMENT IN BIOFERTILIZER AND BIOPESTICIDE PRODUCTION 2(0+2)	0	-	2		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the Biofertilizer and Biopesticide Production.

To provide an insight into the concept and scope of Biofertilizer, and Biopesticide Production, to expose the student to various production aspects of different Biofertilizers such as Rhizobium sp., Azospirillum sp., Azotobacter sp.and Biopesticides such as *Beauveria bassiana, Metarhizium anisopliae*to helps the student to develop a knowledge and helps to establisha viable Biopesticide and Biofertilizer industryby own.

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

CO1. To get knowledge on different Biofertilizer's Isolation and Mass Production

CO2. To understand the different Biofertilizer's production aspects

CO3. To understand steps involved in the Biofertilizer's production commercially

CO4. To understand production aspects of different Biopesticides

CO5. To understand the steps involved in the Biopesticide's production commercially

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

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		-	-	-	-	3	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	-	3	-	-	3	-	2	-	-	-	-	-		-
CO6	3	-	-	3	-	-	-	-	-	3	-	-		-
Course correlation mapping	**3**	**3**	**3**	**3**	**3**	**-**	**2**	**3**	**3**	**3**	**-**	**-**		**-**

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
1.	Laboratory Equipment's for the Biofertilizers and Biopesticides Production
2.	Isolation of Rhizobium from Root Nodules
3.	Isolation of Azospirillum from Paddy Root Samples
4.	Isolation of Azotobacter from Soil Samples
5.	Isolation of Gluconacetobacter from Sugarcane
6.	Isolation of Phosphobacteria from Soil Sample
7.	Isolation of Methylotrophs from Phyllosphere by Leaf Imprint Technique
8.	Mass Production of Bacterial Biofertilizers & Liquid Biofertilizers
9.	Estimation of Arbuscular Mycorrhizal (AM) Infection in Roots
10.	Mass Production of Arbuscular Mycorrhizal Biofertilizer
11.	Isolation of Blue Green Algae from Soil
12.	Mass Production of Blue Green Algae (BGA)
13.	Mass Production of Azolla
14.	Methods of Application of Different Biofertilizers
15.	Testing Quality Control of Biofertilizers
16.	BIS Standards for Assessing the Quality of Biofertilizers
17.	Isolation of Trichoderma viride from Soil
18.	Isolation of Pseudomonas fluorescence from Soil
19.	Isolation of Bacillus thuringiensis from soil
20.	Isolation of Beauveria bassiana from soil
21.	Isolation of Serratia entomophila from Soil

22.	Isolation of arbuscular mycorrhizae from Soil
23.	Mass production of Trichoderma viride from Soil
24.	Methods of evaluation of biopesticides
25.	To purify and preserve the biofertilizers and biopesticides
26.	Establishment of Biopesticide units
27.	Production of Ha NPV and SI NPV
28.	Guidelines/Data Requirements for Registration of Biopesticides
29.	Regulations for establishment of Biopesticide Lab
30.	Identification of Botanical Biopesticides
31.	Visit to Biopesticide Laboratory
32.	Field Visit to Identify of Entomopathogenic Entities in Field

RESOURCES

TEXT BOOKS:

1. Subba Rao, N.S. 2020, Biofertilizers in Agriculture and Forestry. CBS Publishers, New Delhi.
2. Ramanathan, N. 2023, A Text Book of Biopesticides Technology. Deepika Book Agency, New Delhi.
3. Acharya, K., Sen, S., Rai., M. 2019, Biofertilizers and Biopesticides. Techno World, Kolkata.

REFERENCE BOOKS:

1. Rai, M.K. 2006. Handbook of Microbial Biofertilizers**.** International Book Distributing Co., Lucknow.
2. Nollet, M.L., Rathore, H.S. 2015. Biopesticides Handbook. CRC Press. Boca Raton, Florida, United States.
3. Khosla, R. 2017. Biofertilizers and Biocontrol Agents for Organic Farming (PB). Kojo Press, New Delhi.

VIDEO LECTURES:

1. Biofertilizers and Biopesticides | Advantages and disadvantages of Biopesticides - YouTube
2. Bio Fertilizer & Bio Pesticides | Microbiology | GAT - B, CUET PG - 2024 | L - 12 | IFAS - YouTube

WEB RESOURCES:

1. Frontiers | Overview of biofertilizers in crop production and stress management for sustainable agriculture
2. TNAU AgritechPortal:Sustainable Agriculture

Course Code	Course Title	L	T	P	S	C
24SKIL102	SKILL ENHANCEMENT IN BENEFICIAL INSECT FARMING 2(0+2)	0	-	2		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the
To explain about different types of honey bee species, morphology and anatomy, life cycle, pest and diseases, extraction, processing of honey from bee hives, various products of bee hives and career opportunities in bee keeping

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

CO1 Identification of various bee species in India, life cycle, morphology and anatomy
CO2 To be able to acquaint with various bee keeping equipments, types of bee hives, bee pasturage
CO3 Able to manage honeybee colonies in various seasons, extraction and processing of honey from honey bees
CO4 To manage various pests and diseases of honey bees and their management
CO5 Various products of honey and bee hives, value addition of honey, pesticide poisoning,
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	1	3	-	-	-	1	3	-	-		-
CO2	3	2	3	1	1	-	-	2	1	3	-	-		-
CO3	2	3	2	2	3	-	-	-	1	3	-	-		-
CO4	3	2	-	3	1	-	-	-	-	3	-	-		-
CO5	3	1	-	1	1	-	-	1	1	3	-	-		-
CO6	-	-	-	-	-	-	-	3	3	-	-	-		-
Course correlation mapping	**3**	**3**	**-**	**2**	**2**	**-**	**-**	**2**	**3**	3	**-**	**-**		**-**

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

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. predators, parasitoids, pollinators, weed killers and scavengers)
2. Beekeeping – Definition, Importance and its limitations
3. Identification of important species of honey bees - Rock bee, Little bee, Indian bee, European/Italian bee, Dammar bee, Himalayan bee and Indian black bee.
4. Morphology and Anatomy of honey bee
5. To study the life cycle, caste and sex determination in honey bees
6. To study the structural and morphological adaptations in honey bees
7. Communication in bees – Round dance and wag tail dance.
8. Acquaintance with various beekeeping appliances and different beehives
9. To study the different types of beehives
10. Commercial methods of bee rearing
11. To study the methods of queen rearing
12. Bee pasturage - different species of pollen and nectar yielding plants; honey flow season and dearth period
13. Swarming, migrating and absconding
14. Practical methods for division and uniting bee colonies
15. Seasonal management of honey bee colonies: Spring management
16. Seasonal management of honey bee colonies: Summer, monsoon and autumn season management
17. Seasonal management of honey bee colonies: Winter management and migratory beekeeping
18. Extraction of honey from honey comb
19. Processing of extracted honey
20. Manipulation for honey production
21. Management of bees for crop pollination
22. Bee stings and management
23. Study of insect pests of honey bees and bee brood

24. Study of diseases of honey bees and bee brood
25. Beehive inspection
26. Various products of honey bees and bee hives
27. Value addition of honey bee products
28. Impact of insecticides on honeybees and its foraging behaviour
29. Pesticide poisoning in honey bees
30. Economics of bee keeping
31. Making a career in beekeeping
32. Visit to nearby bee keeping centres

RESOURCES

TEXT BOOKS:

1. Practical Manual on Apiculture – G.K. Ghosh and K. C. Ghosh, 1994
2. Perspectives in Indian Apiculture – R. C. Mishra, 2001
3. Bees and Beekeeping in India – T. N. R. Reddy, 2014
4. Bee keeping in India – R. C. Mishra, 1995.

REFERENCE BOOKS:

1. Manual on Beekeeping – A.K. Singh and Omkar Nath, 2012
2. Honey bees of Asia – H. R. Hepburn and Sarah E. Radloff, 2011
3. Beekeeping Development in India – R.C. Mishra, 1999

VIDEO LECTURES:

1. https://www.youtube.com/channel/UC3mjpM6Av4bxbxps_Gh5YPw
2. https://www.uaex.uada.edu

WEB RESOURCES:

1. https://eCourses (icar.gov.in)
2. https://agritech.tnau.ac.in

Course Code	Course Title	L	T	P	S	C
24EXTN102	Communication Skills 2(1+1)	1	-	1	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION

This course is designed to enhance the communication abilities of students by focusing on listening, speaking, reading, and writing skills. It aims to build confidence, improve interpersonal communication, and strengthen employability skills. The course provides practical exposure to various communication contexts, helping students realize their potential, express themselves effectively, and adapt communication styles to professional and social needs.

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

CO1 Understand the fundamentals of communication and its process in personal and professional contexts.

CO2 Develop effective verbal and non-verbal communication skills

CO3 Apply listening, speaking, reading, and writing skills for academic and workplace success

CO4 Demonstrate the ability to work in teams and interact confidently with peers and professionals.

CO5 Enhance presentation, group discussion, and interview skills for improved employability

CO6 Use communication strategies for problem-solving, conflict resolution, and leadership roles.

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

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

COURSE CONTENT

Module 1: Communication Process: ***(04 Periods)***

The magic of effective communication; Building self-esteem and overcoming fears; Concept, nature and significance of communication process; Meaning, types and models of communication; Verbal and non-verbal communication; Linguistic and non-linguistic barriers to communication and reasons behind communication gap/ miscommunication.

Module 2: Basic Communication Skills: ***(04 Periods)***

Listening, Speaking, Reading and Writing Skills; Precis writing/ Abstracting/ Summarizing; Style of technical communication Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions.

Module 3: Structural Grammar: ***(04 Periods)***

Sentence structure, modifiers, connecting words and verbals; phrases and clauses; Case: subjective case, possessive case; objective case;

Module 4: Functional Grammar ***(04 Periods)***

Correct usage of nouns, pronouns and antecedents, adjectives, adverbs and articles; Agreement of verb with the subject: tense, mood, voice; Writing effective sentences; Basic sentence faults.

Total Periods: **16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. LISTENING AND NOTE TAKING
2. WRITING SKILLS
3. PRECIS WRITING
4. SUMMARIZING AND ABSTRACTING
5. READING (WRITTEN AND ORAL) OF GENERAL AND TECHNICAL ARTICLES
6. COMPREHENSION (WRITTEN AND ORAL) OF GENERAL AND TECHNICAL ARTICLES
7. MICRO-PRESENTATIONS
8. IMPROMPTU PRESENTATIONS
9. FEEDBACK ON PRESENTATIONS
10. STAGE MANNERS: GROOMING, BODY LANGUAGE,
11. STAGE MANNERS: VOICE MODULATION, SPEED
12. GROUP DISCUSSIONS
13. PUBLIC SPEAKING EXERCISES
14. VOCABULARY BUILDING EXERCISES

15. INTERVIEW TECHNIQUES

16. ORGANIZATION OF EVENTS

RESOURCES

TEXT BOOKS:

1. Andrews, Sudhir. 1988. How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGrawHill.
2. Raman, Meenakshi & Sharma, Sangeeta (2019). Technical Communication: Principles and Practice. Oxford University Press.
3. Sehgal, M.K. & Khetarpal, Vandana (2018). Business Communication. Excel Books

REFERENCE BOOKS:

1. Lesikar, R.V. & Pettit, J.D. (2017). Business Communication: Theory and Application. McGraw Hill Education.
2. Kaul, Asha (2018). Effective Business Communication. PHI Learning Pvt. Ltd.
3. Murphy, Herta A., Hildebrandt, Herbert W. & Thomas, Jane P. (2019). Effective Business Communication. McGraw Hill.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=hZjVwhEL1vA&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8
2. https://www.youtube.com/watch?v=EpABzwvpams&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8&index=2

WEB RESOURCES:

1. https://owl.purdue.edu](https://owl.purdue.edu) – Writing and communication resources
2. https://nptel.ac.in/courses/109/104/109104114/](https://nptel.ac.in/courses/109/104/109104114/

Course Code	Course Title	L	T	P	S	C
24AGRN102	**Farming based Livelihood Systems 3(2+1)**	2	-	1	-	3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the farming-based livelihood systems in agriculture and to disseminate the knowledge and skill how farming-based systems can be a source of livelihood

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

CO1 understand different agricultural livelihood system and its approaches for sustainable agriculture development in India

CO2 Analyze different farming-based livelihood systems prevailed in India

CO3 Understand different components related to farming systems and their significance in enhancing agricultural livelihoods

CO4 Gain knowledge on different livelihood enterprises associated with the farming in India

CO5 Understand the dynamics of farming-based livelihood system and their relevance in addressing modern challenges 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				
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PSO 1**	**PSO 2**	**PSO 3**	**PSO 4**	**PSO 5**
CO1	2	-	-	-	-	-	-	-	1	3	-	-		-
CO2	3	-	-	-	3	-	-	-	1	3	-	-		-
CO3	3	2	-	-	3	-	-	-	2	3	-	-		-
CO4	3	2	-	-	-	-	-	-	-	3	-	-		-
CO5	3	-	-	-	2	1	-	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	**3**	**2**	**-**	**-**	**3**	**1**	**3**	**3**	**2**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: INDIAN AGRICULTURAL STATUS AND AGRICULTURAL LIVELIHOOD SYSTEMS ***(05 Periods)***

Status of agriculture in India and different states, Income of farmers and rural people in India, Livelihood-Definition, concept and livelihood pattern in urban and rural areas, Different indicators to study livelihood systems. Agricultural livelihood systems (ALS): Meaning, approach, approaches and framework

Module 2: FARMING SYSTEMS AND ITS COMPONENTS ***(05 Periods)***

Definition of farming systems and farming based livelihood systems Prevalent Farming systems in India contributing to livelihood. Types of traditional and modern farming systems. Components of farming system/ farming-based livelihood systems

Module 3: CROPS AND CROPPING SYSTEMS ***(11 Periods)***

Components of farming system/ farming-based livelihood systems Crops and cropping systems, Livestock (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agro--forestry systems, Aqua culture Duck/Poultry cum Fish, Dairy cum Fish, Piggery cum Fish etc., small, medium and large enterprises including value chains and secondary enterprises as livelihood components for farmers,

Module 4: COMMERCIAL FARMING SYSTEM-BASED LIVELIHOOD MODELS ***(05 Periods)***

Factors affecting integration of various enterprises of farming for livelihood. Feasibility of different farming systems for different agro-climatic zones, Commercial farming-based livelihood models by NABARD, ICAR and other organizations across the country Case studies on different livelihood enterprises associated with the farming

Module 5: LIVELIHOOD ENTERPRISES- SCHEMES AND PROGRAMS ***(06 Periods)***

Case studies on different livelihood enterprises associated with the farming. Risk and success factors in farming-based livelihood systems, Schemes and programs by Central and State Government, Public and Private organizations involved in promotion of farming-based livelihood opportunities. Role of farming-based livelihood enterprises in 21st Century in view of circular economy, green economy, climate change, digitalization and changing life style

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Survey of farming systems and agricultural-based livelihood enterprises
2. Study of components of important farming- based livelihood models/ systems in different agro-climatic zones
3. Preparation of cropping scheme for different situation in India

4. Study of agro forestry and its components

5. Study of different integrated farming system for irrigated / dryland situations

6. Study of production and profitability of crop based, livestock based, processing based and integrated farming-based livelihood models

7. Evaluation of multiple cropping systems and their sustainability through induces

8. Study of profitable utilization of agriculture waste in IFS

9. Case studies on different livelihood enterprises associated with the farming

10. Field visit of innovative farming system models.

11. Visit of agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors

12. Study of agri-enterprises involved in industry and service sectors (Value Chain Models),

13. Learning about concept of project formulation on farming-based livelihood systems along with cost and profit analysis,

14. Case study of Start-Ups in agri-sectors

15. Visit to existing farming systems in nearby villages

16. Visit to an IFS unit in KVK/RARS/SAU

RESOURCES

TEXT BOOKS:

1. Dixon, J. and A. Gulliver with D. Gibbon. (2001). Farming Systems and Poverty: Improving Farmers' Livelihoods in a Changing World. FAO and World Bank, Rome, Italy and Washington, DC, USA

2. Ashley, C.; Carney, D. (1999). Sustainable Livelihoods: Lessons from Early Experience; Department for International Development: London, UK, Volume 7. [Google Scholar]

3. Reddy, S.R. 2016. Farming System and Sustainable Agriculture, Kalyani Publishers, New Delhi.

4. Panwar et al. 2020. Integrated Farming System models for Agricultural Diversification, Enhanced Income and employment, Indian Council of Agricultural Research, New Delhi.

REFERENCE BOOKS:

1. Singh, J.P., et al. 2015. Region Specific Integrated Farming System Models, ICAR-Indian Institute of Farming Systems Research, Modipuram
2. Walia, S. S. and U. S. Walia, 2020. Farming System and Sustainable Agriculture, Scientific Publishers, Jodhpur, Rajasthan.
3. Carloni, A. 2001. Global Farming Systems Study: Challenges and Priorities to 2030 – Regional Analysis: Sub-Saharan Africa, Consultation Document, FAO, Rome, Italy
4. Evenson, R.E. 2000. Agricultural Producitivity and Production in Developing Countries'. In FAO, The State of Food and Agriculture, FAO, Rome, Italy

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=OxVc9M2pwK4
2. https://www.youtube.com/watch?v=V08vxHtvPhE&list=PLFLM7qfYY44nywteTj7KhWtL1aLP2Zz7c
3. https://www.youtube.com/watch?v=MpVgJU7UXVQ&list=PLFLM7qfYY44nywteTj7KhWtL1aLP2Zz7c&index=7
4. https://www.youtube.com/watch?v=iloAQmroRK0

WEB RESOURCES:

1. https://atarijabalpur.icar.gov.in/upload/publication/Large%20scale%20technology/Integrated%20Farming%20System.pdf
2. https://icar.gov.in/sites/default/files/inline-files/Selected-Integrated-Farming-System-models.pdf

Course Code	Course Title	L	T	P	S	C
24EXTN101	**RURAL SOCIOLOGY AND EDUCATIONAL PSYCHOLOGY 2(2+0)**	2	-	0	-	2

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

COURSE DESCRIPTION: This course is designed to provide knowledge on concept and importance of sociology and rural sociology as well as the relationship with Extension Education

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

CO1 Understand the basic concepts and components Extension Education and Agricultural Extension
CO2 Understanding the social structure and functions
CO3 Analyzing the role of social institutions in social development
CO4 Understand the basic concepts of psychology and educational psychology
CO5 Analyzing the role and importance of teaching and learning

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1	1	1	-	-	2	-	-	2	-	-	-	-	3	-
CO2	2	3	2	-	2	1	-	-	-	-	-	-	3	-
CO3	2	-	3	-	-	2	-	-	-	-	-	-	3	-
CO4	1	-	-	2	-	2	2	-	3	-	-	-	3	-
CO5	2	-	-	2	-	-	2	2	3	-	-	-	3	-
Course correlation mapping	2	2	3	2	2	2	2	2	3	-	-	-	3	-

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

COURSE CONTENT

Module 1: Extension Education and Agricultural Extension ***(07 Periods)***

Meaning, definition, scope, and importance. Sociology and rural sociology: Meaning, definition, scope, importance of rural sociology in Agricultural Extension, and interrelationship between rural sociology and Agricultural Extension. Indian Rural Society: important characteristics, differences, and relationship between rural and urban societies. Social Groups: Meaning, definition, classification, factors considered information and organization of groups, motivation in group formation and role of social groups in Agricultural Extension.

Module 2: Society concepts and roles ***(08 Periods)***

Social Stratification: Meaning, definition, functions, basis for stratification, forms of social stratification- characteristics and- differences between class and caste system. Cultural concepts: culture, customs, folkways, mores, taboos, rituals. Traditions: Meaning, definition and their role in Agricultural Extension. Social Values and Attitudes: Meaning, definition, types and role of social values and attitudes in agricultural Extension. Social Institutions: Meaning, definition, major institutions in rural society, functions, and their role in agricultural Extension.

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

Meaning, definition, types of organizations and role of social organizations in agricultural Extension. Social Control: Meaning, definition, need of social control and means of social control. Social change: Meaning, definition, nature of social change, dimensions of social change and factors of social change. Leadership: Meaning, definition, classification, roles of leader, different methods of selection of professional and lay leaders. Training of Leaders: Meaning, definition, methods of training, Advantages and limitations in use of local leaders in Agricultural Extension

Module 4: Introduction to Psychology and educational psychology ***(06 Periods)***

Psychology and educational psychology: Meaning, definition, scope, and importance of educational psychology in Agricultural Extension. Intelligence: Meaning, definition, types, factors affecting intelligence and importance of intelligence in Agricultural Extension. Personality: Meaning, definition, types, factors influencing the personality and role of personality in agricultural Extension

Module 5: Teaching: Learning process: ***(05 Periods)***

Meaning and definition of teaching, learning, learning experience and learning situation, elements of learning situation and its characteristics. Principles of learning and their implication of teachin

Total Periods: **32**

RESOURCES

TEXT BOOKS:

1. Dahama O. P. and Bhatnagar, O. P. - Education and Communication for Developmen
2. Sandhu A. S. -Textbook on Agricultural Communication
3. Ray, G. L. -Extension Communication and Management

REFERENCE BOOKS:

1. R Velusamy Textbook on Rural Sociology and Educational Psychology
2. J.B. Chitambar -Introductory Rural Sociology
3. M.B. Ghorpade- Essential of psychology

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=OWXa2IZKZTk

2. https://www.youtube.com/watch?v=upeGGJYDjGk
3. https://www.youtube.com/watch?v=1_w2gDpemcc
4. https://www.youtube.com/watch?v=PIUj6te_P4g&list=PLY2dc7q4qC_wLu8BkSGZqhmP4N2OPynFU

WEB RESOURCES:

1. https://agri-bsc.kkwagh.edu.in/uploads/department_course/Rural_Sociology_and_Educational_Psychology.pdf
2. https://nahep.icar.gov.in/KMS/UploadKC2/4d1761dd-b259-4079-8acc-46dee9198a66/Manual%20(Sociology)%20_CAAST%20-CSKHPKV.pdf

Course Code	Course Title	L	T	P	S	C
24AGRN101	**FUNDAMENTALS OF AGRONOMY**	2	-	1	-	3

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 WoriIndependently or in teams to solve problems with effective communication.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
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 AND ITS SCOPE ***(06 Periods)***

Definition, meaning and scope of Agronomy; art, science and business of crop production, relation of Agronomy with other disciplines of Agricultural Science, f ields crops and classification, importance, ecology and ecosystem. Agro climatic zones of India and the state. cropping systems: Factors affecting cropping systems, major cropping patterns and systems in the country.

Module 2: SEEDS AND SOWING, TILLAGE AND TILTH (08 Periods)

Definitions of crops, variety and seed. Factors affecting crop stands establishment: good quality seed, proper tillage, time of sowing seed rate, depth and method of sowing: broadcasting, drilling, dibbling, transplanting etc. Definition, objectives, types, advantages and disadvantages of tillage including conservation tillage. Crop density and geometry: plant geometry and planting geometry, its effect on growth, yield.

Module 3: CROP NUTRITION ***(08 Periods)***

Definition of essential nutrients, criteria of essentiality, functional elements, classification of essential nutrients, role of macro and micro nutrients. Nutrient absorption, active and passive absorption of nutrients, forms of plant nutrients absorbed by plants, Combined /un combined forms. Manures and fertilizers, nutrient use efficiency: Sources of nutrients: Inorganic (fertilizers), organic (manures) and bio-fertilizers; their classification and characteristics, method of preparation and role of organic manures in crop production. Integrated Nutrient Management (INM): Meaning, different approaches and advantages of INM. Green manure- role in crop production: Definition, objectives types of green manuring, desirable characteristics, advantages and limitations of green manuring.

Module 4: WATER MANAGEMENT, WEEDS ***(06 Periods)***

Water resources, soil-plant-water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation, water logging. Definition, Importance and basics of classification of weeds and their control. Allelopathy-Meaning and importance in crop production.

Module 5: SUSTAINABLE CROP PRODUCTION, GROWTH AND DEVELOPMENT OF CROPS ***(04 Periods)***

Definition, importance and practices, natural resources and conservation pollution and pollutants. Definition, Meaning and factors affecting growth and development.

(Total Periods: 32)

PRACTICALS/ EXPERIENTIAL LEARNING
LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. A visit to Instructional Crop farm
2. Study on field crops
3. Identification of crops, seeds
4. Identification of fertilizers, pesticides
5. Crops and cropping systems in different Agro-climatic zones of the state

6. Study of some preparatory tillage implements
7. Study of inter tillage implements
8. Practice of ploughing / puddling
9. Study and practice of inter cultivation in field crops
10. Numerical exercises on calculation of seed, plant population
11. Numericals on fertilizer requirement
12. Study of yield contributing characters
13. Yield estimation of crops
14. Identification of weeds in different crops
15. Seed germination and viability test of seed
16. Practice on time and method of application of manures and fertilizers.

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
24SSAC101	**FUNDAMENTALS OF SOIL SCIENCE 3(2+1)**	2	-	1	-	3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the soil genesis, basic soil properties viz., Soil physico chemical properties like soil reaction(pH) CEC, AEC, base saturation, buffering capacity, soil organic matter, soil physical properties BD, PD, soil consistency, soil temperature, soil air and soil water. Soil taxonomy, classification, soils of India

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

CO1 Understand basic concepts of soil
CO2 Analyze the processes responsible for the formation of rocks and minerals
CO3 Understand the chemistry involved in soil formation
CO4 Understand the physical properties of soil
CO5 Remember the terminology in soil classification
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	-	-	2	3	-	-	-	-
CO2	2	1	3	2	-	-	-	-	2	3	-	-	-	-
CO3	3	2	2	2	-	-	-	-	1	3	-	-	-	-
CO4	2	1	3	2	2	-	-	-	2	3	-	-	-	-
CO5	3	1	2	2	-	-	-	-	2	3	-	-	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**2**	**1**	**2**	**2**	**2**	**2**	**3**	**3**	**2**	3	**-**	**-**	**-**	**-**

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

COURSE CONTENT

Module 1: Introduction to soil pedological concepts ***(04 Periods)***

Soil: Pedological and edaphalogical concepts

Module 2: Weathering of rocks and minerals ***(06 Periods)***

Rocks and minerals, weathering, Silicate clays: constitution and properties

Module 3: Soil chemical Properties and their significance ***(08 Periods)***

Sources of charge, ion exchange, cation and anion exchange capacity and base saturation (after buffering capacity).Soil colloids: inorganic and organic, Properties of soil colloids and Ion exchange in soils. Soil reaction and buffering capacity

Module 4: Soil forming processes and soil physical parameters ***(08 Periods)***

Soil formation, Soil organic matter, Pedogenic processes. Soil profile, soil texture, soil structure. Bulk density and particle density, soil consistency, soil temperature, soil air, soil water

Module 5: Significance of soil classification and distribution of soils ***(06 Periods)***

Soil taxonomy, keys to soil orders. Soils of India.

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICALEXERCISES:

1. Study of rocks and minerals
2. study of silicate and non-silicate minerals
3. Study of properties of different types of rocks
4. study of a soil profile
5. Collection and processing of soil for analysis
6. Study of soil texture-feel method and mechanical analysis
7. Determination particle and bulk density and soil porosity
8. Determination of soil colour
9. Study of soil structure and aggregate analysis
10. Determination of soil moisture
11. Determination of soil moisture constants field capacity; water holding capacity
12. Study of infiltration rate of soil
13. Determination of soil pH
14. Determination of electrical conductivity of soil.
15. Study of soil map
16. Soil health card and its interpretation

RESOURCES

TEXT BOOKS:

1. Introductory Soil Science – By Dilip Kumar Das, Kalyani Publishers
2. Soil Fertility and Nutrient Management – By S. S. Singh, Kalyani Publishers

REFERENCE BOOKS:

1. Soil Fertility and Fertilizers – By Samual L. Tisdale, Werner L. Nelson and James D. Beaton, Macmillan Publishing Company, New York
2. The Nature and Properties of Soils – By Harry O. Buckman and Nyle C.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=0eF6b08PVt8&list=PLnI1zSpX4B-BFYqiaIvz71du2Yqc86nCh&index=4
2. https://www.youtube.com/watch?v=f7O6hjlIQto&list=PLnI1zSpX4B-BFYqiaIvz71du2Yqc86nCh&index=10
3. https://www.youtube.com/watch?v=qtQGMODJ57U
4. https://www.youtube.com/watch?v=8XTtR96k_XA

WEB RESOURCES:

1. https://agritech.tnau.ac.in/agriculture/pdf/Fundamental%20of%20Soil%20Sci%20by%20ISSS-1.pdf
2. https://ftp.idu.ac.id/wp-content/uploads/ebook/tdg/TERRAMECHANICS%20AND%20MOBILITY/epdf.pub_fundamentals-of-soil-science.pdf

Course Code	Course Title	L	T	P	S	C
24HORT101	FUNDAMENTALS OF HORTICULTURE 3(2+1)	2	-	1	-	3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the To provide knowledge on different branches of horticulture viz. pomology, olericulture, floriculture and landscaping, spices and medicinal plants. Provide knowledge on orchard management, propagation methods, cultural operations and nutrient management of horticultural crops Provide knowledge on different physiological aspects of horticultural crops

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

CO1 understand different branches of Horticulture
CO2 Analyze different Plant propagation methods and propagations and there important
CO3 Understand different components related to orchard establishment and their significance in enhancing horticulture crops.
CO4 To gain knowledge on different orchard management associated with the farming in Indian horticulture sector
CO5 Understand the dynamics of horticulture-based systems and their relevance in addressing modern challenges in horticulture
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	3	-	-	-	3	-	-	-	1	3	-	-		-
CO3	3	2	-	-	3	-	-	-	2	3	-	-		-
CO4	3	2	-	-	2	-	-	-	-	3	-	-		-
CO5	3	-	-	-	2	1	-	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	**3**	**2**	**-**	**-**	**3**	**1**	**3**	**3**	**2**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Important and classification of horticulture ***(05 Periods)***

Its different branches, importance and scope, Horticulture and botanical classification, soil and climate for horticultural crops

Module 2: Plant propagation: ***(07 Periods)***

Methods and propagation structures, seed dormancy and seed germination, Merits and demerits of sexual and asexual propagation Stock-scion relationship.

Module 3: orchard establishment ***(08 Periods)***

Principles of orchard establishment, principles and methods of training and pruning of fruit crops

Module 4: Fruitlessness, unfruitfulness and growth regulators in horticultural crops ***(08 Periods)***

Juvenility and flower bud differentiation, unfruitfulness in horticultural crops, pollination, pollinizers and pollinators, fertilization and parthenocarpy, importance of bio regulators in horticultural crops

Module 5: Nutrient and irrigation methods for horticulture crops ***(04 Periods)***

irrigation and its methods, Fertilizer application in horticultural crops

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification and nomenclature of fruit
2. Layout of orchard
3. Layout of different planting system
4. Nursery raising techniques of fruit crops
5. Digging of pits for fruit crops
6. Understanding of plant propagation structures
7. Propagation through seeds and plant parts
8. Propagation techniques for horticultural crops
9. Study of Containers, potting mixture, potting and repotting methods
10. Training methods on fruit crops
11. Pruning methods on fruit crop
12. Preparation of fertilizer mixture and application methods
13. Layout of different irrigation systems

14. Preparation and application of plant growth regulators
15. Study of Maturity standards and harvesting methods in horticulture crops
16. Study of grading, packaging and storage methods

RESOURCES

TEXT BOOKS:

1. Basics of Horticulture by Jitendra Singh
2. Introduction to Horticulture by N. Kumar

REFERENCE BOOKS:

1. Handbook of Horticulture by ICAR

VIDEO LECTURES:

2. https://www.youtube.com/watch?v=s-VLvtirppw&list=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK
3. https://www.youtube.com/watch?v=bWPBB-B2Sf0&list=PLgYHty1vjcGhBekBoTgUOo2l3ywIpOjfK&index=2
4. https://www.youtube.com/watch?v=cupvfkH9eOI

WEB RESOURCES:

1. https://icar.org.in/e-books
2. https://icar.org.in/consortium-e-resources-agriculture-cera

Course Code	Course Title	L	T	P	S	C
24AGAB103	NATIONAL SERVICE SCHEME-I 1(0+1)	0	-	1	-	1
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION:

This course explores the significance of youth leadership, emphasizing its meaning, types, and essential leadership traits. It highlights the qualities of effective leaders and the vital roles young people play in driving change. It also addresses the need for health education, covering topics like hygiene, nutrition, sanitation, reproductive health, and national health initiatives. Furthermore, it promotes healthy lifestyles by discussing HIV/AIDS, substance abuse, first aid, and home nursing.

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

CO1. Analyze the roles and responsibilities of youth leaders in addressing social, cultural, and economic challenges.

CO2. To introduces students to the development and implementation of youth programs and policies at the national, state, and voluntary levels.

CO3. Describe key national health programs and their relevance to youth and reproductive health.

CO4. Explain the core concepts and traditions of yoga and their relevance to modern life.

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

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

COURSE CONTENT

Module1: Introduction on youth leadership and life competencies (04 Periods)

Importance and role of youth leadership. Meaning, types and traits of leadership, qualities of good leaders; importance and roles of youth leadership, Life competencies. Definition and importance of life competencies, problem-solving and decision-making, interpersonal communication.

Module 2: youth development programs. (4 Periods)

Youth development programs. Development of youth programs and policy at the national level, state level and voluntary sector; youth-focused and youth-led organizations.

Module3: Youth health and lifestyle (04 Periods)

Health, hygiene and sanitation. Definition needs and scope of health education; role of food, nutrition, safe drinking water, water borne diseases and sanitation (Swachh Bharat Abhiyan) for health; national health programs and reproductive health. Youth health, lifestyle, HIV AIDS and first aid. Healthy lifestyles, HIV AIDS, drugs and substance abuse, home nursing and first aid.

Module 4: Yoga and lifestyle (04 Periods)

Youth and yoga. History, philosophy, concept, myths, and misconceptions about yoga; yoga traditions and its impacts, yoga as a tool for healthy lifestyle, preventive and curative method.

RESOURCES

TEXT BOOKS:

4. **Ministry of Youth Affairs & Sports (2020)** – *NSS Manual* Government of India
5. **Dr. Jitendra Singh (2021)** – *Textbook on National Service Scheme (NSS)* Century Publications
6. **Dr. D.P. Verma (2019)** – *National Service Scheme: A Textbook* University Publications
7. **V.K. Sharma (2018)** – *Youth Empowerment through NSS* Kanishka Publishers

REFERENCE BOOKS:

4. **Goel, S.L. (2006)** – *Encyclopaedia of Social Welfare and Administration*. Deep & Deep Publications Pvt. Ltd., New Delhi
5. **ohanty, G. (2005)** – *Youth and Social Development* Anmol Publications Pvt. Ltd., New Delhi
6. **Kapur, Annesha (2011)** – *Youth in Contemporary India: Images of Identity and Social Change* Sage Publications, India
7. **Batra, Promod K. (2002)** – *Life Skills and Personality Development* Think Inc.

VIDEO LECTURES:

3. https://www.youtube.com/watch?v=eWI2Ul1qz3E
4. https://www.youtube.com/watch?v=yDiF2gc0kls
5. https://www.youtube.com/watch?v=1pUmSK36rkA
6. https://www.youtube.com/watch?v=etX8uXqLBok

WEB RESOURCES:

3. https://nss.gov.in
4. https://youth.gov.in

Course Code	Course Title	L	T	P	S	C
24STAT101	**INTRODUCTORY MATHEMATICS (NON-GRADIAL) (2+0)**	2	-	0	-	2

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

COURSE DESCRIPTION: This course is designed to provide an overview about thefoundational understanding of mathematical concepts without the pressure of grading. It covers essential topics such as basic algebra, matrices. Emphasis will be placed on developing problem-solving skills, mathematical reasoning, and practical applications in everyday contexts

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

CO1 Determine the progressions of a series and addition, subtraction and multiplication of a matrix, determinants of a matrix.
CO2 Demonstrate the knowledge of differentiation for single and two variable function and its applications, maxima and minima of a function.
CO3 Demonstrate the knowledge of partial differentiation
CO4 Evaluate indefinite and definite integrals of function.
CO5 Design the mathematical models of agricultural systems, fitting different linear and nonlinear models from the experimental data.

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

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

COURSE CONTENT

Module 1: Algebra and Matrices ***(03 Periods)***

Progressions- Arithmetic, Geometric and Harmonic Progressions. Matrices: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order by adjoint method, Properties of determinants up to 3rd order and their evaluation.

Module 2: Differential Calculus- I ***(04 Periods)***

Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions, Methods, Increasing and Decreasing Functions. Application of Differentiation- Growth rate, Average Cost, and Marginal cost, Marginal Cost, Marginal Revenue.

Module 3: Differential Calculus- II ***(03 Periods)***

Partial differentiation: Homogeneous function, Euler's theorem, Maxima and Minima of the functions of the form y = f (x) and y = f (x1, x2)

Module 4: Integral Calculus ***(03 Periods)***

Integration-Definite and Indefinite Integrals-Methods- Integration by substitution, Integration by parts. Area under simple well-known curves.

Module 5: Mathematical Models ***(03 Periods)***

Agricultural systems - Mathematical models - classification of mathematical models-Fitting of Linear, quadratic and exponential models to experimental data

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
3.

REFERENCE BOOKS:

1. Text Book for A.P Intermediate Mathematics – Paper (IA & IIB).
2. 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
4. https://www.youtube.com/watch?v=GVaffjRYWJg

WEB RESOURCES:

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

B.Sc. Hons. (Agri) – II Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL103	Skill Enhancement in Seed Production Technology	-	-	2	2
2.	24SKIL104	Skill Enhancement in Post harvest processing technology	-	-	2	2
3.	24EXTN103	Personality Development	1	-	1	2
4.	24AMET101	Environmental Studies and Disaster Management	2	-	1	3
5.	24SSAC102	Soil Fertility Management	2	-	1	3
6.	24ENTM101	Fundamentals of Entomology	2	-	1	3
7.	24VETY101	Livestock and Poultry Management	1	-	1	2
8.	24PATH101	Fundamentals of Plant Pathology	2	-	1	3
9.	24LANG101	Regional Language – Telugu (NG)	1(NG)	-	-	1(NG)
10.	24AGAB103	National Service Scheme (NSS-II)	-	-	1	1
		Total	**11**	**-**	**11**	**22**

Course Code	Course Title	L	T	P	S	C
24 SKIL103	SKILL ENHANCEMENT IN SEED PRODUCTION TECHNOLOGY	-	-	2	-	2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION:

The **Skill Enhancement in Seed Production Techniques** course is designed to provide students with a comprehensive, hands-on understanding of the advanced techniques employed in seed production, quality control, and certification. This course covers key aspects of seed biology, from classification and dormancy management to seed processing, storage, and treatment, with a focus on both self- and cross-pollinated crops. The curriculum emphasizes practical skills such as seed testing for viability and vigor, floral biology for pollination management, rouging for genetic purity, and application of the Seed Act and certification procedures. Students will also gain insights into seed economics and entrepreneurship, allowing them to design seed production models for commercial success.

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

CO1 Demonstrate a clear understanding of seed classification, and identify various seed classes—Nucleus, Breeder, Foundation, and Certified—based on regulatory guidelines and physical attributes.

CO2 Apply standard protocols to assess seed quality, including germination testing, seed viability through advanced methods like the Tetrazolium test, and dormancy-breaking techniques.

CO3 Analyze and document floral biology, including pollination systems (self-pollination and cross-pollination) and implement effective rouging strategies to maintain genetic purity in seed crops.

CO4 Execute seed processing techniques, including cleaning, grading, and packaging, using state-of-the-art equipment while ensuring compliance with seed quality standards.

CO5 Understand and evaluate seed certification processes, label production, and adherence to legal provisions under the Seed Act, Seed Rules, and other regulatory frameworks.

CO6 Develop cost-effective and sustainable seed production models, with a focus on economic viability, seed business management, and the establishment of seed enterprises.

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		-	-	-	-	3	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	-	3	-	-	3	-	2	-	-	-	-	-		-
CO6	3	-	-	3	-	-	-	-	-	3	-	-		-
Course correlation mapping	**3**	**3**	**3**	**3**	**3**	**-**	**2**	**3**	**3**	**3**	**-**	**-**		**-**

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

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1	Seed Production Technology-An Introduction
2	Seed Morphology: Internal structure Analysis
3	Classes of Seed
4	Seed Production Techniques for Paddy Varieties and Hybrids
5	Techniques for Seed Quality Testing and Evaluation
6	Techniques for Seed Germination Testing
7	Techniques for Assessing Seed Viability
8	Seed Production Techniques in Maize
9	Hybrid Seed Production in Maize
10	Techniques for Breaking Seed Dormancy in Kharif Crops
11	Assessment Crop Seedling Vigour Using Length and Dry Weight Methods
12	Floral Biology
13	Techniques of Controlled Pollination and Emasculation
14	Seed Production Techniques in Sorghum
15	Seed Production Techniques in Bajra
16	Seed Production Techniques in Pigeon pea
17	Seed Production Techniques in Chick pea
18	Seed Production Techniques in Black gram
19	Seed Production Techniques in Green gram
20	Seed Production Techniques in Groundnut
21	Seed Production Techniques in Mustard and Rapeseed
22	Seed Production Techniques in Sesame
23	Seed Production Techniques in Soybean
24	Seed Production Techniques in Tomato
25	Seed Production Techniques in Brinjal
26	Seed Production Techniques in Bhendi/Okra
27	Stage wise Field Inspection Protocol for Seed Certification
28	Compatibility Testing of Bio inoculants and Chemical Seed Treatments
29	Cost Analysis of Seed vs. Grain Production in Maize
30	Seed Sorting, Grading, and Packaging Based on Size and Weight
31	Establishing an Internal Quality Control System for a Seed Lot

References

TEXTBOOKS:

1. Singh, B.D. 2005. *Plant Breeding - Principles and Methods*. Kalyani Publishers, New Delhi.
2. Chahal, G.S., and Gosal, S.S. 2002. *Principles and Procedures of Plant Breeding: Biotechnological and Conventional Approaches*. Narosa Publishing House, India.
3. Poehlman, J.M., and Sleper, D.A. 2006. *Breeding Field Crops*. 5th edition. Blackwell Publishing, Iowa, USA.
4. Bharadwaj, D.N. 2012. *Breeding Field Crops*. Agrobios (India), Jodhpur. ISBN: 9788177544749.
5. Thomas, A. 2019. *Seed Technology: Principles and Practices*. Springer Nature, India.
6. Khan, M.A., and Ali, S.H. 2010. *Seed Quality: Basic Principles and Practices*. Springer, USA.
7. Ram, K., and Prakash, N. 2014. *Seed Testing and Certification Methods*. ICAR, India.

Reference Books

1. Dinesh, P. 2013. *Seed Science and Technology*. Agri-Horticultural Publishing House, India.
2. Jha, R., and Yadav, R.S. 2014. *Seed Production in Field Crops*. CBS Publishers & Distributors, India.
3. Sukhwinder, S., and Bhat, A. 2008. *Seed Technology: Principles and Practices*. Kalyani Publishers, New Delhi.
4. Kumar, R., and Sharma, S. 2016. *Seed Certification and Testing*. New India Publishing Agency, India.
5. Reddy, N., and Sundaram, M. 2015. *Seed Technology in Agriculture*. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

6. Kaur, G., and Pal, P. 2017. *Principles of Seed Technology*. New India Publishing Agency, India.
7. Purohit, S.S., and Sharma, R. 2012. *Seed Biology and Technology*. Scientific Publishers, India.
8. Vishwanath, S. 2013. *Seed Production and Quality Control in Agricultural Crops*. CRC Press, USA.

Video lectures

1. Seed Technology Lecture Series for ICAR JRF/SRF/ASRB NET/ARS-You tube.
2. Seed Production 101-You tube.

Web Resources

1. https://sbc.ucdavis.edu/seed-production
2. https://www.online.colostate.edu/certificates/seed-technology/
3. https://iiwbr.org.in/wp-content/uploads/2024/01/Training-Manual-4-Seed-Production-Technology.pdf
4. https://sites.google.com/a/uasd.in/ecourse/seed-science-technology

Course Code	Course Title	L	T	P	S	C
24SKIL104	SKILL ENHANCEMENT IN POST-HARVEST PROCESSING TECHNOLOGY 2(0+2)	-	-	2		2

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

COURSE DESCRIPTION: This course is designed to provide an overview of Post-Harvest Processing Technology.
It aims to offer insight into the concepts and scope of post-harvest management, while exposing students to various post-harvest techniques and technologies applied to different agricultural and horticultural produce. This includes handling, storage, grading, packaging, transportation, and value addition methods. The course helps students develop the knowledge and skills necessary to minimize post-harvest losses, maintain quality, and establish a viable post-harvest processing enterprise of their own.

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

CO7. Gain knowledge about post-harvest handling and processing of various agricultural and horticultural produce.
CO8. To understand techniques for the preservation, storage, and shelf-life enhancement of perishable commodities.
CO9. To understand the steps involved in pest, disease, and microbial management during post-harvest stages.
CO10 To comprehend the infrastructure and operational requirements for establishing post-harvest processing units.
CO11 To understand the processes involved in value addition, grading, packaging, and marketing of post-harvest products.
CO12 Work independently or in teams to solve practical problems related to post-harvest losses, quality maintenance, and efficient processing.

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		-	-	-	3	-	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	3	-	-	-	-	-	3	-	-	-	-	-		-
CO6	3	-	-	-	-	3	-	-	-	3	-	-		-
Course correlation mapping	3	3	3	3	3	-	3	3	3	3	-	2		-

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

COURSE CONTENT

PRACTICALS/ EXPERIENTIAL LEARNING

1. Study of post-harvest losses in fruits and vegetables and their impact on marketability
2. Sorting and grading of fruits and vegetables based on size, colour, and ripeness
3. Cleaning and washing techniques for fresh produce using traditional and improved methods
4. Pre-cooling and packaging methods to improve shelf life of perishable commodities
5. Study of unit operations in cereal processing including dehusking, sieving, and milling
6. Manual dehusking and pounding of paddy and analysis of recovery percentage
7. Shelling of maize and groundnut and separation of kernels using winnowing
8. Preparation of flour from wheat or millets using household grinders
9. Parboiling process of paddy and its influence on milling characteristics
10. Extraction of oil from groundnut or sesame using manual or mechanical methods
11. Blanching of vegetables prior to drying and its effect on quality
12. Sun drying and shade drying of leafy greens and fruit slices
13. Dehydration of banana or papaya slices using solar cabinet dryer
14. Preparation of fruit chips or vegetable slices using controlled drying
15. Preparation of fruit bar or leather using pulp blending and tray drying
16. Preparation of Aonla candy or citrus preserve using sugar syrup
17. Preparation of mixed fruit jam or jelly and evaluation of consistency
18. Preparation of lemon or mango pickle using salt, oil, and spices
19. Preparation of tomato ketchup or chutney using home-scale methods
20. Extraction and preservation of fruit juice for RTS beverage
21. Determination of total soluble solids using hand refractometer
22. Measurement of acidity and pH of fruit juice or preserve
23. Sensory evaluation of processed products using hedonic scale
24. Study of packaging materials suitable for processed products
25. Packaging and sealing of dried or processed foods for storage and marketing
26. Designing of food product labels with nutritional facts and regulatory information
27. Study of food safety regulations and FSSAI standards applicable to small-scale food businesses
28. Study of good hygiene practices and sanitation procedures in food handling
29. Preparation of spice powders like chilli, turmeric, and coriander and their hygienic packaging
30. Extraction of essential oil from lemongrass or curry leaves using simple distillation method
31. Visit to a spice processing or essential oil unit to understand small-scale machinery, branding, and marketing
32. Visit to a women-led self-help group enterprise or FPO to study entrepreneurship, value addition, and agribusiness opportunities

RESOURCES

TEXT BOOKS:

8. Amalendu Chakraverty, Arun S. Mujumdar, Hosahalli S. Ramaswamy (2003). Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices Books in soils, plants, and the environment.
9. S. Krishnaprbhu (2020) Post Harvest Technology A Text Book.
10. N S Rathore (Author), G K Mathur (Author), S S Chasta (2012). Post-Harvest Management and Processing of Fruits and Vegetables. The Energy And Resources Institute.

REFERENCE BOOKS:

8. *K.P. Sudheer & V. Indira Post Harvest Technology of Horticultural Crops Publisher: New India Publishing Agency*
9. *A.K. Thompson. Fruit and Vegetables: Harvesting, Handling and Storage. Publisher: Wiley-Blackwell*
10. *Kumar, Sanjeev & S. Suresh. Post-Harvest Technologies for Agricultural Products Publisher: Agro-Tech Publishers*

VIDEO LECTURES:

7. https://www.youtube.com/watch?v=BMIUAVhzRuc&list=PLgYHty1vjcGjhmAnec3LVKxnahBRR9aGx
8. https://www.youtube.com/watch?v=WhaepfiKtuk

WEB RESOURCES:

5. https://onlinecourses.nptel.ac.in/noc25_ag18/preview
6. https://epubs.icar.org.in/index.php/pht

Course Code	Course Title	L	T	P	S	C
24EXTN103	PERSONALITY DEVELOPMENT 2(1+1)	1	-	1	-	2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the
To make students realize their potential strengths, cultivate their inter-personal skills and improve employability

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

CO1 understand of personality concepts and theories
CO2 Analyze different Determinants of personality.
CO3 Understand different concepts of behavior and influencing factors
CO4 Gain knowledge on learning process
CO5 Understand the different types of intelligence and influencing 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	2	-	-	-	-	-	-	-	1	3	-	-		-
CO2	-	2	-	1	-	-	-	-	-	3	-	-		-
CO3	3	1	-	-	-	-	-	-	2	3	-	-		-
CO4	3	1	-	-	-	-	-	-	-	3	-	-		-
CO5	1	3	-	-	-	-	3	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	**3**	**2**	**-**	**1**	**-**	**-**	**3**	**3**	**-**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Personality concepts ***(04 Periods)***
Nature of personality, theories of personality and its types. The humanistic approach - Maslow's self-actualization theory

Module 2: Determinants of personality ***(07 Periods)***
shaping of personality, determinants of personality, Myers-Briggs Typology Indicator, Locus of control and performance, Type A and Type B Behaviours, personality and Organizational Behaviour

Module 3: Behavior concepts ***(08 Periods)***

Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior, Perception and attributes and factors affecting perception, Attribution theory and case studies on Perception and Attribution

Module 4: Learning its process ***(08 Periods)***

Learning: Meaning and definition, theories and principles of learning, Learning and organizational behavior, Learning and training, learning feedback.

Module 5: Intelligence- types ***(05 Periods)***

Attitude and values, Intelligence- types of Intelligence, theories of intelligence, measurements of intelligence, factors influencing intelligence, intelligence and Organizational behavior, emotional intelligence. Motivation- theories and principles, Teamwork and group dynamics

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

17. MBTI personality analysis
18. Learning Styles
19. Leaning Strategies
20. Motivational needs
21. The fundamental inter personal relations orientation/ behavior (Firo-B)
22. Interpersonal Communication
23. Teamwork and team building
24. Group Dynamics
25. Win-win game
26. Conflict Management
27. Leadership styles
28. Methods of identifying leaders
29. Case studies on Personality
30. Case studies on Organizational Behavior
31. Identifying the characters of confident personality
32. Importance of body language in public

RESOURCES

TEXT BOOKS:

4. Andrews, Sudhir. 1988. How to Succeed at Interviews. 21st (rep.) New Delhi. Tata McGrawHill.
5. Heller, Robert. 2002. Effective Leadership. Essential Manager series. Dk Publishing.
6. Hindle, Tim. 2003. Reducing Stress. Essential Manager series. Dk Publishing
7. Lucas, Stephen. 2001. Art of Public Speaking. New Delhi. Tata - Mc-Graw

Hill.

REFERENCE BOOKS:

4. Mile, D.J. 2004. Power of Positive Thinking. Delhi. Rohan Book Company.
5. Pravesh Kumar. 2005. All about Self- Motivation. New Delhi. Goodwill Publishing House.
6. Smith, B. 2004. Body Language. Delhi: Rohan Book Company.
7. Shaffer, D. R. 2009. Social and Personality Development (6th Edition). Belmont, CA: Wadswor.

VIDEO LECTURES:

3. https://www.youtube.com/watch?v=hZjVwhEL1vA&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8
4. https://www.youtube.com/watch?v=EpABzwvpams&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8&index=2
5. https://www.youtube.com/watch?v=j2WwXAKa8Ro&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8&index=3
6. https://www.youtube.com/watch?v=lMPoRzGwP2Q&list=PLPlACV9U2YPGO1brVJa9ekTGPWYHmrOn8&index=4

WEB RESOURCES:

3. https://onlinecourses.swayam2.ac.in/cec21_mg22/preview
4. https://egyankosh.ac.in/handle/123456789/17130

Course Code	Course Title	L	T	P	S	C
24AMET101	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 about the To expose and acquire knowledge on the environment and to gain the state-of-the-art - skill and expertise on management of disaster

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

CO1 understand the basic concepts of environmental studies

CO2 Understand the categorize various recourses and eco-system including there and structure and function

CO3 Understand and analyze various types of pollution including there causes effect and control masers

CO4 Understand global environmental issues along with there possible solutions

CO5 Analyze the different types of natural and man-made disasters

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

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

COURSE CONTENT

Module 1: Introduction to Environment ***(03 Periods)***

Environmental studies: Definition, scope and importance - Multidisciplinary nature of environmental studies - Segments of Environment - Spheres of Earth - Lithosphere - Hydrosphere - Atmosphere - Different layers of atmosphere

Module 2: Natural Resources: ***(08 Periods)***

Classification - Forest resources. Water resources. Mineral resources Food resources. Energy resources. Land resources. Soil resources. Ecosystems: Concept of an ecosystem - Structure and function of an ecosystem - Energy flow in the ecosystem. Types of ecosystem. Biodiversity and its conservation: Introduction, definition, types. Biogeographical classification of India. Importance and Value of biodiversity. Biodiversity hot spots. Threats and Conservation of biodiversity.

Module 3: Environmental Pollution and Types ***(06 Periods)***

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 h. Light pollution. Solid Waste Management: Classification of solid wastes and management methods, Composting, Incineration, Pyrolysis, Biogas production, Causes, effects and control measures of urban and industrial wastes. Social Issues and the Environment: Urban problems related to energy. Water conservation, rain water harvesting, watershed management

Module 4: Environmental Laws ***(07 Periods)***

Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Human Population and the Environment: Environment and human health: Human Rights, Value Education. Women and Child Welfare. Role of Information Technology in Environment and human health.

Module 5: Disaster management: ***(08 Periods)***

Disaster definition - Types - Natural Disasters - Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves. Man Made Disasters: Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, road accidents, rail accidents, air accidents, sea accidents. International and National strategy for disaster reduction. Concept of disaster management, national disaster management framework; financial arrangements; role of NGOs, community-based organizations and media in disaster management. Central, state, district and local administration in disaster control; Armed forces in disaster response; Police and other organizations in disaster management.

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Energy: Biogas production from organic wastes
2. Visit to a local area to document environmental assets river/forest/grassland/hill/mountain.
3. Visit to wind mill / hydro power / solar power generation units
4. Biodiversity assessment in farming system.
5. Floral and faunal diversity assessment in polluted and un polluted system
6. Visit to local polluted site - Urban/Rural/Industrial/Agricultural to study of common plants, insects and birds.
7. Environmental sampling and preservation
8. Water quality analysis: pH, EC and TDS.
9. Estimation of Acidity, Alkalinity.
10. Estimation of water hardness.
11. Estimation of DO and BOD in water samples
12. Estimation of COD in water samples.
13. Enumeration of E. coli in water sample.
14. Assessment of Suspended Particulate Matter (SPM)
15. Study of simple ecosystem – Visit to pond/river/hills.
16. Visit to areas affected by natural disaster.

RESOURCES

TEXT BOOKS:

1. De, A.K. 2010. Environmental chemistry. Published by New Age International Publishers, New Delhi. ISBN:13–978 81 224 2617 5. 384 pp
2. Dhar Chakrabarti, P.G. 2011. Disaster management - India's risk management policy frameworks and key challenges. Published by Centre for Social Markets (India), Bangalore. 36 pp
3. Erach Bharucha, Text book for Environmental studies. University Grants Commission, New Delhi

REFERENCE BOOKS:

1. Parthiban, K.T. Vennila, Prasanthrajan, S., Umesh, M. and Kanna, S. 2023. Forest, Environment, Biodiversity and Sustainable development. Narendra Publishing House, New Delhi, India. (In Press).
2. Prasanthrajan M. and Mahendran, P.P. 2008. A text book on Ecology and

Environmental Science. ISBN 81-8321-104-6. Agrotech Publishing Academy, Udaipur - 313 002. First Edition: 2008
3. Prasanthrajan M. 2018. Objective environmental studies and disaster management. ISBN 9789387893825. Scientific publishers, Jodhpur, India. Pp. 146.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=C9VFsrt4YPc&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7
2. https://www.youtube.com/watch?v=n3VTOwqT_RI&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7&index=4
3. https://www.youtube.com/watch?v=UHpnyRHRVg4&list=PL9AUXQTZw3SvT4H9JaRL88Etg9dlWaTa7&index=5

WEB RESOURCES:

1. https://www.hzu.edu.in/bed/E%20V%20S.pdf
2. https://vardhaman.org/wp-content/uploads/2021/03/ENVIRONMENTAL-SCIENCE-1.pdf

Course Code	Course Title	L	T	P	S	C
24SSAC102	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 about theA comprehensive knowledge of soil fertility, plant nutrition, fertilizers, and nutrient management

COURSE OUTCOMES: After successful completion of the course, students will be able to
CO1. Gain knowledge on different nutrients and their role in plant system
CO2. Plant nutrients and their transformations in soils
CO3. How to evaluate the fertility status of soils
CO4. Important manures with nutrient values and their role in maintaining soil fertility
CO5. Different fertilizers and their use efficiency in soils
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	3	-	-	-	-	-	-	3	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	3	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	3	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	3	-	-	-	-
CO5	3	1	2	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course correlation mapping	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

COURSE CONTENT

Module 1: Soil fertility concepts- Essential plant nutrients ***(04 Periods)***

Introduction - History of soil fertility and plant nutrition - Concepts of soil fertility, soil productivity, Nutrient Elements - Arnon's criteria of essentiality –-Ionic forms of plant nutrients in soil – Mechanism of nutrient transport- Essential nutrients –functions and deficiency symptoms in plants - Corrective measures – Toxicity symptoms

Module 2: Chemistry of macro and micronutrients ***(11 Periods)***

Transformations of Nitrogen, Phosphorus, potassium, calcium, magnesium, sulphur, micronutrients and beneficial elements

Module 3: **Soil Fertility Evaluation** ***(03 Periods)***

Soil fertility Evaluation: - Approaches – Soil testing – Objectives of soil testing – Chemical methods for estimating available nutrients. Critical levels of different nutrients in soil. Plant analysis – Indicator plants - Biological methods of soil fertility evaluation - Soil test based fertilizers recommendation:- Critical nutrient concept (Cate and Nelson) - Use of empirical equations for scheduling fertilizer doses - Targeted yield approach (STCR/RTNM/IPNS), Carbon sequestration and Carbon trading

Module 4: **Important manures – Classification – Nutrient value** ***(06 Periods)***

Importance of organic manures - Classification of manures. Importance of manures in soil fertility management- Bulky organic manures – Compost–Vermi-composting-Green manures – Definitions of penning, sewage, sewerage, sullage, Pouderette, Activated compost process. Concentrated organic manures – Oil cakes, blood meal, bone meal, horn meal, fish meal, meat meal and Guano

Module 5: **Fertilizers and INM and Nutrient Use Efficiency (NUE)** ***(08 Periods)***

Fertilizer - Definition Chemical fertilizers – Classification with examples – Nitrogenous fertilizers – composition and properties of major nitrogenous fertilizers - Phosphatic fertilizers - Potassic fertilizers - Secondary and micronutrient fertilizers –Amendments – Complex fertilizers and Mixed fertilizers–Nano-fertilizers- Fertilizer grade – Fertilizer ratio – unit value of fertilizers – Problems - INM- components – advantages - Fertilizer Control Order (FCO) - Fertilizer storage – Specifications - problems during storage

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction to Analytical instruments- Colorimetry and Flame photometry
2. Estimation of soil organic carbon, qualitative & quantitative
3. Estimation of soil available nitrogen by Subbiah & Asija method
4. Estimation of soil available phosphorus by Olsen's method and Brays & Kurtz method
5. Estimation of soil available potassium by flame photometer method
6. Estimation of soil available sulphur by turbidity method
7. Estimation of exchangeable Ca and Mg in soil
8. Estimation of soil available micronutrients by AAS
9. Plant sampling and sample preparation for analysis.
10. Digestion of plant material
11. Estimation of N content in plant sample
12. Estimation of P content in plant sample
13. Estimation of K and S contents in plant sample
14. Estimation of N content in organic manure (FYM)
15. Estimation of N content in Urea

16. Estimation of K content in MOP

RESOURCES

TEXT BOOKS:

4. Introductory Soil Science by Dilip Kumar Das, Kalyani Publishers
5. Soil Fertility and Nutrient Management by S. S. Singh, Kalyani Publishers

REFERENCE BOOKS:

3. Soil Fertility and Fertilizers by Samual L. Tisdale, Werner L. Nelson and James D. Beaton, Macmillan Publishing Company, New York
4. The nature and Properties of Soils by Harry O. Buckman and Nyle C

VIDEO LECTURES:

5. https://www.youtube.com/watch?v=1uIVIX-IzLQ&list=PL4mlRretUNCCzpObDfNWukUAYrHazob_k
6. https://www.youtube.com/watch?v=kz48vKS7NTI&list=PLqMl6r3x6BUSlk_0e2UXmU5TkvRo-vYgg&index=15

WEB RESOURCES:

3. https://drive.google.com/file/d/1--11BDrSXIDX0ORHVeg-OwmJjcxBikuP/view

24ENTM101 **FUNDAMENTALS OF ENTOMOLOGY** 2 - 1 - 3
3(2+1)

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

COURSE DESCRIPTION: This course is designed to provide an overview about the To know the history of entomology, classification of insects and their relationship with other arthropods, study the various morphological characters of class insect and their importance for classification of insects, get an idea about the different physiological systems of insects and their roles in growth and development and communications of insects, study the characteristics of commonly observed insect orders and their economically important families

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 various insect physiological processes
CO3 Understand the insect ecology with the environment to develop pest-resistant varieties/pest-free crops.
CO4 Identify the different types of pests and apply the concept of Integrated pest management for pest control in agricultural crops.
CO5 Understand the Taxonomy of different insects and pests to identify them for effective control of crop damage.
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	3	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	**3**	**3**	**2**	**1**	**-**	**-**	**3**	**3**	**-**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: History of Entomologydominance and morphology of insects ***(06 Periods)***

in India. Major points related to dominance of Insects in Animal kingdom. Classification of phylum Arthropoda up to classes. Relationship of class Insects with other classes of

Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of head, thorax and abdomen.

Module 2: Types of Insect Antennae, Mouth parts, legs, wings, metamorphosis and various systems ***(06 Periods)***

Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus.Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory system.

Module 3: Types of reproduction, sensory organs and Insect Ecology ***(08 Periods)***

Insert nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors and biotic factors. Categories of pests.

Module 4: Taxonomy and systematic of Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera and Hemiptera ***(06 Periods)***

Systematics: Taxonomy – importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta up to Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigoniidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae;

Module 5: Taxonomy and systematic of Neuroptera, Lepidoptera, Coleoptera, Hymenoptera and Diptera ***(06 Periods)***

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: **32**

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 Cockroach/Grasshopper
3. Study of types of insect antennae and mouthparts
4. Study of types of insect legs, wing venation, types of wings and wing coupling apparatus
5. Study of types of insect larvae and pupae

6. Dissection of digestive system in insects (cockroach)
7. Study of characters of orders Orthoptera, Blattodea, Odonata, Thysanoptera and their families of agricultural importance
8. Study of characters of orderHemipteraand their families of agricultural importance
9. Study of characters of orders Lepidoptera and their families of agricultural importance
10. Study of characters of orders Neuroptera, Diptera and their families of agricultural importance
11. Study of characters of order Hymenoptera and their families of agricultural importance
12. Study of characters of order Coleoptera and their families of agricultural importance
13. Sampling techniques for estimation of insect population and damage
14. Pest surveillance through light traps, pheromone traps and forecasting of pest incidence
15. Insecticides and their formulations
16. Pesticide appliances and their maintenance

RESOURCES

TEXT BOOKS:

1. Chapman, R. F 2013 Insects: Structure and Function. Ed by Simpson, S. J. and Douglas, A. C. Cambridge Univ. Press, UK.
2. Richards, O.W. and Davies, R.G 1977. Imm's General Text Book o of Entomology (Vol. I and II). Chapman and Hall, London
3. Wigglesworth, V.B 2013. Insect Physiology. Springer (Originally published by Chapman and Hall, London, 1974).

REFERENCE BOOKS:

1. Pant, N.C. and Ghai, S. 198. Insect Physiology and Anatomy. ICAR, New Delhi.
2. Vasantharaj David, B. and Rama Murthy V.V. 2016. Elements of Economic Entomology, Popular Book Depot, Coimbatore.
3. Dhaliwal, G.S. and Ramesh Arora 2001. Integrated Pest Management: Concepts and Approaches, Kalyani Publishers Ludhiana.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=59BEO5WemoA&list=PLlhZ55-t6eFYypK8zLCwdpeYlXegbetxI
2. https://www.youtube.com/watch?v=3IcGyuzYXKE
3. https://www.youtube.com/watch?v=Z5DmfUM2eH0

WEB RESOURCES:

1. https://agritech.tnau.ac.in/
2. https://ecourses.icar.gov.in/

Course Code	Course Title	L	T	P	S	C
24VETY101	**LIVESTOCK AND POULTRY MANAGEMENT 2(1+1)**	1	-	1	-	2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the Provide basic knowledge to the students about scientific livestock and poultry rearing practices Entrepreneurship development through Livestock/poultry and Agriculture Integrated Farming System

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** Understand reproduction and health management of dairy cattle
- **CO4** Gain knowledge on modern rearing practices of sheep and goat for meat and milk production
- **CO5** Gain knowledge on management practices of swine, broiler and layer farming for egg and meat production
- **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	-	2	-	-	-	-	-	3	-	-		-
CO3	3	3	-	2	-	-	-	-	-	3	-	-		-
CO4	3	3	-	3	-	-	-	-	-	3	-	-		-
CO5	3	3	-	2	-	-	-	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	3	-	-		-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Introduction to Livestock and Poultry Management ***(04 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 ***(03 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 -

Module 3: Health management of dairy cattle ***(08 Periods)***

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 4: Sheep and Goat Management ***(08 Periods)***

Breeds - Classification - Economic traits - Systems of rearing – Housingmanagement – Floorspace requirement – Care and management of young and adult stock – Nutrition – Feed and fodder – Flushing – Steaming up - Prophylactic and control measures of diseases.

Module 5: Swine Management and Poultry management ***(09 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: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. External body parts of cattle, buffalo, sheep, goat, swine and poultry
2. Handling and restraining of livestock
3. Identification methods of farm animals and poultry
4. Judging of cattle, buffalo and poultry
5. Culling of livestock and poultry
6. Planning and layout of housing for different types of livestock
7. Computation of rations for livestock. Formulation of concentrate mixtures
8. Clean milk production, milking methods.

9. Hatchery operations, incubation and hatching equipment.
10. Management of chicks, growers and layers.
11. Debeaking, dusting and vaccination
12. Economics of cattle and buffalo.
13. Economics of sheep and goat,
14. Economics of swine and poultry production
15. Visit to IDF to study breeds of livestock and daily routine farm operations and farm records.
16. Visit to IPF to study breeds of poultry and daily routine farm operations and farm records.

RESOURCES

TEXT BOOKS:

1. Gopalakrishnan, C.A and G.M.M, Lall Livestock and Poultry enterprises for rural development, Vikas Publishing House, UP, 1993.
2. Hafez,E.S.E Adaptation of animals, Lea &Febiger, Philadelphia, 1968.

REFERENCE BOOKS:

1. Handbook of Animal husbandry, ICAR, New Delhi, 2002.
2. Ranjan, S.K., Agro Industrial by products and Non-conventional feeds for livestock feeding , ICAR, New Delhi, 1990,

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=ycbptlAOYrE
2. https://www.youtube.com/watch?v=xSX5F-IAoAY&list=PLITE3dCbq-vZGJtNSC-f8X1bTEV04iJ1H

WEB RESOURCES:

1. Https://www.mrveterinarycollege.edu.in/downloads/files/n5e327ec526cc5.pdf
2. Https://www.researchgate.net/profile/mbojiraj/publication/321161489_LIVESTOCK_AND_POULTRY_PRODUCTION_MANAGEMENT/links/5a1288b20f7e9bd1b2c1123b/LIVESTOCK-AND-POULTRY-PRODUCTION-MANAGEMENT.pdf

Course Code	Course Title	L	T	P	S	C
24PATH101	**FUNDAMENTALS OF PLANT PATHOLOGY**	2	-	1	-	3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the fundamentals of Plant Pathology. The course provides deep insight in to 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** Understand the causes for the development of diseases in plants.
- **CO3** Analyze the General characters and taxonomy of Fungi, & Bacteria
- **CO4** Analyze the General characters and taxonomy of viruses, mollicutes and other pathogens
- **CO5** Apply different principles for 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	-	-	-	-	-	3	-	-		-
CO5	3	-	1	3	-	-	-	-	-	3	-	-		-
CO6	-	-	-	-	-	-	3	3	-	-	-	-		-
Course correlation mapping	**3**	**2**	**-**	**-**	**3**	**1**	**3**	**3**	**2**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Introduction to Plant Pathology ***(04 Periods)***

Concept of disease in plants; Different terms used in Plant Pathology, History of Plant Pathology with special references to India

Module 2: Causes and classification of plant disease ***(07 Periods)***

Inanimate and animate causes; Classification of plant disease; Parasitism and pathogenesis; Development of disease in plants: Disease Triangle, Disease cycle

Module 3: General characters, taxonomy, and classification of Fungi and Bacteria ***(08 Periods)***

Fungi and their morphology, reproduction and classification of fungi; Bacteria: Morphology, reproduction classification of phytopathogenic bacteria

Module 4: General characters, taxonomy, and classification of Mollicutes, Viruses and other pathogens ***(08 Periods)***

Mollicutes; Flagellant protozoa; FVB; Green algae and parasitic higher plants; Viruses and viroids, virus transmission

Module 5: Principles of Plant disease management ***(08 Periods)***

Disease management with chemicals, Host resistance, cultural and biological method of Integrated Disease Management

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

1. Study of the microscope
2. Acquaintance with laboratory material and equipment
3. Study of different plant disease symptoms
4. Microscopic examination of general structure of fungi
5. Simple staining of bacteria: Direct and indirect staining
6. Gram staining of bacteria
7. Microscopic examination of fungal diseased specimen
8. Microscopic examination of bacterial diseased specimen
9. Preparation of culture media
10. Isolation of plant pathogens: Fungi
11. Isolation of plant pathogens: Bacteria
12. Isolation of plant pathogens: Viruses
13. Purification of plant pathogens
14. Study on plant disease diagnosis: Koch's Postulates
15. Methods of application of Fungicides
16. calculation on fungicides

RESOURCES

TEXT BOOKS:

5. Pathak (Author), V. N. (Author), Khatri, Fundamentals of Plant Pathology, Agrobios, 2009.
6. Ravichandra N. G., Fundamentals of Plant Pathology, PHI, 2011

REFERENCE BOOKS:

1.V.S.S. Samba Murty, A Textbook of Plant Pathology, Dream tech press,

2020.
2. 2. S.K. Tripathi, M.S. Bhale , V.K. Yadav & Ashish Shrivastava, Fundamentals of plant pathology, Scientific publishers, 2020.

Course Code	Course Title	L	T	P	S	C
24AGAB101	NATIONAL SERVICE SCHEME (NSS-I)	0	-	1	-	1

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

COURSE DESCRIPTION: This course is designed to provide an overview about fostering a sense of social responsibility and community service among students. The program encourages students to engage in a variety of volunteer activities that address social, environmental, and cultural challenges while also promoting personal growth and leadership development

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

- **CO1** Evoking social consciousness among students through various activities, viz., working together, constructive, and creative social work
- **CO2** To be skilful in executing democratic leadership, developing skill in program
- **CO3** To be able to seek self-employment, reducing gap between educated and uneducated, increasing awareness and desire to help sections of society
- **CO4** Understanding of the importance of community service and engage in initiatives that improve the lives of people in the local community
- **CO5** Acquire leadership qualities by organizing and leading NSS activities such as social campaigns, blood donation drives, and environmental initiatives
- **CO6** Work independently or in teams to solve problems with effective knowledge

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**	**2**	**-**	**-**	**3**	**1**	**3**	**3**	**2**	3	**-**	**-**		**-**

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

COURSE CONTENT

1. Orientation: history, objectives, principles, symbol, badge; regular programs under NS
2. Organizational structure of NSS
3. 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, analyzing guiding financial patterns of scheme, youth programs/ schemes of GOI,
6. Coordination with different agencies and maintenance of diary..
7. Understanding youth. Definition, profile, categories, issues and challenges of youth; and opportunities for youth who is agent of the social change
8. Community mobilization. Mapping of community stakeholders,
9. Designing the message as per problems and their culture; identifying methods of mobilization involving youth- adult partnership. Social harmony and national integration.
10. Social harmony and national integration.
11. Indian history and culture, role of youth in nation building,
12. Conflict resolution and peacebuilding. Volunteerism and shramdaan. Indian tradition of volunteerism,
13.Importance, motivation, and constraints; shaman as part of volunteerism
14. Citizenship, constitution, and human rights. Basic features of constitution of India,
15. Fundamental rights and duties, human rights, consumer awareness and rights and rights to information. Family and society. Concept of family, community (PRIs and other communitybased organizations) and society
16. Concept of family, community (PRIs and other communitybased organizations) and society.

Total Periods: **16**

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

B.Sc. Hons. (Agri) – III Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL105	Skill Enhancement in Mushroom Production Technology	-	-	2	2
2.	24AECO101	Entrepreneurship Development and Business Communication	2	-	1	3
3.	24PHED101	Physical Education, First Aid, Yoga Practices and Meditation	-	-	1	1
4.	24GPBR101	Principles of Genetics	2	-	1	3
5.	24AGRN103	Crop Production Technology-I (*Kharif* crops)	1	-	2	3
6.	24HORT102	Production Technology of Fruit and Plantation Crops	1	-	1	2
7.	24EXTN104	Fundamentals of Extension Education	2	-	1	3
8.	24NEMA101	Fundamentals of Nematology	1	-	1	2
9.	24AGRN104	Principles and Practices of Natural Farming	1	-	1	2
		Total	**10**	**-**	**11**	**21**

B.Sc. Hons. (Agri) – III Semester

Course Code	Course Title	L	T	P	S	C
24SKIL105	**Skill Enhancement in Mushroom Production Technology 2(0+2)**	-	-	2		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the Mushroom Production Technology.
To provide an insight into the concept and scope of mushroom production, to expose the student to various production aspects of different mushrooms such Button Mushroom, Oyster Mushroom, Milky Mushroom, Paddy Straw Mushroom, Shiitake Mushroom and Reishi Mushroom as to helps the student to develop a knowledge and helps to establish a viable Mushroom production industry by own.

COURSE OUTCOMES: After successful completion of the course, students will be able to:
CO13. To get knowledge on different Mushrooms production
CO14. To understand the Isolation and Mass production of Mushrooms production
CO15. To understand steps involved in the pest and disease management in Mushroom Production
CO16. To understand establishment aspects of different Mushroom Units
CO17. To understand the steps involved in the value addition of different Mushrooms commercially
CO18. Work independently or in teams to solve problems with effective Mushrooms 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		-	-	-	3	-	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	3	-	-	-	-	-	3	-	-	-	-	-		-
CO6	3	-	-	-	-	3	-	-	-	3	-	-		-
Course correlation mapping	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**3**	**3**	**3**	**-**	**2**		**-**

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

COURSE CONTENT

PRACTICALS/ EXPERIENTIAL LEARNING
LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Laboratory Equipment's used for the Mushroom Production
2. General Introduction and Importance of Mushroom
3. Morphological Characteristics for Identification of Different Mushrooms
4. Preparation of Potato Dextrose Agar and Broth Medium
5. Isolation and Maintenance of Mushroom Fungi
6. Preparation of Mushroom Mother Spawn
7. Production of Commercial Mushroom Spawn
8. Prevention and Management of Contaminants in Mother Spawn and Bed Spawn
9. Compost preparation for the Mushroom Production
10. Methods of Mushroom Spawning
11. Preparation of Casing Soil
12. Button Mushroom Cultivation
13. Oyster Mushroom Cultivation
14. Milky Mushroom Cultivation
15. Paddy Straw Mushroom Cultivation
16. Shiitake Mushroom Cultivation
17. Reishi Mushroom Cultivation
18. Diseases of Mushroom and Their Management
19. Major Insect, Mites and Nematodes of Mushroom and Their Management
20. Integrated Pest and Disease Management in Mushrooms
21. Preservation and Storage of Mushroom Culture
22. Long Term Post Harvest Processing of Milky Mushroom
23. Packing Methods of Milky Mushrooms
24. Short Term Post Harvest Processing of Button Mushrooms
25. Long Term Post Harvest Processing of Button Mushroom
26. Packing Methods of Button Mushrooms
27. Canning of Button Mushroom
28. Project Preparation on Mushroom Production
29. Biodegradation of Agro-wastes Using Mushroom Spawn
30. Recipe And Value-Added Products from Button Mushroom
31. Visit to Market and Observing the Marketing Pattern of Button Mushroom
32. Visit to Button Mushroom Production Units

RESOURCES

TEXT BOOKS:

1. Rajani, G., Ajay, S. 2023. Text Book of Mushroom Cultivation. Daya Publishing House, New Delhi.
1. Niir, B. 2006. Handbook on Mushroom Cultivation and Processing (With Dehydration, Preservation and Canning). National Institute of Industrial Research, New Delhi.
1. Simthe, C. 2022. Mushroom cultivation for beginners: The Ultimate Guide to Growing Mushrooms at Home for Business, Food, Soil and Medicine. Jianfang Ou, China.

REFERENCE BOOKS:

11. Kuo, Michael (2005). Morels. Ann Arbor: University of Michigan Press. *ISBN* *978-0472030361*.
12. Pacioni, Giovanni (1981). Simon and Schuster's Guide to Mushrooms. New York: Simon and Schuster. *ISBN* *978-0671428495*.
13. *Stamets, Paul* (1978). Psilocybe Mushrooms & Their Allies. Seattle Berkeley, Calif: Homestead Book Co. Distributed nationally by And/Or Press. *ISBN* *0-930180-03-8*.

VIDEO LECTURES:

9. https://www.youtube.com/watch?v=6AprfYx28aM
10. https://www.youtube.com/watch?v=jK5gCvEOQew

Web Resources:

7. Mushroom farming: A review Focusing on soil health, nutritional security and environmental sustainability - ScienceDirect
8. https://epubs.icar.org.in/index.php/MR

Course Code	Course Title	L	T	P	S	C
24AECO101	ENTREPRENEURSHIP DEVELOPMENT AND BUSINESS COMMUNICATION 3(2+1)	2	-	1		3

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

To provide an insight into the concept and scope of entrepreneurship, to expose the student to various aspects of establishment and management of a small business unit and to enable the student to develop financially viable agribusiness proposal.

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

CO1. To get knowledge on Entrepreneurship concept, process, importance and factors effecting entrepreneurship development
CO2. To understand the environment affecting entrepreneurship development like government policies, external agencies etc
CO3. To understand steps involved in enterprise management, project formulation and report preparation of an enterprise
CO4. To understand production and personal management of an enterprise
CO5. To understand financial, Marketing and crisis management of an enterprise
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	-	-		-
CO2	1	-	1	3	-	-	-	-	-	2	-	-		-
CO3	-	2		3	-	-	-	-	-	2	-	-		-
CO4	-	2	3	2	-	-	-	-	-	2	-	-		-
CO5	-	3	-	1	1	-	1	-	-	2	-	-		-
CO6	-	-	-	-	-	-	-	3	3	2	-	-		-
Course correlation mapping	**1**	**3**	**2**	**3**	**1**	**-**	**1**	**3**	**3**	**2**	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Entrepreneurship development ***(05 Periods)***

Development of entrepreneurship, motivational factors, social factors, environmental factors, characteristics of entrepreneurs, entrepreneurial attributes/competencies. Concept, need for and importance of entrepreneurial development. Evolution of entrepreneurship, objectives of entrepreneurial activities, types of entrepreneurs, functions of entrepreneurs, importance of entrepreneurial development, and process of entrepreneurship development.

Module 2: Entrepreneurship environment(External) ***(06 Periods)***

Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus.Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory system.

Module 3: Enterprise Management, Planning and Report Preparation ***(07 Periods)***

Steps involved in functioning of an enterprise. Selection of the product / services, selection of form of ownership; registration, selection of site, capital sources, acquisition of manufacturing know how, packaging and distribution. Planning of an enterprise, project identification, selection, and formulation of project; project report preparation, Enterprise Management.

Module 4: Production and personal management ***(05 Periods)***

Production management: product, levels of products, product mix, quality control, cost of production, production controls, Material management. Production management: raw material costing, inventory control. Personal management: manpower planning, labour turn over, wages / salaries.

Module 5: Financial, Marketing and Crisis Management ***(09 Periods)***

Financial management /accounting: funds, fixed capital and working capital, costing and pricing, long term planning and short-term planning, book keeping, journal, ledger, subsidiary books, annual financial statement, taxation. Marketing management: market, types, marketing assistance, market strategies. Crisis management: raw material, production, leadership, market, finance, natural etc

(32 Periods)

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. To assess entrepreneurial traits among the entrepreneurs
2. To improve management skills (The Perfect Employee Exercise)
3. To improve management skills (The Pros and Cons Exercise)
4. To improve management skills (Perfectionism Myth Exercise)
5. To improve management skills (The Perfect Employee Exercise)
6. To understand Contextual Achievement Motivation Scale (CAMS)
7. Exercise in Creativity
8. To study time audit through planning using Ivy Lee‘s time efficiency hacking technique
9. To prioritize time using Stephen Covey‘s four quadrant system
10. To monitor viability of an enterprise and prepare a report
11. To identify and select business Idea

12. Visit to small scale industries/agro-industries
13. Interaction with successful entrepreneurs/ agri entrepreneurs
14. Visit to financial institutions and support agencies.
15. Preparation of project proposal for funding by different agencies
16. To prepare tour report based on the visit to the entrepreneurs in the locality

RESOURCES

TEXT BOOKS:

1. Charantimath, P.M. 2009, Entrepreneurship Development and Small Business Enterprises. Pearson Publications, New Delhi.
2. Desai, V. 2015, Entrepreneurship: Development and Management, Himalaya Publishing HouseR. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*,
3. Gupta, C.B. 2001. Management Theory and Practice. Sultan Chand & Sons

REFERENCE BOOKS:

1. Indu Grover. 2008. Handbook on Empowerment and Entrepreneurship. Agrotech Public Academy.
2. Khanka, S.S. 1999. Entrepreneurial Development. S. Chand &Co.R. C. Sharma & Krishna Mohan, *Business Correspondence and Report Writing*,
3. Mehra, P. 2016, Business Communication for Managers. Pearson India, New Delhi

VIDEO LECTURES:

1. What is Entrepreneurship? definition, characteristics and entrepreneurial process
2. introduction to Entrepreneurship Development (ED @NAISHAACADEMY)

WEB RESOURCES:

1. 2.-entrepreneurship.pdfEXTN 355 NOTES FINAL.pdf
2. aex-311 entrepreneurship development and business communication.pdf

Course Code	Course Title	L	T	P	S	C
24GPBR101	PRINCIPLES OF GENETICS 3(2+1)	2	-	1		3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the. To make the students acquainted with both principles and practices in the areas of classical genetics, modern genetics, quantitative genetics and cytogenetic

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 polyploidy.
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. 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	-	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 genetics ***(07 Periods)***

Pre and post Mendelian concepts of heredity, Mendelian principles of heredity, Study of model organisms (Drosophila, Arabidopsis, Garden pea, E. coli, and mice),

Module 2: Chromosome structure and Inheritance pattern ***(07 Periods)***

Architecture of chromosomes, chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere, special types of chromosomes,theory of inheritance- cell cycle and cell division-mitosis and meiosis. Probabilit and Chi-square. Types of DNA and RNA, Dominance relationships, Epistatic interactions

Module 3: Genetic interactions and variations ***(07 Periods)***

Types of DNA and RNA, Dominance relationships, Epistatic interactions Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics,

Module 4: Linkage ,Mutations and Chromosomal Variations ***07 Periods)***

Linkage and its estimation, crossing over mechanism, chromosome mapping, Structural and numerical variations in chromosomes and their implications, Use of haploids, dihaploids and double haploids in Genetics,Mutation, classification, Methods of inducing mutations, mutagenic agents and induction of mutation.

Module 5: Molecular genetic nad gene regulation ***(04 Periods)***

Qualitative and quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance Nature, structure and replication of genetic material, Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Use of microscopes
2. Principles of killing and fixing; preparation of stains and preservatives.
3. Study of behavior of chromosomes in mitosis.
4. Study of the mitotic phases in root tips of onion / Aloe sp.
5. Procedure for fixing and observing different meiotic phases in the inflorescence of rice/maize.
6. Procedure for fixing and observing different meiotic phases in the inflorescence in pearl millet/ sorghum/ /horticultural crop/forest tree.
7. Repetition of meiotic studies in maize/ sorghum/ pearl millet/ forest tree and making temporary and permanent slides.
8. Observation of bivalents, trivalent, quadrivalents and chromosome banding.
9. Principles of dominance, recessive, back cross, test cross, incomplete dominance, codominance and lethal factor; Chi square test; Monohybrid genetic ratio with dominance, with incomplete dominance and test cross.
10. Dihybrid ratio with dominance, with incomplete dominance and test cross
11. Simple interaction of genes – comb character in fowls; Dominant epistasis.
12. Recessive epistasis, Duplicate and additive epistasis.
13. Duplicate dominant epistasis, Duplicate recessive epistasis, Dominant and recessive epistasis.
14. Multiple alleles and polygenic inheritance

15. Estimation of linkage with F2 and test cross data; Coupling and repulsion.
16. Problems on two point test cross and three point test cross; Working out interference, coincidence and drawing genetic maps.

RESOURCES

TEXT BOOKS:

1. Gupta P.K., 1997. Cytogenetics. Rastogi Publications, Meerut.
2. Verma, P.S. and V.K.Agarwal. 2007. Genetics. S.Chand and Company Ltd./ New Delhi.
3. Stansfield, W.D.1990. Theory and problems of genetics. McGraw Hill Book Co., New York.
4. Pundhansingh. 2014. Elements of Genetics. Kalyani Publishers

REFERENCE BOOKS:

1. Fundamentals of Genetics: B. D. Singh
2. Genetics: M. W. Strickberger.
3. Principles of Genetics: Gardner, Simmons and Snustad.
4. Principles of Genetics: Sinnott, Dunn and Dobzhansky

VIDEO LECTURES:

1. http://www.bozemanscience.com/029-mendelian-genetics
2. http://www.bozemanscience.com/ap-biology
3. https://www.youtube.com/playlist?list=PLmVYuxv4mIil1yNrudAoGL1Ilqd2rkAjI
4. http://www.bozemanscience.com/029-mendelian-genetics

WEB RESOURCES:

1. https://ocw.mit.edu/courses/7-03-genetics-fall-2004/pages/lecture-notes/

Course Code	Course Title	L	T	P	S	C
24HORT102	PRODUCTION TECHNOLOGY OF FRUIT AND PLANTATION CROPS 2(1+1)	1	-	1		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the. To educate about the different forms of classification of fruit crops educate about the origin, area, climate, soil, improved varieties and cultivation practices of fruit and plantation crops educate about the physiological disorders of fruit crops, palms 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 crop
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 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	-	-	-	-	1	3	-	-		-
CO2	3	2	-	2	-	-	-	-	2	3	-	-		-
CO3	3	3	-	2	-	-	-	-	1	3	-	-		-
CO4	3	2	-	3	-	1	-	-	-	3	-	-		-
CO5	3	2	-	3	-	1	-	-	1	3	-	-		-
CO6	-	-	-	-	-	-	-	3	3	-	-	-		-
Course correlation mapping	**3**	**3**	**-**	**3**	**-**	**1**	**-**	**3**	**2**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Introduction of fruit and plantation crops ***(06 Periods)***

Production status of fruit and plantation crops: Importance and scope of fruit and plantation crop industry in India;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: Cultivation of major fruit crops ***(07 Periods)***

Production technology of Production status of fruit and plantation crops: Importance and scope offruit and plantation crop industry in India- 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: Cultivation of subtropical and temparate fruit crops ***(07 Periods)***

Production technology of Production status of fruit and plantation crops: Importance and scope offruit and plantation crop industry in India- 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 4: Cultivation of minor fruit crops ***05 Periods)***

Production technology of nut crops Jackfruit and minor fruits- date, berEconomic Importance, Nutritive Value, Origin & Distribution, Area &Production, Species and Varieties: Production Technology: Soil and Climatic,Propagation, Root Stocks, Planting, Training and Pruning, Irrigation, Nutrition, MaturityIndices, Harvesting and Yield.

Module 5: Cultivation of plantation crops ***(07 Periods)***

Production technology of plantation crops-coconut, arecanut, cashew, tea, coffee and rubberOrigin,GeographicDistribution,Economic Importance, Soil and Climatic Requirement, Varieties,Cultural Practices andPost-Harvest Management.

Total Periods: 32

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
7. Description and identification of varieties of Pear
8. Training and Pruning of Mango
9. Training and Pruning of Ber
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 and Rubber plantations
15. Different methods of tapping of Rubber
16. Visit to commercial orchards

RESOURCES

TEXT BOOKS:

1. T.K.Chattopadhyay, 1997. Text book on pomology. Kalyani Publishers, New Delhi.
2. Chadha,K.L. (ICAR) 2002, 2001. Hand book of Horticulture. ICAR, New Delhi.
3. Shanmugavelu, K.G. Kumar, N and Peter, K.V., 2005. Production technology of spices and plantation crops. . Agrosis, Jodhpur.

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/results?search_query=production+technology+for+fruit+and+plantation+crops

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/course/index.php?categoryid=12

Course Code	Course Title	L	T	P	S	C
24EXTN104	**Fundamentals of Extension Education 3(2+1)**	2	-	1		3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the State the importance of extension education in agriculture Familiarize with the different types of agriculture and rural development programs launched by govt. of India Classify the types of extension teaching methods Elaborate the importance and different models of communication. Explain the process and stages of adoption along with adopters' categories

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

CO1. To understand the *Extension education concepts and schemes*
CO2. To gain knowledge on new trends in agriculture extension
CO3. To understand the rural development programs and Concepts
CO4. To analyze the programmer evaluation and monitoring techniques
CO5. To understand ICT tools in transfer of technology and Farm Journalism
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	-	-	-	-	1	3	-	-		-
CO2	3	-	2	-	-	-	-	-	-	3	-	-		-
CO3	2	-	3	-	-	-	-	-	-	3	-	-		-
CO4	-	3	-	2	-	-	-	-	1	3	-	-		-
CO5	2	-	-	2	-	-	-	-	2	3	-	-		-
CO6	-	-	-	-	-	-	-	3	3	3	-	-		-
Course correlation mapping	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**3**	**3**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: Extension education concepts and schemes ***(08 Periods)***

Education: Meaning, definition and 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. 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.); Reorganised Extension System (T&V system) various extension/ agriculture development programs launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). Social Justice and poverty alleviation programme: ITDA, IRDP/SGSY/NRLM. Women Development Programme: RMK, MSY

Module 2: New trends in agriculture extension ***(05 Periods)***

privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc., Attributes of Innovation, DWCRA, Commodity Interest Groups (CIGs)., Farmers Producer Group (FPG)

Module 3: Rural development and concepts ***(06 Periods)***

Rural Development: concept, meaning, definition; various rural development programs launched by Govt. of India. Community Development: meaning, definition, concept and principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; Method of identification of Rural Leader. Extension administration: meaning and concept, principles and functions.

Module 4: ProgrmmesMontoring and evaluation techniques ***06 Periods)***

Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programs; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods,

Module 5: ICT Applications and Farm Journalism ***(07 Periods)***

TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories

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
4. Handling of liquid crystal display (LCD) projecto
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
16. Visit to a KVK and NGO to study about its functions and activities

RESOURCES

TEXT BOOKS:

1. Adivi Reddy, A. 2001. Extension Education, Sree Lakshmi press, Bapatla
2. Dahama, O. P. and Bhatnagar, O.P. 1998. Education and Communication for Development, Oxford and IBH publishing Co. Pvt. Ltd, New Delhi
3. Jalihal, K. A. and Veerabhadraiah, V. 2007. Fundamentals of Extension Education and Management in Extension, Concept publishing company, New Delhi

REFERENCE BOOKS:

1. Sagar Mondal and Ray, G. L., Text Book on Rural Development, Entrepreneurship and Communication Skills, Kalyani Publications
2. Rathore, O. S. et al. 2012. Handbook of Extension Education, Agrotech Publishing Academy, Udaipur
3. Dudhani, C.M., Hirevenkatgoudar, L.V., Manjunath, L. Hanchinal, S.N. and Patil, S.L. 2004. Extension Teaching Methods and Communication Technology, UAS, Dharwad

VIDEO LECTURES:

1. Extension Education- concept, meaning, principles, philosophy, scope and importance
2. EXTENSION PROGRAMME PLANNING MODEL and evaluation

WEB RESOURCES:

1. Fundamentals of Extension Education: Definitions
2. eGyanKosh: Block-1 Introduction to Extension Education and Development

Course Code	Course Title	L	T	P	S	C
24NEMA101	FUNDAMENTAL OF NEMATOLOGY 2(1+1)	1	-	1		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the.To impart knowledge on history, economic importance of plant parasitic nematodes, morphology, biology, host parasitic relationship of nematodes. Impart knowledge on nematode pests of different crops of national and local importance and their management.

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

CO19. Understand the History of Phytonematology
CO20. knowledge of nematode classification and morphology to identify nematode pests and understand their impact on crops and agricultural systems
CO21. Understand the Role of Nematodes in Disease Development
CO22. Understand the Impact of Nematode Pests on Crop Yield and Quality
CO23. Understand Cultural Methods for Nematode Management
CO24. 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	2	-	-	-	-	-	-	-	3	-	-
CO3	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO4	3	3	2	3	-	-	-	-	-	-	-	3	-	-
CO5	3	3	1	2	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	3	-	-
Course correlation mapping	**3**	**3**	**2**	**3**	-	-	**3**	**3**	-	-	-	**3**	-	-

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

COURSE CONTENT

Module 1: Introduction to Phytonematology ***(03 Periods)***

Introduction History of phytonematology, habitat and diversity, economic importance of nematodes. General characteristics of plant parasitic nematodes.

Module 2: Classification of Nematodes with Focus on Economically Important Genera ***(03 Periods)***

Nematode: definition, general morphology and biology. Classification of nematodes up to family level with emphasis on groups containing economically important genera

Module 3: Interactions with Plant Diseases ***(04 Periods)***

Classification of nematodes on the basis of feeding/ parasitic habit. Symptomatology, role of nematodes in disease development, Interaction between plant parasitic

nematodes and disease-causing fungi, bacteria and viruses

Module 4: Nematode Pests of Major Crops and Their Management Strategies ***04 Periods)***

Nematode pests of crops: Rice, wheat, vegetables, pulses, oilseed and fiber crops, citrus and banana, tea, coffee and coconut. Different methods of nematode managemen

Module 5: Integrated Nematode Management ***(02Periods)***

Cultural methods, physical; methods, Biological methods, Chemical methods, Plant Quarantine, Plant resistance and INM.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Sampling methods, collection of soil and plant samples
2. Extraction of nematodes from soil
3. plant tissues following Cobb's sieving and decanting technique
4. Baermann funnel technique
5. Picking and counting of plant parasitic nematode
6. Identification of economically important plant nematodes up to generic level with the help of keys and description
7. Meloidogyne, Pratylenchus
8. Heterodera
9. Tylenchulus
10. Xiphinema
11. Helicotylenchus
12. Study of symptoms caused by important nematode pests of cereals
13. vegetables
14. pulses
15. plantation crops etc
16. Methods of application of nematicides and organic amendments

RESOURCES

TEXT BOOKS:

1. Economic Nematology-Edited by J.M. Webster
2. Plant Parasitic Nematodes (Vol-1) by Zukerman, Mai, Rohde

REFERENCE BOOKS:

1. Plant Parasitic Nematodes of India: Problems and Progress by - Gopal Swarup, D. R. Dasgupta, P. K. Koshy
2. Text book on Introductory Plant Nematology -R.K. Walia and H.K. Bajaj.

VIDEO LECTURES:

1. Introduction to Nematology| Tulasi B| AIR-2 | ICAR JRF/SRF/CUET/AFO| All Agricultural Exams
2. How Nematodes Damage Plants

WEB RESOURCES:

1. INTRODUCTORY-NEMOTOLOGY.pdf
2. lec01.pdf

Course Code	Course Title	L	T	P	S	C
24AGRN103	**CROP PRODUCTION TECHNOLOGY-I (*KHARIF* CROPS) 3 (1+2)**	1	-	2	-	3

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. It provides a comprehensive understanding of *kharif* crops, including their cultivation, management, and the application of modern agricultural practices. Students will gain insights into the unique characteristics of *kharif* 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 and millet crops

CO2. To gain knowledge about importance of pulses, fibre crops 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 oilseed and perennial fodders and its preservation

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	2	-	3	-	-	-	-	-	3	-	-	-	-
CO4	2	2	-	3	-	1	-	-	-	3	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course Correlation Mapping	**2**	**2**	**-**	**3**	**-**	**1**	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**-**

Module 1: INTRODUCTION (01 Periods)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of *kharif* crops.

Module 2: CEREALS AND MILLETS (07 Periods)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of rice, maize, sorghum, pearl millet, finger millet and other minor millets

Module 3: PULSES (02 Periods)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of pigeonpea, mungbean and urdbean

Module 4: OIL SEEDS, FIBRE CROPS, FORAGE CROPS (06 Periods)

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Oil seeds - groundnut, soybean, sesame, castor.

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of cotton and jute

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of forage crops - sorghum, cowpea, cluster bean, maize, guinea and napier.

PRACTICALS/ EXPERIENTIAL LEARNING

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

1. Identification of *kharif* field crops.
2. Rice nursery preparation,
3. Study of different types of rice nurseries
4. Transplanting of rice.
5. Layout of filed preparation
6. Germination and viability test.
7. Calculation of seed rate for different *kharif* crops.
8. Seed treatment of *kharif* crops
9. Sowing of *kharif* crops.
10. Effect of seed size on germination and seedling vigour of *kharif* crops.
11. Effect of sowing depth on germination of *kharif* crops.
12. Identification of weeds in *kharif* crops.
13. Fertilizer dose calculation for *kharif* crops
14. Top dressing and foliar feeding of nutrients.
15. Study of yield contributing characters and yield calculation of cereals.
16. Study of yield contributing characters and yield calculation of pulses.
17. Study of yield contributing characters and yield calculation of fibre crops.
18. Study of yield contributing characters and yield calculation of oilseeds.
19. Study of crop varieties and important agronomic experiments at experiential farm.
20. Recording biometric observations of cereals.
21. Recording biometric observations of pulses.
22. Recording biometric observations of fibre crops.
23. Recording biometric observations of oilseeds.
24. Recording biometric observations of forage crops.
25. Study of forage experiments.
26. Study of morphological description of cereals.
27. Study of morphological description of pulses.
28. Study of morphological description of fibre crops.
29. Study of morphological description of oilseeds.
30. Study of morphological description of forage crops.
31. Study of silage and hay making.
32. Visit to research centre of cereals/pulses/oilseed/forage crops.

Suggested Readings

TEXT BOOKS:

1. Rajendra Prasad. Textbook of Field Crops Production - Commercial Crops. Volume II ICAR Publication.
2. Textbook of Field Crops – 1, Kalyani publishers, January 2015.

Reference Books:

1. Chidda Singh.1997. Modern techniques of raising field crops. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. S.R. Reddy. 2009. Agronomy of Field Crops. Kalyani Publishers, New Delhi.
3. S.S. Singh. 2005. Crop Management. Kalyani Publishers, New Delhi.
4. UAS, Bangalore. 2011. Package of Practice. UAS, Bangalore.
5. Subhash Chandra Bose, M. and Balakrishnan, V. 2001. Forage Production. South Asian Publishers, New Delhi.

VIDEO LECTURES:

https://www.youtube.com/watch?v=EoMyAVFZ4DQ

https://www.youtube.com/watch?v=kWdKMz4-TuI

https://www.youtube.com/watch?v=n8e-snQMqiA

WEB RESOURCES:

https://www.scribd.com/doc/22308132/AGRONOMY-OF-FIELD-CROPS-1

http://nsdl.niscair.res.in/123456789/524

http://nsdl.niscair.res.in/123456789/502

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

Course Code	Course Title	L	T	P	S	C
24AGRN104	**PRINCIPLES AND PRACTICES OF NATURAL FARMING 2(1+1)**	1	-	1		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the .To provide comprehensive understanding and knowledge to students about natural farming. Teach students the concept, need and principles of native ecology-based production under natural farming. impart practical knowledge of natural farming and related agricultural practices in Indian and global environmental and economic perspectives

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

CO1. To understand the ancient agricultural practices and the significance of natural farming in context of climate change and sustainable development.
CO2. To understand the concept, principles and practical applications of natural farming and its distinction from conventional farming practices.
CO3. To understand the concept of ecological balance and its significance in sustainable agriculture particularly in natural farming systems
CO4. To understand different production practices under natural farming systems.
CO5. To understand the roles of government and NGO's in promoting natural farming in India.
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	-	-	-	1	3	-	-		-
CO2	3	-	-	-	2	1	-	-	2	3	-	-		-
CO3	2	-		-	2	-	-	-	1	3	-	-		-
CO4	2	-	-	1	1	-	-	-	-	3	-	-		-
CO5	2	-	-	1	-	1	-	1	1	3	-	-		-
CO6	-	-	-	-	-	-	-	3	3	-	-	-		-
Course correlation mapping	**2**	**-**	**-**	**1**	**2**	**1**	**-**	**2**	**3**	3	**-**	**-**		**-**

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

COURSE CONTENT

Module 1: HISTORY AND IMPORTANCE OF NATURAL FARMING ***(03 Periods)***

Indian Heritage of Ancient Agriculture, History of Natural Farming, Importance of natural farming in view of climate change, soil health, water use carbon sequestration, biodiversity conservation, food security and nutritional security, and sustainable development goals (SDGs)

Module 2: CONCEPT-SCOPE AND PRINCIPLE OF NATURAL FARMING ***(03 Periods)***

Definition of natural farming; Objective of natural farming, Essential characteristics and Principles of natural farming; Scope and importance of natural farming. Main Pillars of natural farming; Methods/ types/schools of natural farming. Characteristics and design of a natural farm

Module 3: PRINCIPLES OF NATIVE ECOLOGY-BASED PRODUCTION UNDER NATURAL FARMING ***(04 Periods)***

Concept of ecological balance, ecological engineering and community responsibility in natural versus other farming systems, Introduction to concept of ecological, water, carbon and nitrogen foot prints, Concept and evaluation of ecosystem services, integration of crops, trees and animals, cropping system approaches, Biodiversity, indigenous seed production, farm waste recycling, water conservation and renewable energy use approaches on a natural farm,

Module 4: AGRICULTURE RELATED TO NATURAL FAMING, GOVERNMENT SCHEMES FOR PROMOTION OF NATURAL FARMING ***(06 Periods)***

Concept of ecological balance, ecological engineering and community responsibility in natural versus other farming systems, Introduction to concept of ecological, water, carbon and nitrogen foot prints, Concept and evaluation of ecosystem services, integration of crops, trees and animals, cropping system approaches, Biodiversity, indigenous seed production, farm waste recycling, water conservation and renewable energy use approaches on a natural farm,

Initiatives taken by Government (central/state), NGOs and other organizations for promotion of natural farming and chemical free agriculture, Case studies and success stories in natural farming and chemical free traditional farming, Entrepreneurship opportunities in natural farming

Total Periods: **16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit of natural farm and chemical free traditional farms to study the various components and operations of natural farming principles at the farm
2. Indigenous technical knowledge (ITK) for seed, tillage, water, nutrient, insect-pest, disease and weed management
3. On-farm inputs preparation methods and protocols in natural farming
4. Studies in green manuring in-situ and green leaf manuring
5. Studies on different types of botanicals based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management
6. Studies on different types of animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management

7. Weed management practices in natural farming;
8. Nutrient management practices in natural farming
9. Techniques of Indigenous seed production- storage and marketing
10. Partial and complete nutrient budgeting in natural farming
11. Partial and complete financial budgeting in natural farming
12. Evaluation of ecosystem services in natural farming (Crop, Field and System)
13. Acquiring skill in preparation of jeevamrutham, in natural farming
14. Acquiring skill in preparation of panchagavya in natural farming
15. Case study on low budget natural farming practices of cultivation of agricultural crop
16. Visit nearby former filed practicing natural faming

RESOURCES

TEXT BOOKS:

1. Ecological Farming -The seven principles of a food system that has people at its heart. May 2015, Greenpeace.
2. FAO. 2018. The 10 elements of agro-ecology: guiding the transition to sustainable food and agricultural system.https://www.fao.org/3/i9037en/i9037en.pdf Agro ecosystem Analysis for Research and Development Gordon R. Conway.1985
3. Hill S.B and Ott. P. (Eeds.). 1982. Basic Techniques in Ecological Farming Berkhauser Verlag, Basel, Germany, 366 pp

REFERENCE BOOKS:

1. Explained: What Is Natural Farming? | Chemical Ayachit, S.M. 2002. Kashyapi Krishi Sukti (A Treatise on Agriculture by Kashyapa). Brig Sayeed Road, Secunderabad, Telangana: Asian Agri-History Foundation 4: 205
2. Boeringa, R. (Eed.). 1980. Alternative Methods of Agriculture. Elsevier, Amsterdam, 199 pp.
   Das, P., Das, S.K., Arya, H.P.S., Reddy, G. Subba, Mishra, A. and others: Inventory of Indigenous
3. Technical Knowledge in Agriculture: Mission mode Project on Collection, Documentation and Validation of Indigenous Technical Knowledge, Document 1 To 7, Indian Council of Agricultural Research, New Delhi.

VIDEO LECTURES:

1. -Free Natural Farming | IndiaSpend
2. What is Organic Farming? Why it is important? Challenges - YouTube

WEB RESOURCES:

1. 5.pdf
2. Adoption of Natural Farming and its Effect on Crop Yield and Farmers' Livelihood in In

Course Code		L	T	P	S	C
24PHED101	PHYSICAL EDUCATION, FIRST AID, YOGA PRACTICES AND MEDITATION 1 (0+1)	0	-	1		1

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the
To explain about the basic physiological process of plant viz. plant cell and water relations, mineral nutrition, carbon metabolism, reproductive physiology and plant growth and development.

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

CO1. Understand the physiological mechanisms underlying plant water uptake, transport, and loss and also evaluate the impact of water stress on plant growth, development, and productivity.

CO2. Comprehend the essential role of minerals in plant growth, metabolism, and overall health and also analyze the mechanisms of mineral uptake, translocation, and utilization within plants.

CO3. Understand the biochemical processes of photosynthesis and respiration and their significance in plant metabolism.

CO4. Comprehend the diverse roles and regulatory functions of plant growth hormones in various physiological processes.

CO5. Comprehend the diverse roles of minor growth hormones and their application

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

Objectives

i) To make the students aware about Physical Education, First Aid and Yoga Practices

ii) To disseminate the knowledge and skill how to perform physical training, perform first aid and increase stamina and general wellbeing through yoga

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		-	-	-	3	-	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	3	-	-	-	-	-	3	-	-	-	-	-		-
CO6	3	-	-	-	-	3	-	-	-	3	-	-		-
Course correlation mapping	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**3**	**3**	**3**	**-**	**2**		**-**

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

COURSE CONTENT

Module 1: Physical Fitness, Wellness, and Lifestyle ***(04 Periods)***

Physical Fitness, Wellness, and Lifestyle 1. Meaning & importance of Wellness, Health, and Physical Fitness. 2. Components/Dimension ns of Wellness, Health, and Physical Fitness 3. Traditional Sports & Regional Games for promoting wellness 4. Leadership through Physical Activity and Sports.

Module 2: Yoga as Preventive measure for Lifestyle Disease ***(08 Periods)***

Yoga; History of Yog, Types of Yog, Introduction to Yog,

- Asanas (Definition and Importance) Padmasan,san, Vajrajasan, Shashankasan, Pashchimotasan, Ushtrasan, Tadasan, Padhastasan, Ardhchandrasan, Bhujangasan, Utanpadasan, Sarvangasan, Parvatasan, Patangasan, Shishupalanasan – left leg-right leg, Pavanmuktasan, Halasan, Sarpasan, Ardhdhanurasan, Sawasan
- Suryanamskar Pranayama (Definition and Importance) Omkar, Suryabhedan, Chandrabhedan, AnulomVilom, Shitali, Shitkari, Bhastrika, Bhramari

Meditation (Definition and Importance), Yogic Kriyas (Kapalbhati), Tratak, Jalneti and Tribandh

- Mudras (Definition and Importance) Gyanmudra, Dhyanmudra, Vayumudra, Akashmudra, Pruthvimudra, Shunyamudra, Suryamudra, Varunmudra, Pranmudra, Apanmudra, Vyanmudra, Uddanmudra

Module 3: Management of Sporting Events ***(08 Periods)***

Functions of Sports Events Management (Planning, Organising, Staffing, Directing & Controlling) 2. Various Committees & their Responsibilities (pre; during & post) Intramural & Extramural tournaments – Meaning, Objectives & Its Significance 5. Community sports program (Sports Day, Health Run, Run for Fun, Run for Specific Cause & Run for Unity)

Module 4: Asanas ***(06 Periods)***

Teaching of Asanas – demonstration, practice, correction and practice.

Obesity: Procedure, Benefits & Contraindications Diabetes: Procedure, Benefits & Contraindications Asthma: Procedure, Benefits & Contraindications Hypertension: Procedure, Benefits & ContraindicationsBack Pain and Arthritis: Procedure, Benefits & Contraindications

Module 5: History of sports and ancient games ***(06 Periods)***

History of sports and ancient games, Governance of sports in India; Important national sporting events; Awards in Sports; History, latest rules, measurements of playfield, specifications of equipment, skill, technique, style and coaching of major games (Cricket, football, table Tennis, Badminton, Volleyball, Basketball, Kabaddi and Kho-Kho) and Athletics

Total Periods: 32

B.Sc. Hons. (Agri) – IV Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24SKIL106	Skill Enhancement in Horticulture Nursery Management	-	-	2	2
2.	24STAT102	Agricultural Informatics and Artificial Intelligence	2	-	1	3
3.	24HORT103	Production Technology of Vegetables and Spices	1	-	1	2
4.	24AECO102	Principles of Agricultural Economics and Farm Management	2	-	-	2
5.	24AGRN105	Crop Production Technology-II (*Rabi* Crops)	1	-	2	3
6.	24AENG101	Farm Machinery and Power	1	-	1	2
7.	24AGRN106	Water Management	1	-	1	2
8.	24SSAC103	Problematic Soils and their management	1	-	1	2
9.	24GPBR102	Basics of Plant Breeding	2	-	1	3
		Total	**11**	**-**	**10**	**21**

B.Sc. Hons. (Agri) – IV Semester

Course Code	Course Title	L	T	P	S	C
24SKIL106	SKILL ENHANCEMENT IN HORTICULTURE NURSERY MANAGEMENT 2(0+2)	0	-	2		2

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

COURSE DESCRIPTION: This course is designed to provide an in-depth understanding of the principles and practices involved in the management of horticultural nurseries.

It aims to introduce students to the fundamental concepts, scope, and significance of nursery management in horticulture. The course offers comprehensive training in plant propagation techniques, nursery layout planning, infrastructure development, production of quality planting material, and post-production handling. Students will gain practical exposure to nursery operations including seedling production, vegetative propagation, potting, irrigation, nutrient management, pest and disease control, and marketing of nursery products. By the end of the course, students will be equipped with the knowledge and technical skills to produce high-quality planting material and manage a sustainable horticultural nursery.

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

CO1. To gain knowledge about the principles, scope, and significance of horticultural nursery management.
CO2. To understand and apply various plant propagation techniques including sexual and asexual methods.
CO3. To develop skills in nursery layout planning, media preparation, and use of propagation structures like shade nets, poly houses, and mist chambers.
CO4. To acquire practical knowledge in potting, transplanting, irrigation, nutrient management, and plant protection within nursery settings.
CO5. Analyze the financial, operational, and record-keeping aspects required to establish and manage a successful nursery enterprise.
CO6. Work independently or collaboratively in solving practical nursery management challenges and implementing sustainable nursery practices.

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		-	-	-	3	-	-	-	-	-		-
CO4	-	-	3	3	-	-	-	-	-	3	-	-		-
CO5	3	-	-	-	-	-	3	-	-	-	-	-		-
CO6	3	-	-	-	-	3	-	-	-	3	-	-		-
Course correlation mapping	**3**	**3**	**3**	**3**	**3**	**-**	**3**	**3**	**3**	**3**	**-**	**2**		**-**

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

COURSE CONTENT

PRACTICALS/ EXPERIENTIAL LEARNING

1. Seed treatment and sowing techniques for better germination.
2. Raising seedlings in portrays using soilless media.
3. Vegetative propagation using softwood and hardwood cuttings.
4. Layering methods for raising nursery plants.
5. T-budding and patch budding practice on citrus/rose.
6. Grafting techniques for nursery management
7. Use and application of rooting hormones in nursery (IBA/NAA).
8. Selection of nursery site and location
9. Preparation of nursery beds – flat, raised, sunken types.
10. Soil sterilization by solarization, formalin, or steam methods.
11. Preparation of potting mixtures
12. Filling of pots and portrays uniformly and efficiently.
13. Installation and use of drip irrigation system in nursery.
14. Preparation of liquid organic manures (vermiwash, compost tea).
15. Fertigation method in nursery conditions.
16. Use of biofertilizers and biofungicides (Trichoderma, Azotobacter).
17. Potting and repotting techniques for container-grown plants.
18. Labeling and tagging of nursery plants
19. Grading and sorting of nursery plants based on size/health.
20. Hardening and acclimatization of seedlings before transplanting.
21. Identification of major nursery pests and diseases.
22. Preparation and spraying of pesticides and fungicides.
23. Use of neem oil and organic pest repellents.
24. Integrated Pest Management (IPM) practices in nursery.
25. Design and layout of nursery units – open field, polyhouse/net house.
26. Maintenance of shade nets, mist chambers, and greenhouse structures.
27. Preparation of propagation structures (mist chambers, poly tunnels).
28. Installation and management of foggers/misters.
29. Record maintenance of nursery management
30. Cost calculation for raising seedlings per 1000 plants.
31. Packaging and transportation techniques for delicate nursery plants.
32. Preparing a business plan for a model nursery.

RESOURCES

TEXT BOOKS:

14. Dr. R. R. Sharma, Manish Srivastav · (2004) Plant Propagation and Nursery Management. International Book Distributing Company.
15. P.K. Ray · (2020) Essentials of Plant Nursery Management 2nd Edition. Scientific Publishers.
16. John Mason · (2004) Nursery Management. CSIRO Publishing

REFERENCE BOOKS:

14. *Practical Manual of Horticulture Crops. (2015) Vol. 01: Production Technologies. Anil Kumar Verma.*
15. *Rajaneesh Singh, Dr. Bijendra Kumar Singh · (2020) Textbook On Horticulture*

16. *Bhaskar Chandra Das, Bhimasen Naik, Ranjan Kumar Tarai · (2020) Fundamentals Of Horticulture.*

VIDEO LECTURES:

11. https://www.youtube.com/watch?v=Ml6ZcjbouIM
12. https://www.youtube.com/watch?v=jv6jCIbQBkI

WEB RESOURCES:

9. http://www.cazri.res.in/publications/PRathaKrishnan.pdf
10. https://ncert.nic.in/vocational/pdf/kegr102.pdf

Course Code	Course Title	L	T	P	S	C
24STAT02	AGRICULTURAL INFORMATICS AND ARTIFICIAL INTELLIGENCE	2	-	1	-	3

Pre-Requisite **-**

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course provides a detailed discussion and hands-on experience onfundamentals of computers, operating systems, MS Office applications, and database management relevant to agriculture, internet concepts, programming basics, IT tools in e-Agriculture, crop modeling, decision support systems, geospatial technologies, AI, IoT and Big Data in digital agriculture.

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

CO1. Understand basic computer systems, operating systems, programming and online agricultural information tools.

CO2. Demonstrate MS Office tools to create, edit, present documents, and analyze data.

CO3. Apply computer models and apps to analyze plant needs and manage farm inputs.

CO4. Evaluate computer-based models and simulation tools to support agricultural planning.

CO5. Explore and utilize geospatial technologies, decision support systems and digital tools for precision farming and contingency crop planning

CO6. Work independently or in team to solve problems with effective communications.

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes												Program Specific Outcomes			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1																
CO2																
CO3																
CO4																
CO5																
CO6																
Course Correlation Mapping																

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

COURSE CONTENT

Module 1: INTRODUCTION TO COMPUTERS AND IT APPLICATIONS *(09 Periods)*

Anatomy of Computers: Memory Concepts, Units of Memory, Operating System:

Definition and types,

Applications of MS-Office: Creating, Editing and Formatting a document, Data presentation, Tabulation and graph creation, Statistical analysis, Mathematical expressions, Database, concepts and types, creating data base, Uses of DBMS in Agriculture.

Internet and World Wide Web (WWW): Concepts and components.

Module 2: COMPUTER PROGRAMMING AND e-AGRICULTURE ***(08 Periods)***

Computer Programming: Introduction general programming concepts, standard input/ output operations.

e-Agriculture: Concepts, design and development, Application of innovative ways to use information and communication technologies (IT) in Agriculture.

Module 3: COMPUTER MODELS AND IT TOOLS IN AGRICULTURE ***(09 Periods)***

Computer Models In Agriculture: Statistical, weather analysis and crop simulation models, concepts, inputs-outputs files, limitation, advantages and application of models for understanding plant processes, sensitivity, verification, calibration and validation, IT applications for computation of water and nutrient requirement of crops, Computer-controlled devices (automated systems) for Agri-input management.

Smartphone mobile apps in agriculture for farm advice: Market price, post-harvest management etc.

Module 4: GEOSPATIAL TECHNOLOGY AND DECISION SUPPORT SYSTEMS ***(09 Periods)***

Geospatial Technology: Introduction to Geospatial techniques, components and uses for generating valuable agri-information.

Decision support systems: components and applications in agriculture, Agriculture Expert System, Soil Information Systems for supporting farm decisions, Preparation of contingent crop planning and crop calendars using IT tools, Digital India and schemes to promote digitalization of agriculture in India.

Module 5: AI, IOT AND BIG DATA IN AGRICULTURE ***(10 Periods)***

Introduction to Artificial Intelligence: background and applications, Turing test. Control strategies, Breadth-first search, Depth-first search, Heuristics search techniques: Best-first search, A* algorithm,

IoT and Big Data: Use of AI in agriculture for autonomous crop management and health, monitoring livestock health, intelligent pesticide application, yield mapping and predictive analysis, automatic weeding and harvesting, sorting of produce, and other food processing applications; Concepts of smart agriculture, use of AI in food and nutrition science.

Total Periods: 32

EXPERIENTIAL LEARNING

1. To study computer hardware components, practice essential DOS commands, and perform file/folder management in Windows and Unix/Linux operating systems.
2. To create, edit and present scientific documents effectively using MS Word and MS PowerPoint.
3. To create spreadsheets to record data, analyze it using statistical tools and generate graphs in MS Excel.
4. To design and create a simple database with queries and reports relevant to agricultural records using MS Access.
5. To study the components of the World Wide Web (WWW) using a web browser and basic elements like URLs, HTTP, and HTML.
6. To study the basic features and differences of programming languages like Visual Basic, Java, Fortran, C, and C++.
7. To simulate crop growth by entering input parameters and interpreting the model outputs using crop simulation models such as DSSAT, Crop-Info, CropSyst, and WOFOST.

8. To study the components of the India Digital Ecosystem of Agriculture (IDEA) and identify key digital platforms supporting farm-level decision-making.
9. To demonstrate how IoT devices can monitor crop health, soil moisture, or livestock in real-time.
10. To demonstrate the use of smartphones and digital devices in agro-advisory services and dissemination of real-time market information.

RESOURCES

TEXT BOOKS:

1. Dhabal Prasad Sethi and Manoranjan, Concepts and Techniques of Programming in C, First Edition, Wiley India, 2017.
2. V. Rajaraman, Fundamentals of Computers, Sixth Edition, PHI Learning Pvt. Ltd., 2014.
3. Alexis Leon and Mathews Leon, Introduction to Information Technology, Second Edition, Pearson Education, 2009.
4. G. Vanitha, *Agro-Informatics*, First Edition, New India Publishing Agency (NIPA), New Delhi, 2023.

REFERENCE BOOKS:

1. C. J. Date, An Introduction to Database Systems, Eighth Edition, Pearson Education, 2003.
2. Subrat K. Mahapatra, R.K. Mahapatra, and L.B. Patnaik, Introductory Agri-Informatics, First Edition, Jain Brothers, 2015.
3. PradipDey and Manas Ghosh, *Programming in C*, Second Edition, Oxford University Press,New Delhi, 2013.

SOFTWARE/TOOLS:

1. Software: Microsoft Office, Turbo C/C++

VIDEO LECTURES:

1. https://onlinecourses.nptel.ac.in/noc20_cs91/preview
2. https://archive.nptel.ac.in/courses/106/102/106102220/

WEB RESOURCES:

1. https://www.geeksforgeeks.org/basics-of-computer-and-its-operations/
2. Learn C Programming - https://www.programiz.com/c-programming
3. Learn C Programming - https://www.tutorialspoint.com/cprogramming/index.htm
4. https://onlinecourses.nptel.ac.in/noc21_cs72/preview
5. https://vajiramandravi.com/upsc-exam/geospatial-technology/
6. https://intellias.com/artificial-intelligence-in-agriculture/

Course Code	Course Title	L	T	P	S	C
24HORT103	PRODUCTION TECHNOLOGY OF VEGETABLES AND SPICES 2(1+1)	1	-	1		2

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

COURSE DESCRIPTION: This course is designed to provide an overview about the.To educate about the different forms of classification of vegetables educate about the origin, area, climate, soil, improved varieties and cultivation practices of vegetables and spices educate about the physiological disorders of 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, tuber, root & perennial vegetable crops
CO4. To create awareness about Production techniques of spice crops and their use
CO5. To understand the Scope, Importance and classification of vegetable & Spice 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	3	1	2	-	-	-	-	-	-	-	-	3	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	-	1	-	-	-	-	-	-	-	3	-	-
CO4	3	2	-	2	-	-	-	-	-	-	-	3	-	-
CO5	3	1	-	2	-	-	-	-	-	-	-	3	-	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	-	-
Course correlation mapping	**3**	**3**	**2**	**2**	-	-	**3**	**3**	-	-	-	**3**	-	-

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

COURSE CONTENT

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

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

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

Cultivation practices of tropical crops- Tomato, brinjal, chilli, capsicum, bhendi, Amaranthus, palak. Cucurbits- gourds (cucumber, pumpkin, bitter gourd, bottle gourd)

Module 3: Production technology of cole, legume, root & (05 Periods)

Cole crops- Cabbage & Cauliflower, knol-khol, Peas &French bean, Root crops (carrot radish, beetroot),

Module 4: Production technology of bulb, tuber perennial vegetable crops (05 Periods)

potato cassava, sweet potato, Perennial vegetables – drumstick & curry leaf, Bulbcrops – onion & garlic,

Module 5: Production techniques of spice crops (05 Periods)

Cultivation practices of spices- Black pepper, tamarind, Cardamom, Cloves, nutmeg,cinnamon, Turmeric, Ginger, Coriander, Cumin, fennel, Fenugreek and herbal spice

Total Periods: 16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of morphological characters of different vegetables and spices
2. Nursery raising.
3. Direct seed sowing and transplanting
4. Identification and description of varieties/hybrids in Tomato and chilli.
5. Identification and description of varieties/hybrids in Brinjal and Okra
6. Identification and description of varieties/hybrids in cucumber and bottle gourd.
7. Identification and description of varieties/hybrids in Pea and French bean
8. Identification and description of varieties/hybrids in Amaranthus and palak.
9. Identification and description of varieties/hybrids in black pepper, cardamom fenugreek, fennel
10. Identification and description of varieties/hybrids in turmeric, zinger, moringa
11. Identification and description of varieties/hybrids in curry leaf, tamarind
12. Propagation methods - rapid multiplication techniques
13. Fertilizers applications
14. Harvesting and post-harvest practices
15. Economics of vegetables and spices cultivation
16. Visit to spice gardens.

RESOURCES

BOOKS:

1. Textbook of vegetable, tuber crops, and Spices. S. Thamburaj, ICAR, New Delhi, 2014.
2. A Textbook on the production technology of vegetables. B.R. Choudhary, Kalyani Publishers. Ludhiana, 2009. **TEXT**
3. Modern Technology in Vegetable Production. P. Hazra, New India Publishing Agency. New Delhi, 2011.

REFERENCE BOOKS:

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

VIDEO LECTURES:

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

WEB RESOURCES:

1. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1776584
2. https://vigyanvarta.com/adminpanel/upload_doc/VV_1220_11.pdf
3. https://www.allthatgrows.in/blogs/posts/vegetables-kitchen-garden

Course Code	Course Title	L	T	P	S	C
24AECO102	PRINCIPLES OF AGRICULTURAL ECONOMICS AND FARM MANAGEMENT 2(2+0)	2	-	0		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To aware the students about broad areas covered under agricultural Economics and farm management impart knowledge on judicious use of resources for optimum production

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

CO1. Understand the meaning, scope and basic concept of economics

CO2. Gain Knowledge about consumer behavior and measurement of demand and elasticity of demand

CO3. Understand the concept of production , factors of production and supply and elasticity of supply

CO4. Understand the theory of Distribution, national income and population theories

CO5. Understand the Concept of money, economic system and international trade

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	-	-	-	-	-	-	-	-	3	-
CO5	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Course correlation mapping	3	3	-	3	-	-	-	-	-	-	-	-	3	-

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

COURSE CONTENT

Module 1: Basic concepts in economics (07 Periods)

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro- and macro-economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare

Module 2: Agricultural economics: Consumer behavior and Demand (06Periods)

Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Demand: meaning, law of demand, demand schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity.

Module 3: Agricultural production economics (07 Periods)

Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: Cost concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, supply schedule, supply curve, determinants of supply, elasticity of supply

Module 4: Distribution theory, national income and population theories (05 Periods)

Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socio-economic determinants, current policies and programs on population control.

Module 5: Concept of money, economic system and international trade (07 Periods)

Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, money supply, general price index, inflation and deflation. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning. Forms of business organizations, international trade and balance of payments. GST and its implication on Indian economy.

Total Periods: 32

RESOURCES

TEXT BOOKS:

1. Johl, S.S. and T.R Kapur. 2009. Fundamentals of Farm Business Management. Kalyani Publishers
2. S. Subha Reddy, P. Raghu Ram, T.V. Neelakanta and I. Bhvani Devi .2004. Agricultural Economics. Oxford & IBH publishing Co. Pvt. Ltd

REFERENCE BOOKS:

1. S. Subha Reddy, P. Raghu Ram, T.V. Neelakanta and I. Bhvani Devi .2004. Agricultural Economics. Oxford & IBH publishing Co. Pvt. Ltd
2. Amarjit singh , A N Sadhu and jasbirsingh , fundamental of agriculture economics, Himalaya Publishing house , Mumbai(11th edition), 2018

VIDEO LECTURES:

1. Bing Videos
2. Bing Videos

WEB RESOURCES:

1. Production-Economics-Farm-Management.pdf
2. 07123-12.pmd

Course Code	Course Title	L	T	P	S	C
24AGRN105	**CROP PRODUCTION TECHNOLOGY –II(RABI CROPS)** **3(1+2)**	1	-	2		3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the. To impart basic and fundamental knowledge on principles and practices of rabi crop production. impart knowledge and skill on scientific crop production and management.

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

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

COURSE CONTENT

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

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 (04Periods)

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, MEDICINAL AND AROMATIC CROPS (06 Periods)

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

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 PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Land preparation
2. Layout of plots
3. Sowing methods of sugarcane
4. Sowing of cereals
5. Sowing of pulses
6. Sowing of Millet crops
7. Sowing of oil seeds
8. Sowing of fiber crops
9. Sowing of sugar crops
10. Sowing of fodder crops
11. Field operations on the Experimental plots
12. Identification of plant characteristics of cereals, Recording of yield contributing characters (biometric observations)
13. Identification of plant characteristics of pulses, Recording of yield contributing characters (biometric observations)
14. Identification of plant characteristics of millets, Recording of yield contributing characters (biometric observations)
15. Identification of plant characteristics of oil seed crops, Recording of yield contributing characters (biometric observations)
16. Identification of plant characteristics of fiber crops, Recording of yield contributing characters (biometric observations)
17. Identification of plant characteristics of sugar crops, Recording of yield contributing characters (biometric observations)
18. Identification of plant characteristics of fodder crops, Recording of yield contributing characters (biometric observations)
19. Yield and juice quality analysis of sugarcane
20. Visit to agronomic experiments of Oil seeds at experimental farms.
21. Visit to agronomic experiments of fiber crops at experimental farms.
22. Visit to agronomic experiments of sugar crops and fodder crops at experimental farms.
23. Visit to agronomic experiments of fodder crops at experimental farms Visit to forage
24. Hay and silage making
25. Visit to research stations of related crops

26. Visit to related agro-based industries
27. Visit to nearby farmers' fields
28. Visit to nearby processing units
29. Oil extraction of medicinal crops,
30. Identification of weeds in rabi season crops,
31. Study of morphological characteristics of rabi crops.
32. visit to research stations of related 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

Course Code	Course Title	L	T	P	S	C
24AENG101	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 about the.Need of farm power, basic principles and parts of IC engine, different tillage, sowing, intercultural, plant protection equipment, working principles of threshers, harvesting of field and horticultural crops

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

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

COURSE CONTENT

Module 1: Farm Power in India: Tractor Systems, Components, and Economic Analysis (03Periods)

Status of Farm Power in India; Sources of Farm Power, Tractor: components and systems-hydraulic control system of a tractor; Familiarization with Power transmission system: clutch; gearbox, differential and final drive of a tractor; Tractor types; Cost analysis of tractor power and attached implement; Criteria for selection of tractor and machine implements.

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

I.C. engines, working principles of IC engines; comparison of two-stroke and four-stroke cycle engines, Study of different components of I.C. engine, I.C. engine terminology, and solved problems—familiarization with different systems of I.C. engines: Air cleaning, cooling, lubrication, fuel supply system.

Module 3: Tillage and sowing equipment. (03 Periods)

Familiarization with Primary and Secondary Tillage implements; Implements for hill agriculture; Familiarization with sowing and planting equipment; calibration of a seed drill and solved examples.

Module 4: Intercultural and Plant protection equipment (03 Periods)

Intercultural Equipment- implements for intercultural operations; Familiarization with Plant Protection equipment - sprayers and Dusters.

Module 5: Harvesting and threshing equipment (03 Periods)

Familiarization with harvesting and threshing equipment – working principles, methods, types of harvesters, and threshers.

Total Periods: 16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of different components of I.C. engine.
2. To study the air cleaning and cooling system of the engine
3. Familiarization with the clutch, transmission, differential and final drive of a tractor
4. Familiarization with lubrication and fuel supply system of the engine
5. Familiarization with brake, steering, hydraulic control system of engine
6. Learning of tractor driving
7. Familiarization with the operation of power tiller
8. Familiarization of Implements for hill agriculture;
9. Familiarization with different types of primary and secondary tillage implements: mould plough, disc plough and disc harrow.
10. Familiarization with seed-cum-fertilizer drills their seed metering mechanism and calibration.
11. Familiarization with planters, and transplanters.
12. Familiarization with different types of sprayers and dusters.
13. Familiarization with different inter-cultivation equipment.
14. Familiarization with harvesting and threshing machinery.
15. Calculation of power requirement for different implements.
16. Study of different components of I.C. engine.

RESOURCES

TEXT BOOKS:

1. T. P. Ojha and A.M. Michael. 2005. Principles of Agricultural Engineering (Volume - 1), Jain Brothers
2. Kepner RA Roy Bainer and Barger BL.1978. Principles of Farm Machinery. CBS Publisher and Distributors, Delhi
3. M.M. Pandey & Others. 2012. Handbook of Agricultural Engineering. ICAR publication yyJagadishwar Sahay.1992. Elements of Agricultural Engineering. Agro Book Agency, Patna.

REFERENCE BOOKS:

1. Surendra Singh. 2007. Farm Machinery Principles and Applications. ICAR Publications

2. RothField. 1992. Introduction to Agricultural Engineering - Problem Solving Approaches, 2nd. Edition. CBS publishers & distributors Pvt. Ltd

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=PEojc_K7u9U&list=PLbRMhDVn
2. https://www.youtube.com/watch?v=AKZSbxyIhMo&list=PLdoIhVhQV

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=12
2. https://farmech.dac.gov.in/FarmerGuide/TN/Harvesting%20Equipme

Course Code	Course Title	L	T	P	S	C
24AGRN106	WATER MANAGEMENT 2(1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the. To study the important properties of soil affecting water availability to crops and water requirement for optimum growth and development different methods of irrigation and water management practices of both field and horticultural crops and drainage. soil moisture conservation practices including management of rain water, watershed and command areas.

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

CO1. Define irrigation and explain its primary objectives in agricultural practice

CO2. Develop water budgets for different agricultural fields, considering precipitation

CO3. Understand the mechanics and operation of **sprinkler irrigation** and **drip irrigation** systems.

CO4. Analyze how irrigation methods and water management practices impact both irrigation and water use efficiency.

CO5. Understand how automation improves irrigation efficiency, reduces labor costs, and ensures timely water application.

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	3	-	2	**-**	**-**	**-**	**-**	-	-	-	-	-	-
CO6	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**
Course correlation mapping	3	3	2	-	-	-	3	3	-	-	3	-	-	-

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

COURSE CONTENT

Module 1: IRRIGATION (03 Periods)

definition and objectives; Importance: Function of water for plant growth, water resources and irrigation development for different crops in India. Soil plant water relationships; Available and unavailable soil moisture, distribution of soil moisture, water budgeting, rooting characteristics, moisture extraction pattern, effect of moisture stress on crop growth.

Module 2: METHODS OF SOIL MOISTURE ESTIMATION (03 Periods)

evapotranspiration and crop water requirement; effective rainfall, different approaches of

scheduling of irrigation

Module 3: METHODS OF IRRIGATION, IRRIGATION EFFICIENCY AND WATER USE EFFICIENCY (05 Periods)

surface and sub-surface, pressurized methods, viz., sprinkler and drip irrigation, their suitability, merits and limitations, fertigation, economic use of irrigation water;

Layout of different irrigation systems, Irrigation efficiency and water use efficiency, conjunctive use of water, irrigation water quality and its management.

Module 5: WATER MANAGEMENT OF DIFFERENT CROPS, IRRIGATION MANAGEMENT PRACTICES (05 Periods)

Water management of different crops (rice, wheat, maize, groundnut, sugarcane, mango, banana and tomato)

Quality of irrigation water, irrigation management practices for different soils and crops, drip, sprinkler. Layout of underground pipeline system, Irrigation automation, Artificial Intelligence and climate-based irrigation practices and its management.

Total Periods: 16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Determination of bulk density by field method
2. Determination of soil moisture content by gravimetric method
3. Determination of soil moisture content by tensiometer, electrical resistance block and neutron moisture meter;
4. Determination of field capacity by field method
5. Determination of permanent wilting point
6. Measurement of irrigation water by using water measuring devices viz
7. flumes, weirs, notches, orifices
8. Calculation of irrigation water requirement (Problems)
9. Determination of infiltration rate; Demonstration of furrow method of irrigation
10. Demonstration of check basin and basin method of irrigation;
11. Demonstration of filter cleaning
12. fertigation, injection and flushing of laterals
13. layout for different methods of irrigation, Erection and operation of sprinkler irrigation system
14. Measurement of emitter discharge rate, wetted diameter and calculation of emitter discharge variability
15. Visit to farmers' field and cost estimation of drip irrigation system
16. Visit to irrigation research centre/ station and visit to command area

RESOURCES

TEXT BOOKS:

1. Rao, Y.P. and Bhaskar, S.R. Irrigation technology. Theory and practice. Agrotech publishing Academy, Udaipur
2. DilipkumarMujmdar. Irrigation water management: Principles and Practices. Prentice Hall of India Pvt. Ltd.,
3. Michael, A.M. Irrigation Theory and practice. Vikas publishing house Pvt, Ltd

REFERENCE BOOKS:

1. S.V. Patil &Rajakumar, G. R., Water Management in Agriculture and Horticultural Crops. Satish serial publishing House, Delhi.
2. Carr M. K. V. and Elias Fereres. Advances in Irrigation Agronomy. Cambridge University Press

VIDEO LECTURES:

1. Water Management

1. Watershed management, Definition, objective and steps

WEB RESOURCES:

1. https://www.bing.com/search?q=WATER+MANAGENET++PDF+&qs=n&form=QBRE&sp=-1&lq=0&pq=water+managenet++pdf&sc=11-20&sk=&cvid=E5CA1ED7162A4924BAA464D1AE174BCF&ghsh=0&ghacc=0&ghpl=

2. Revised_COMPENDIUM-OF-BEST-PRACTICES-IN-WATER-MANAGEMENT-3.pdf

Course Code	Course Title	L	T	P	S	C
24SSAC103	PROBLEMATIC SOILS AND THEIR MANAGEMENT 2 (1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about thevarious problematic soils and also gives us knowledge about remote sensing, gis, multipurpose tree and land capability classification. It also provides hands on training about estimation of various soil and water quality parameters associated with problem soils

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

CO1. Gain knowledge on different problematic soils

CO2. Study in detail chemistry of saline soils, sodic soils and acid soils and their management

CO3. Study detail chemistry of degraded soils and their management

CO4. Able to judge the irrigation water quality and standards

CO5. Get information on using remote sensing and gis for management of problematic soils

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

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

COURSE CONTENT

Module 1: Soil quality and health, Categorization of Problem soils (02Periods)

Soil health and quality – Definition - Concepts – Soil resilience – Factors affecting soil quality (Physical, chemical and biological) – Assessment of soil quality - Management and improvement of soil quality. Problem soils –Definition – Different types of problematic soils – Extent and distribution of problematic and wastelands soils in different agro-eco systems and in Andhra Pradesh

Module 2: Saline soils, Sodic soils and Acid Soils (05Periods)

Salt affected soils – Origin and formation - Distribution - Characteristic features of saline, sodic and saline – sodic soils – Reclamation and management. Sodic soils - Reclamation and management. Acid soils - Characteristics of acid soils – Reclamation of acid soils - Benefits of liming – Harmful effects of over liming. Acid sulphate soils – Origin – Types – Characterization - Constraints and management.

Module 3: Land degraded soils, Polluted soils, Contaminated soils, Mined soils (Coal mined, Oil mined), Riverine soils **(03 Periods)**

Land degradation - Eroded, compacted, flooded and Water logged soils – Biologically sick soils – Effects on plant growth – Management. Polluted soils – Definition – Sources of pollution – Bio solid wastes –Industrial effluents - Soil pollution - Potentially toxic elements - Excessive use of fertilizers, pesticides and weedicides – Heavy metal contamination – Management. Mined soils (Coal mined, Oil mined), Riverine soils

Module 4: Irrigation water – quality and standards, utilization of saline water in agriculture **(02 Periods)**

Irrigation water – Quality and standard parameters - Classification based on ICAR, CSSRI and USDA criteria. Guidelines for judging quality of water - Utilzation of saline water in agriculture

Module 5: Management using Remote sensing and GIS, Land capability and Land suitabilityclassification. **(04 Periods)**

Bio-remediation of problem soils through Multi Purpose Tree Species - Taxonomic classification of soils - Land Capability Classification. Land suitability classification - Index – Criteria - Different approaches - Remote Sensing and GIS techniques in diagnosis, mapping and management of degraded and problematic soils.

Total Periods: 16

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Determination of pHs and EC of saturation extract of problematic soil.
2. Determination of redox potential in soil,
3. Estimation of Calcium and Magnesiumin soil
4. Estimation of Carbonates and Bicarbonates in soil
5. Estimation of Chlorine in soil
6. Estimation of Sodium in soil**,** computation of SAR and ESP and characterization of problematic soil.
7. Determination of Gypsum requirement of alkali / sodic soil.
8. Determination of lime requirement of acidic soil.
9. Determination of pH and EC irrigation water
10. Determination of Calcium and Magnesiumirrigation water
11. Determination of Sodiumirrigation water
12. Determination of carbonates and bicarbonatesirrigation water
13. Determination of chlorineirrigation water
14. Determination of SAR and RSC in irrigation water
15. Determination of nitrate (NO3 -) from irrigation water
16. Determination of dissolved oxygen and free carbon dioxide levels in water samples.

RESOURCES

TEXT BOOKS:

1. The Nature and Properties of Soils – Nyle C. Brady

2. Text Book of Soil Science – T.D. Biswas and S.K. Mukherjee

REFERENCE BOOKS:

1. Fundamentals of Soil Science – Indian Society of Soil Science
2. Principles of Soil Chemistry – Kim H. Tan

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=CvP2kMCU_5o&list=PLK83hxGCAk70O5YfmTxn2hsr_E1ntyCx_
2. https://www.youtube.com/watch?v=EnCpia7g39I&list=PLg6dY4ATfXEvU97TCzOwv25-4NMdSOl1X
3. https://www.youtube.com/watch?v=Na5zS09iWL4&list=PLFLM7qfYY44loMKS4T1ckDZc9QuhkwlMu

WEB RESOURCES:

1. https://agritech.tnau.ac.in/pdf/3.pdf
2. https://drive.google.com/file/d/1xAfmKujdfcKqheHciBkgg1HnlvHznLsr/view

Course Code	Course Title	L	T	P	S	C
24GPBR102	**BASICS OF PLANT BREEDING 3(2+1)**	2	-	1		3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To acquaint with different techniques ranging from simply selecting plants with desirable characteristics for propagation, to more complex molecular techniques for breeding new varieties, which are higher yielding, resistant to biotic and abiotic stresses for ensuring food security.

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

CO1. To understand the ancient agricultural practices and the significance of natural farming in context of climate change and sustainable development.

CO2. To understand the concept, principles and practical applications of natural farming and its distinction from conventional farming practices.

CO3. To understand the concept of ecological balance and its significance in sustainable agriculture particularly in natural farming systems

CO4. To understand different production practices under natural farming systems.

CO5. To understand the roles of government and NGO's in promoting natural farming in India.

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

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

COURSE CONTENT

Module 1: Introduction plant breeding principle ***(04 Periods)***

Historical development, concept, nature and role of plant breeding, major achievements and future prospects; Genetics in relation to plant breeding, modes of reproduction and apomixes, self incompatibility and male-sterility-genetic consequences, cultivar options, Plant genetic resources, its utilization and conservation Domestication, Acclimatization and Introduction. Centres of origin/ diversity,

Module 2: Genetics various and principles ***(04Periods)***

Components of Genetic variation. Heritability and genetic advance. Pre-breeding and Universal Plant Breeder's equation Concepts of population genetics and Hardy-Weinberg Law

Module 3: Breeding methods for self and cross pollinated crops ***(04Periods)***

Genetic basis and breeding methods in self-pollinated cropsmass and pure line selection, hybridization techniques and handling of segregating population. Multiline concept, Genetic basis and methods of breeding cross-pollinated crops, modes of selection

Module 4: Advanced breeding techniques ***(02Periods)***

Heterosis and inbreeding depression, development of inbred lines and hybrids, composite and synthetic varieties. Breeding methods in asexually propagated crops, clonal selection and hybridization. Wide hybridization and pre-breeding. Polyploidy in relation to plant breeding, mutation breeding- methods and uses. Breeding for important biotic and abiotic stresses.

Module 5: Legal ,sourcial and participatory aspects ***(02Periods)***

Participatory plant breeding. Variety Release and notification. Intellectual Property Rights, Patenting, Plant Breeders and Farmer's Rights.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit of natural farm and chemical free traditional farms to study the various components and operations of natural farming principles at the farm
2. Indigenous technical knowledge (ITK) for seed, tillage, water, nutrient, insect-pest, disease and weed management
3. On-farm inputs preparation methods and protocols in natural farming
4. Studies in green manuring in-situ and green leaf manuring
5. Studies on different types of botanicals based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management
6. Studies on different types of animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management
7. Weed management practices in natural farming;
8. Nutrient management practices in natural farming
9. Techniques of Indigenous seed production- storage and marketing
10. Partial and complete nutrient budgeting in natural farming
11. Partial and complete financial budgeting in natural farming
12. Evaluation of ecosystem services in natural farming (Crop, Field and System)
13. Acquiring skill in preparation of jeevamrutham, in natural farming
14. Acquiring skill in preparation of panchagavya in natural farming
15. Case study on low budget natural farming practices of cultivation of agricultural crop
16. Visit nearby former filed practicing natural faming

RESOURCES

TEXT BOOKS:

1. Principles of Plant Breeding (1st & 2nd Edition) by RW Allard.
2. Plant Breeding: Principles & Practices by JR Sharma.
3. Plant Breeding- B.D. Singh.

REFERENCE BOOKS:

1. Principles and Procedures of Plant Breeding - Biotechnical and Conventional Approaches by GS Chahal and SS Gosal.

2. Principles of Plant Genetics and Breeding by George Acquaah.

VIDEO LECTURES:

1. An Introduction To Plant Breeding
2. How To Breed Plants (Basics)

WEB RESOURCES:

1. Manual Plant Breeding
2. Principles-of-Plant-Breeding.pdf

B.Sc. Hons. (Agri) – V Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24AECO103	Agricultural Marketing and Trade	2	-	1	3
2.	24AMET102	Introduction to Agro-meteorology	1	-	1	2
3.	24CPHY101	Fundamentals of Crop Physiology	2	-	1	3
4.	24ENTO102	Pest management in Crops and Stored Grains	2	-	1	3
5.	24PATH102	Diseases of Field Crops and their Management	1	-	1	2
6.	24GPBR103	Crop Improvement -I (*kharif* crops)	1	-	1	2
7.	24AGRN107	Weed Management	1	-	1	2
8.	24HORT104	Ornamental Crops, MAPs and Landscaping	1	-	1	2
9.	24AGRN108	Introductory Agro forestry	1	-	1	2
10.	24TOUR101	Study Tour (NG)	-	-	2(NG)	2(NG)
		Total	**12**	**-**	**11**	**23**

B.Sc. Hons. (Agri) – V Semester

Course Code	Course Title	L	T	P	S	C
24PATH102	**DISEASES OF FIELD CROPS AND THEIR MANAGEMENT 2(1+1)**	**1**	**-**	**1**	**-**	**2**

Pre-Requisite **NA**

Anti-Requisite **-**

Co-Requisite **-**

COURSE DESCRIPTION: This course is designed to provide an overview of major diseases of 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 crops.

CO3 Analyze the impact of host-pathogen interactions on disease development in field 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 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
CO1	3	3	-	3	-	-	-	-	-	-
CO2	3	3	-	3	-	-	-	-	-	-
CO3	3	3	-	3	-	-	-	-	-	-
CO4	3	3	-	3	-	-	-	-	-	-
CO5	3	3	-	3	-	-	-	-	-	-
CO5	-	-	-	-	-	-	3	3	-	-
Course Correlation Mapping	**3**	**3**	**-**	**3**	**-**	**-**	**3**	**3**	**-**	**-**

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

COURSE CONTENT

Module 1: Symptoms and etiology of Rice, Wheat and Maize (4 Periods)

Symptoms, etiology, disease cycle and management of following diseases: Rice (blast, brown spot, sheath blight, false smut, bacterial leaf blight, bacterial leaf streak, tungro, khaira); Wheat (rusts, loose smut, Karnal bunt); Maize (banded leaf and sheath blight, southern and northern blight, downy mildew).

Module 2: Symptoms and etiology of Sorgham, Bajra, Finger millet and Groundnut **(4 Periods)**

Sorghum (smuts, grain mold, anthracnose); Bajra (downy mildew, ergot) and Finger millet (blast, leaf spot); Groundnut (early and late leaf spots, rust, wilt);

Module 3: Symptoms and etiology of Soya bean, Grams, Pea, Black gram and Green gram **(4 Periods)**

Soybean (rhizoctonia blight, bacterial spot, seed and seedling rot, mosaic); Grams (Ascochyta blight, wilt, grey mold); Pea (downy mildew, powdery mildew, rust); Black gram and Green gram (web blight, Cercospora leaf spot, anthracnose, yellow mosaic);

Module 4: Symptoms and etiology of Sugarcane, Mustard, Sunflower and Cotton **(4 Periods)**

Sugarcane (red rot, smut, grassy shoot, ratoon stunting, PokahBoeng); Mustard (Alternaria blight, white rust, downy mildew, sclerotinia stem rot) and Sunflower (sclerotinia stem rot, Alternaria blight); Cotton (anthracnose, vascular wilts, black arm).

Total Periods:16

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Diseases of potato and Tomato
2. Diseases of Tomato
3. Diseases of pea and Coriander
4. Diseases of Chilli and Turmeric
5. Acquaintance with fungicides
6. Acquaintance with Antibiotics
7. Acquaintance with Biopesticides
8. Field Visit
9. Diseases of Citrus, Guava and Banana
10. Diseases of Apple, Peach, Grapevine and Strawberry
11. Diseases of Cucurbits
12. Diseases of Cruciferous vegetables
13. Diseases of Beans and Okra
14. Diseases of Rose and Marigold
15. Field visit
16. Field visit

RESOURCES / STUDY MATERIALS

TEXT BOOKS:

1. Das Gupta M.K. and W.C. Mandel.1989. Post-harvest pathogens of Perishables. Oxford and IBH Publishing Company, New Delhi.
2. Integrated Plant Disease Management By R.C. Sharma
3. Plant Diseases By R.S. Singh
4. Plant Disease Management: Principles and Practices By Hriday Chaube
5. Plant Pathology By G.N. Agrios

Reference Books

1 Rangaswamy, C. 2005, Diseases of crop plants in India –. Prentice Hall of India, Pvt. Limited, New Delhi.
2 Dasgupta, M.K. and W.C. Mandal. 1989. Post-harvest pathology of perishables. Oxford IBH publishing Co. New Delhi.

VIDEO LECTURES:

https://www.youtube.com/watch?v=hf-0dIVC9tI&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3
https://www.youtube.com/watch?v=Xrc2UDiM1KU&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3&index=4

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://agritech.tnau.ac.in/pdf/9.pdf
2. http://www.eagri.org/eagri50/PATH371/index.html

Course Code	Course Title	L	T	P	S	C
24AECO103	AGRICULTURAL MARKETING AND TRADE 3(2+1)	2	-	1		3

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

COURSE DESCRIPTION: This course is designed to provide an overview about the To educate about the different forms of classification of vegetables educate about the origin, area, climate, soil, improved varieties and cultivation practices of vegetables and spices educate about the physiological disorders of 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, tuber, root & perennial vegetable crops
CO4. To create awareness about Production techniques of spice crops and their use
CO5. To understand the Scope, Importance and classification of vegetable & Spice 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	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: Agricultural marketing: concepts, definitions and classification of agricultural markets (03 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

Module 2: Proucer Surplus, pricing and promotion strategies (05 Periods)

producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketable surplus of agri-commodities; Pricing and promotion strategies: pricing considerations and approaches – cost based and competition based pricing;

Module 3: Process of agricultural Marketing (07 Periods)

Market promotion – advertising, personal selling, sales promotion and publicity – meaning, merits and demerits; Marketing process and functions: Marketing process concentration, dispersion and equalization; 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 of products.

Module 4: Role of Government in Agricultural marketing and risk in marketing **(09 Periods)**

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; Role of Govt. in agricultural marketing: Public sector institutions- CWC, SWC, FCI, CACP and DMI – their objectives and functions; cooperative marketing in India; Risk in marketing: Types of risk in marketing; speculation and hedging; an overview of futures trading; Agricultural prices and policy: Meaning and functions of price; administered prices; need for innovations in agricultural price policy; Trade:

Module 5: Role of Government in International trade **(08 Periods)**

Concept of International Trade and its need, theories of absolute and comparative advantage. Present status and prospects of international trade in agri-commodities; WTO; Agreement on Agriculture (AoA) and its implications on Indian agriculture; IPR; Role of government in agricultural marketing; Role of APMC and its relevance in the present day context.

Total Periods: 32

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Plotting and study of demand curves and calculation of elasticities
2. Plotting and study of supply curves and calculation of elasticities
3. Study of relationship between market arrivals and prices of some selected commodities;
4. Computation of marketable surplus of important commodities;
5. Computation of marketed surplus of important commodities
6. Study of price behavior over time for some selected commodities
7. Construction of index numbers
8. Visit to a local market to study various marketing functions performed by different agencies,
9. Identification of marketing channels for selected commodity,
10. Calculation of data regarding marketing costs and margins
11. Calculation of price spread
12. Visit to market institutions –NAFED.
13. Visit to market institutions – SWC.
14. Visit to market institutions –CWC.
15. Visit to market institutions – cooperative marketing society, etc
16. Application of principles of comparative advantages of international trade .

RESOURCES

TEXT BOOKS:

1. Acharya, S.S. and Agarwal, N.L. 2006. Agricultural Marketing in India, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Chinna, S.S. 2005. Agricultural Economics and Indian Agriculture. Kalyani Pub, N Delhi.
3. Dominic Salvatore, Micro Economic Theory
4. Kohls Richard, L. and Uhl Josheph, N. 2002. Marketing of Agricultural Products, Prentice-Hall of India Private Ltd., New Delhi

REFERENCE BOOKS:

1. Kotler and Armstrong, 2005. Principles of Marketing, Pearson Prentice-Hall
2. Lekhi, R. K. and Joginder Singh. 2006. Agricultural Economics. Kalyani Publishers, Delhi
3. Memoria, C.B., Joshi, R.L. and Mulla, N.I. 2003. Principles and Practice of Marketing in India, Kitab Mahal, New Delhi
4. Pandey Mukesh and Tewari, Deepali. 2004. Rural and Agricultural Marketing, International Book Distributing Co. Ltd, New Delhi

VIDEO LECTURES:

1. What is Market , Marketing and their classification || agricultural marketing trade and prices
2. what is agriculture marketing || agriculture marketing trade and prices || bsc ag 5th sem.

WEB RESOURCES:

1. E-Learning Portal
2. agrifair.in/wp-content/uploads/2020/10/Agricultural-Marketing-Trade-and-Prices-pdf.pdf

Course Code	Course Title	L	T	P	S	C
24AMET102	**INTRODUCTION OF AGRO- METEOROLOGY 2 (1+1)**	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the. To introduce the students to the concept of weather and climate and underlying physical processes occurring in relation to plant and atmosphere impart the theoretical and practical knowledge of instruments/equipment used for measurement of different weather variables in an agrometeorological observatory meteorological aspects of climate change in agriculture and allied activities

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

CO1. Understand the Basics of Agricultural Meteorology:

CO2. Analyze Atmospheric Temperature

CO3. Define atmospheric humidity, explain the concept of saturation, and understand the relationship between humidity, temperature, and vapour pressure.

CO4. Analyze the causes and characteristics of extreme weather events and evaluate their short-term and long-term effects on crop and livestock production

CO5. Explain the concept of weather forecasting, including its purpose and importance in agricultural planning.

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

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

COURSE CONTENT

Module 1: Introduction to Agricultural Meteorology ***(03 Periods)***

Meaning and scope of agricultural meteorology; Earth atmosphere: its composition, extent and structure; Atmospheric weather variables; Atmospheric pressure, its variation with height; Wind, types of wind, daily and seasonal variation of wind speed, cyclone, anticyclone, land breeze and sea breeze

Module 2: Dynamics, and Their Applications in Agricultural ***(04 Periods)***

Meteorolog

Nature and properties of solar radiation, solar constant, depletion of solar radiation, short wave, longwave and thermal radiation, net radiation, albedo; Atmospheric temperature, temperature inversion, lapse rate, daily and seasonal variations of temperature, vertical profile of temperature, Application of Thermal time concept and Crop/Pest weather calendar

Module 3: Atmospheric Energy Balance ***(03 Periods)***

Energy balance of earth; Atmospheric humidity, concept of saturation, vapour pressure, process of condensation, formation of dew, fog, mist, frost, cloud; Precipitation, process of precipitation, types of precipitation such as rain, snow, sleet, and hail, cloud formation and classification; Artificial rainmaking. Monsoon- mechanism and importance in Indian agriculture

Module 4: Agricultural Impacts ***(03 Periods)***

Weather hazards - drought, floods, frost, tropical cyclones and extreme weather conditions such as heat-wave and cold-wave; Agriculture and weather relations; Modifications of crop microclimate, climatic normal for crop and livestock production.

Module 5: Weather Forecasting, Climate Change, and Their Impact on Agricultural Systems ***(03 Periods)***

Weather forecasting- types of weather forecast and their uses. Climate change, climatic variability, global warming, causes of climate change and its impact on regional and national agriculture

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording
2. Measurement of total, shortwave and long wave radiation, and its estimation using Planck's intensity law
3. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS
4. Measurement of maximum and minimum air temperatures, its tabulation, trend and variation analysis
5. Measurement of soil temperature and computation of soil heat flux
6. Determination of vapor pressure and relative humidity
7. Determination of dew point temperature
8. Measurement of atmospheric pressure and analysis of atmospheric conditions
9. Measurement of wind speed and wind direction, preparation of windrose
10. Measurement, tabulation and analysis of rain
11. Measurement of open pan evaporation and evapotranspiration
12. Computation of PET and AET
13. Use of synoptic charts and weather reports
14. weather forecasting-types and methods
15. Concept of crop weather calendar
16. Visit to nearby advanced agrometeorological center

RESOURCES

TEXT BOOKS:

1. Agricultural Meteorology by G.S.L.H.V. Prasado Rao

2. Fundamentals of Agrometeorology and Climate Change by G. S. Mahi and P. K. Kingra

REFERENCE BOOKS:

1. Introduction to Agrometeorology and Climate Change by Alok Kumar Patra
2. Introduction to Agrometeorology by H. S. Mavi
3. Text Book of Agricultural Meteorology by M. C.Varshneya and P.B. Pillai

VIDEO LECTURES:

1. Lecture-1 Meteorology and agro-meteorology useful for #icar #afo #iffco #nabard
2. Agricultural Meteorology and Climatology

WEB RESOURCES:

1. https://agrifair.in/wp-content/uploads/2021/01/Introductory-Agrometeorology-and-Climate-Change.pdf
2. https://elearning.icar.gov.in/DisplayUG_ECoursesContent.aspx?CourseCode=bEElDVL0bZZqx!YBDnUBxA==

Course Code	Course Title	L	T	P	S	C
24CPHY101	**FUNDAMENTALS OF CROP PHYSIOLOGY 3(2+1)**	2	-	1		3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the
To explain about the basic physiological process of plant viz. plant cell and water relations, mineral nutrition, carbon metabolism, reproductive physiology and plant growth and development.

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

CO7. Understand the physiological mechanisms underlying plant water uptake, transport, and loss and also evaluate the impact of water stress on plant growth, development, and productivity.

CO8. Comprehend the essential role of minerals in plant growth, metabolism, and overall health and also analyze the mechanisms of mineral uptake, translocation, and utilization within plants.

CO9. Understand the biochemical processes of photosynthesis and respiration and their significance in plant metabolism.

CO10. Comprehend the diverse roles and regulatory functions of plant growth hormones in various physiological processes.

CO11. Comprehend the diverse roles of minor growth hormones and their application

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

CO-PO-PSO Mapping Table:

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

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

COURSE CONTENT

Module 1: Plant Water Relationshi ***(06 Periods)***

Definitions of plant physiology and crop physiology; Importance of crop physiology; Relationship of crop physiology with other branches of crop science; Diffusion and osmosis; Physiological roles of water to crop plants; Definition of water potential and components of water potential; Water absorption by plants: Concept of active and passive absorption; Water loss by plants: Types of water loss: transpiration, stomatal physiology and guttation; Water use efficiency

Module 2: Mineral Nutrition of Plants ***(08 Periods)***

Essential and beneficial elements; Passive and active transport of mineral element; Functions of essential elements; Criteria of essentiality of nutrients; Correction measures for nutrient deficiency symptoms; Foliar nutrition and root feeding – significance; Aeroponics Imbibition; Field capacity, permanent wilting point and available soil moisture; Apoplast, symplast and transmembrane, Ascent of sap – theories and mechanism; Soil-plant-atmospheric continuum. Significance of transpiration. Stomatal opening and closing mechanisms. Definition of Cavitation and embolism. Antitranspirants - types and examples. Hydroponics and sand culture

Module 3: Photosynthesis and Respiration ***(06 Periods)***

e. Overview of plant cell - organelle and their functions. Brief outline of: Photosynthetic apparatus, pigment system, quantum requirement and quantum yield; Structure of chloroplast, Examples of different photosynthetic pigments (chlorophyll, carotenoids, phycobilins etc.), Difference between chlorophyll a and chlorophyll b, Structure of chlorophyll a and chlorophyll b, Short discussion on quantum requirement and quantum yield, Red drop and Emerson enhancement effect, Pigment system I and II. Introduction to light reaction of photosynthesis, Light absorption by photosynthetic pigments and transfer of energy. Source of O2 during photosynthesis: Hill reaction; Brief introduction to cyclic and non-cyclic photo-phosphorylation: production of assimilatory powers; Introduction to C3 , C4 and CAM pathways: Calvin Cycle, Hatch and Slack Cycle, CAM Cycle; Significance of these pathways (concept of photorespiration, absence of photorespiration in C4 plant: Productivity of C4 plant, CAM: an adaptive mechanism); Factors affecting photosynthesis (light, temperature, CO2 , O2 etc.).

Module 4: Growth and Growth Hormones ***(08 Periods)***

Outline of the process of respiration: Definition and importance, Glycolysis, Kreb Cycle and ETC, Factors affecting respiration (O2 , temperature, CO2 etc.). Terminologies / Definitions: Growth, Development and Differentiation. Measurement of plant growth (fresh weight, dry weight, linear dimension, area etc.). Introduction to CGR, RGR, NAR etc. Photoperiodism: Photoperiodic Classification of plants: Short Day Plant, Long Day Plant, Day Neutral plant etc. Introduction to Photoperiodic induction site of photo-inductive perception, Role of Phytochrome Introduction to Vernalization (What is vernalization, devernalization etc.), Meaning, classification (seasonal, sequential etc), relation with abscission.

Module 5: Minor growth hormones and Application ***(04 Periods)***

Physiological and biochemical changes during senescence, Abscission and its significance, Concept of stay green, Hormonal regulation of senescence. Terminologies / Definitions: Plant hormone, Plant growth regulators (PGR), Plant growth inhibitor. Recognized classes of PGR (Auxins, Gibberellins, Cytokinins, Ethylene and Abscisic acid) and their major physiological roles, Agricultural uses of PGRs (IBA, NAA, 2, 4 –D, GAs, Kinetin etc).

Total Periods: **32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study on structure and distribution of stomata
2. Demonstration of imbibition, osmosis, plasmolysis,
3. estimation of water potential
4. estimation of relative water content
5. Tissue test for mineral nutrients
6. identification of nutrient deficiency and toxicity symptoms in plan
7. Identification of nutrients by hydroponics
8. Estimation of photosynthetic pigments,
9. Estimation of rate of photosynthesis in plant by IRGA
10. Study of respiration in plant
11. Study of transpiration in plant
12. Plant growth analysis
13. Study on senescence and abscission
14. hormonal regulation of senescence
15. Demonstration of the effects of different PGRs on plants
16. Leaf anatomy of C3 and C4 plants.

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VIDEO LECTURES:

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

WEB RESOURCES:

1. http://www.plantphys.org
2. http://6e.plantphys.net

Course Code	Course Title	L	T	P	S	C
24ENTM102	PEST MANAGEMENT IN CROPS AND STORED GRAINS 3 (2+1)	2	-	1		3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To study Diagnosis and management of major insect and non- insect pests of crops in field and storage

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

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

COURSE CONTENT

Module 1: Arthropod Pests of Field Crops ***(10 Periods)***

General description on nature and type of damage by different arthropod pests; Scientific name, order, family, host range, distribution, biology and bionomics; Nature of damage and management of major insect pests of various field crops.

Module 2: Arthropod Pests of Vegetable and Fruit Crops ***(10 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 vegetable crops and fruit crops.

Module 3: Nature of Damage ***(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 various plantation crops, ornamental crops, spices and condiments.

Module 4: stored Grain Protection ***(04 Periods)***

Structural entomology and important household pests, their nature of damage and management.

Factors affecting loss of storedgrains. Insect pests, mites, rodents, birds and microorganisms associated with stored grains and their management. Storage structures and methods of grain storage and fundamental principles of stored grains management. Management of non-insect pest of mites, snails and slugs,

Module 5: integrated Pest Management ***(03 Periods)***

Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides, Biorational pesticides including insect repellents, antifeedants, Use of drones and AI in pest management,

Total Periods:**32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Field visit, identification of major insect pests and their damage symptoms
2. Collection and preservation of major insect pests
3. Collection of damage samples, their identification and herbarium preparation
4. Methods of monitoring of pest incidence *in situ*
5. Management strategies of insect pests of different crops
6. Identification of insect pests and mites associated with stored grain
7. Study on structural entomology and household pests
8. Storage structures and methods of grain storage
9. Spraying techniques for selected field and horticultural crops
10. Management strategies for insect
11. Vertebrate pest management
12. Mass multiplication of NPV, Entomopathogenic nematodes
13. Determination of insect infestation by different methods.
14. Assessment of losses in stored grain due to insect pests
15. Calculations on the doses of insecticides application technique
16. Visit to nearest FCI/CWC/SWC/Indian Storage Management and Research Institute, Hapur and Quality Laboratory, Department of Food., Delhi

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

1. Dennis S Hill 1987 Agricultural Insect Pests of tropics and their control, Cambridge Universtiy Press , New York
2. Upadhyaya K.P. and Kusum Dwivedi. 1996. A Text Book of Plant Nematology. Aman Publishing House, Meerut.
3. Khare, S.P. 1993. Stored Grain Pests and their Management. Kalyani Publishers,

Ludhiana.

VIDEO LECTURES:

1. https://www.youtibe.com/watch?v=RKaGz5IK0AE
2. https://www.youtube.com/watch?v=yRa603A-qsM

WEB RESOURCES:

1. https://ecourses.icar.gov.in
2. https://www.agritech.tnau.ac.in/index.html

Course Code	Course Title	L	T	P	S	C
24GPBR103	**CROP IMPROVEMENT(KHARIF CROP) 2(1+1)**	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To provide knowledge about Self-pollinated and cross pollinated Kharif crops learn about origin and distribution of Kharif crops.Design breeding objectives of major kharif crops impart information on different crop varieties for Kharif season

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

CO1. Recall and explain the differences between self-pollinated and cross-pollinated Kharif crops, including their breeding systems and ecological significance.

CO2. Describe the origin, distribution, and ecological factors influencing the cultivation of key Kharif crops.

CO3. Apply knowledge of breeding objectives to design breeding programs aimed at improving crop traits such as yield, pest resistance, and environmental adaptability..

CO4. Analyze and assess the potential of different Kharif crop varieties in relation to crop improvement goals such as increased yield, pest resistance, and climate adaptability. Evaluate the effectiveness of breeding techniques in enhancing these traits and their impact on the sustainable improvement of Kharif crops.

CO5. Critically evaluate the potential impact of breeding objectives on crop improvement and assess the effectiveness of various Kharif crop varieties in different regions.

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	-	-	-	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 Plant Genetic Resources ***(04 Periods)***

Centers of Origin: The concept of centers of origin as proposed by Nikolai Vavilov and their significance in crop improvement.Importance in Crop Breeding,Case Studies: Centers of origin for key Kharif crops such as maize, rice, and sorghum.wild relatives in crop improvement and their genetic potential, Utilization of Wild Relatives: Global and Indian Context: Major regions for the cultivation of key Kharif crops

Module 2: Genetic Characterization of Kharif Crops ***(04 Periods)***

Definition and importance of genetic resources in sustainable crop production. Role of genetic resources in enhancing yield, stress tolerance, and quality of crops. Methods for conserving genetic resources, including gene banks and on-farm conservation.Qualitative Traits: Traits controlled by a single gene, such as seed color, disease resistance.Quantitative Traits: Traits controlled by multiple genes, such as yield, height, and drought resistance.Techniques for studying genetic variation and heritability in Kharif crops.Breeding Strategies: Conventional breeding methods like selection, hybridization, and mutation breeding for improving qualitative and quantitative traits.Example in Kharif Crops: Breeding for drought resistance in sorghum or disease resistance in maize.

Module 3: Breeding Self-Pollinated, Cross-Pollinated, and Vegetatively Propagated Crops ***(04 Periods)***

Self-Pollination Mechanism: Characteristics of self-pollinated crops and their implications for breeding, Breeding Methods: Pure-line selection, mass selection, and pedigree selection. Examples: Self-pollinated Kharif crops like wheat, rice, and soybean. Cross-Pollination Mechanism: Characteristics and benefits of cross-pollinated crops, including higher genetic diversity. Hybridization Techniques: Controlled pollination, hybrid vigor, and the development of hybrids. Examples: Maize, sorghum, and cotton. Vegetative Propagation: Importance in Kharif crops like potato, sweet potato, and sugarcane.Breeding Strategies: Clonal selection and vegetative propagation for improving traits like size, quality, and pest resistance.Example Crops: Techniques used for improving vegetatively propagated crops.

Module 4: Crop Improvement for Kharif Crops ***(02 Periods)***

Crop Improvement for Yield and Stress Tolerance, Improvement Goals: Focusing on improving yield potential, abiotic stress tolerance (drought, heat), and biotic stress resistance (pests, diseases).Quality Enhancement: Breeding for improved nutritional quality, taste, and marketability of Kharif crops.Examples: Breeding for higher yield in rice, disease resistance in maize, and drought tolerance in sorghum..Conventional Crop Improvement ApproachesMethods: Selection, hybridization, mutation breeding, and polyploidy.Case Studies: Successful examples in Kharif crops like hybrid varieties of maize and sorghum.Challenges: Limitations of conventional breeding, including time-consuming processes and difficulty in improving complex traits.Modern and Innovative Crop Improvement TechniquesBiotechnological Approaches: Marker-assisted selection (MAS), gene editing (CRISPR), and transgenic crops.Climate Resilient Varieties: Breeding crops that can withstand changing climates and extreme weather events.

Module 5: Future of Crop Improvement in Kharif Crops ***(02 Periods)***

Ideotype Concept in Crop Improvement,Definition and Application: Developing an ideal plant type (ideotype) suited for specific environments or agricultural practices.Examples in Kharif Crops: Ideotypes for high yield, disease resistance, and abiotic stress tolerance.Challenges and Opportunities: Adapting the ideotype concept to modern breeding programs.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Botany of Kharif Crops
2. Floral Biology of Self-Pollinated Crops
3. Floral Biology of Cross-Pollinated Crops

4. Emasculation and Hybridization Techniques in Rice
5. Emasculation and Hybridization Techniques in Maize
6. Hybridization Techniques in Pulses
7. Hybridization Techniques in Oilseeds
8. Hybridization Techniques in Vegetable Crops
9. Maintenance Breeding of Kharif Crops
10. Handling Germplasm
11. Field Techniques for Seed Production
12. Hybrid Seed Production in Maize and Sorghum
13. Estimation of Heterosis and Inbreeding Depression
14. Layout of Field Experiments
15. Study of Quality Characters in Kharif Crops
16. Visit to Breeding and Seed Production Plots

RESOURCES

TEXT BOOKS:

1. Breeding field crops -I by V.L. Chopra
2. Genetic improvement of field crops by C.B. Singh and D. Khare
3. Genetics and Breeding of Pulse crops by D.P. Singh

REFERENCE BOOKS:

1. Vegetable breeding – Principles and Practices by Hari Har Ram
2. Plant Breeding –theory and practice by S.K. Gupt
3. Practical manuals on Crop Improvement I (Kharif crops) by Rajendra Kumar Yadav

VIDEO LECTURES:

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

WEB RESOURCES:

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

Course Code	Course Title	L	T	P	S	C
24HORT104	ORNAMENTAL CROPS ,MAP'S AND LANDSCAPING 2(1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the. To educate in detail about origin, area, climate, soil, improved varieties production technology of flowers and MAPs educate about concept, designing principles and components of landscaping educate about the physiological disorders of commercial flowers educate about the post-harvest management and value addition in flower

MAP 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, landscaping, Carpet bedding, Topiary, Bonsai, Lawn.

CO2. To create awareness about Importance and scope of ornamental crops, medicinal and aromatic plants, and landscaping. Principles of landscaping.

CO3. To gain knowledge Cultivation of important flowers and their cultivation

CO4. To construct idea regarding knowledge on Cultivation of major medicinal and aromatic plants.

CO5. To study of processing and value addition in ornamental crops and MAPs produce.

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	-	2	-	-	-	-	-	3	-	-		-
CO3	3	3	-	3	-	-	-	-	-	3	-	-		-
CO4	3	3	-	2	-	-	-	-	-	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: Importance and scope ***(04 Periods)***

Importance and scope of ornamental crops, medicinal and aromatic plants, and landscaping. Principles of landscaping. Brief concept of Home landscaping, Carpet bedding,Topiary, Bonsai, Lawn, flower arrangement, Herbaceous Border, Hedge, Edge etc

Module 2: Production technology of flower ***(04 Periods)***

Production technology of rose, gerbera and orchids, gladiolus, tuberose and lilium chrysanthemum and carnation, marigold and jasmine

Module 3: Production technology of medicinal plants ***(04Periods)***

Production technology of ashwagandha, costus, Isabgol, aloe and ocimum, Coleus, Glorylily, Periwinkle

Module 4: Crop production techniques of aromatic plant ***(02Periods)***

Production technology of plants like geranium, mint, lemongrass, citronella, vetiver and palmarosa

Module 5: Processing and value addition ***(02 Periods)***

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. Propagation of MAP
4. Bed preparation and planting of MAP
5. Nursery bed preparation
6. Sowing of seasonal flower seeds
7. Propagation of ornamental plants by terminal/herbaceous cuttings
8. Correlation Levels: 3: High 2: Medium 1: Low
9. Propagation of Anthurium and orchids
10. Propagation of bougainvillea;
11. Planting of gerbera suckers
12. Gladiolus corms
13. Establishment and maintenance of lawn
14. Planning and layout of garden
15. Training and pruning of ornamental plants
16. Raising of hedge and edge

RESOURCES

TEXT BOOKS:

1. Chattopadhyay, S.K. 2007.Commercial Floriculture. Gene-Tech Books, New Delhi

2. Srivastava, H.C.2014. Medicinal and Aromatic Plants. ICAR, New Delhi.

3. Kumar, N., Abdul Khader, J.B.M, Rangaswamy, P and Irulappan, I. 2004. Introduction to Spices, Plantation Crops, Medicinal and Aromatic Crops. Oxford and IBH publishing Co, New Delhi

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=CC-rBOPbS00
2. https://www.youtube.com/watch?v=lB3UCE9TmZw
3. https://www.youtube.com/watch?v=Gu8WkUe_n_w
4. https://www.youtube.com/watch?v=doqPC5SGinU

WEB RESOURCES:

1. https://coabnau.in/uploads/1644384426_Hort4.4Theorynotes.pdf
2. https://courseware.cutm.ac.in/courses/production-technology-for-ornamental-crops-maps-and-landscaping/

Course Code	Course Title	L	T	P	S	C
24AGRN107	WEED MANAGEMENT 2 (1+1	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the
To teach students about principles of weed science impart practical knowledge of weed management in field and horticultural crop

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

CO1. Identify different types and classification of weeds and also able to understand beneficial and harmful impact of weeds on the ecosystem.

CO2. To Understand and Apply Weed Management strategies in different farming systems

CO3. To understand different properties of herbicides and their role in modern weed managementincluding precision weed management

CO4. Understand the modes of action, selectivity mechanisms, and the practical application of herbicide mixtures in sustainable weed management

CO5. To understand the concept of herbicide resistance and also weed management in different cropping systems

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

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

COURSE CONTENT

Module 1: Introduction, classification and characterization of weeds ***(03 Periods)***

Introduction to weeds, characteristics of weeds, their harmful and beneficial effects on ecosystem. Classification, reproduction and dissemination of weeds, crop-weed completion, factors of competition, factors affecting growth and development

Module 2: Concepts of weed management ***(04 Periods)***

Studies on weed seed bank, weed shifts. Concepts of weed management: physical, cultural, chemical and biological; principles and methods, integrated weed management. Implements for weed control, robotic weed control, weed management in organic/ natural farming

Module 3: Properties of herbicide and precision weed ***(03 Periods)***

management

Herbicide classification and properties of important herbicides, concept of adjuvants, surfactants, herbicide formulation and their use, Nano herbicides, precision weed management

Module 4: Mode of action and compatibility of herbicides, Weed management in different crops ***(06 Periods)***

Mode of action of herbicides and selectivity phenomenon. Concept of herbicide mixture and utility in agriculture, Herbicide compatibility with agro-chemicals and their application

Herbicide resistance and its management. Weed management in different field and horticultural crops; aquatic weed management, weed management in cropping systems

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Techniques of weed preservation
2. weed identification and losses caused by weeds
3. Biology of important weeds
4. Study and identification of weeds in your institutional farm
5. Study weeds in different situations
6. Study of herbicide formulations and mixture of herbicide
7. Study methods of herbicide application
8. Herbicide application equipment- their parts, use, maintenance and calibration
9. Weed control implements
10. Calculation of herbicide doses and requirement
11. weed control efficiency and weed index
12. Phytotoxicity of herbicides
13. Weed management in fallow lands
14. Management of problem and parasitic weeds
15. Study and identification of weeds in nearby SAU/KVK
16. Study and identification of weeds in nearby farmers fields

RESOURCES

TEXT BOOKS:

1. Choudhary ML, Kadam US. 2006. Micro irrigation for Cash Crops, Westville Publishing House.
2. Jat, ML, Sharma SK, Balyan JK, Kothari A K and Jain LK. 2011. Rainfed Farming. Kalyani Publisher, Ludhiana. pp. 324
3. Michael AM. 2012. Irrigation: Theory and Practice. Vikas Publishing House New Delhi.
4. Michael AM and Ojha TP. 2014. Principles of Agricultural Engineering. Vol. II 5th edn. Jain Brothers Publication, New Delhi.

REFERENCE BOOKS:

1. Rajasthan Ki Rajat Bunde.
2. Sadhale Nalini. 2007. Water Harvesting and Conservation in Ancient Agricultural Texts. In: Nene YL. ed. Glimpses of the Agricultural Heritage of India. Asian Agri- History Foundation. pp.414-424.
3. Singh Harpal and Kavia ZD. 2007. Traditional Rainwater Harvesting Methods of Indian Thar Desert. In: Nene YL. ed. Glimpses of the Agricultural Heritage of India. Asian AgriHistory Foundation.pp.432-44
4. Singh, P.K. 2000. Watershed Management: Design and Practices. E-Media Publications, Udaipur

VIDEO LECTURES:

1. Weed identification.... ☺
2. HERBICIDES CLASSIFICATION & APPLICATION - YouTube

WEB RESOURCES:

1. RB-32.pdf
2. DWM Bulltin-78 -2016

Course Code	Course Title	L	T	P	S	C
24AGRN108	INTRODUCTORY AGRO FORESTRY 2 (1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To study Agro forestry as an alternate system of land use study different types of Agro forestry for soil and water conservation. Study the characteristics of Agro forestry in terms its potential for soil moisture conservation practices

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

CO1. Understand the concept of agro forestry and its potential in India and also gain knowledge on multipurpose tree species in india

CO2. Analyze the ecological accepts of agro forestry system and understand tree crop interaction for sustainable of agro forestry systems

CO3. Understand the role of agro forestry in soil in water conservation

CO4. Gain the skills to effectively propagate tree precise implement cultural practices for seedling care and apply sustainable tree species management techniques for forts growth

CO5. Understand the successful establishment and sustainable management of tree species

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

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

COURSE CONTENT

Module 1: AGRO-FORESTRY ***(03 Periods)***

Definition and scope of Agroforestry system, Type of Agroforestry system, potential of Agroforestry in India, Prevailing agroforestry system in India, MPTS- definition, role of MPTS in agroforestry system, its selection for different agroforestry system, MPTS of India, Silviculture: Definition and scope

Module 2: ECOLOGICAL ASPECTS OF AGROFORESTRY SYSTEM ***(03 Periods)***

Agroforestry system, tree -crop interaction – competition, nutrient recycling; Traditional Agroforestry as a viable choice to conserve Agro biodiversity of India. Management of Agro-forestry system

Module 3: ROLE OF AGROFORESTRY IN SOIL AND WATER ***(03 Periods)***

CONSERVATION

Windbreak Shelterbelt– definition, objectives.; Socio- economic aspects of Agroforestry system; Design and Diagnostic study of agroforestry system;

Module 4: PROPAGATION OF TREE SPECIES, MANAGEMENT OF TREE SPECIES ***(07 Periods)***

Regeneration by seed, coppice, root suckers, Transplanting, stump, branch cutting, rhizomes; Nursery bed preparation and management; Cultural practices for bare root and seedling, field handling of nursery stock; Management of tree species;

Silviculture of important tree species, choice of species- site factors, root, crown and bole characteristics, phenology, nutritional and water requirement, ground operation, tending, harvesting utility etc. Horticulture and forage crops-based agroforestry models developed by ICAR-IGFRI; Agroforestry models developed by Indian council of Forestry Research and Education.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Identification of tree species in agro-forestry
2. Tree height measurement by non instrumental method
3. Tree height measurement by instrument method
4. Agro forestry system
5. Study of environmental parameters affecting AF System
6. Plant propagation methods
7. Pre-sowing seed treatment,
8. Preparation of nursery bed exercise,
9. practicing propagation techniques for trees, Afforestation method, practical training, pruning, coppicing, pollarding etc
10. Planting pattern and designs for plantation, natural and artificial regeneration,
11. Design and diagnostic survey of agro forestry system,
12. Evaluation of agro-forestry system in different agro climatic zones,
13. Sliviculture and objectives major and minor products of forest
14. Collection of forest seed and sowing in grow backs
15. Virtual visit of agroforestry models developed by ICAR-IGFRI, ICFRE
16. Exposure Visit to prevailing agroforestry systems of the state and related important institutions,

RESOURCES

TEXT BOOKS:

1. Nair, P.K. R. 1993. An Introduction to Agroforestry, Kluar Academic Publisher
2. Chundawat D. S. and S.K. Gautham. 2017. Textbook of Agroforestry. Oxford & IBH Publishing, (ISBN: 9788120408326)

REFERENCE BOOKS:

1. Parthiban, K. T, N. Krishnakumar and M. Karthick. 2018. Introduction to Forestry, Scientific Publisher, Jodhpur. 350p
2. Divya M. P. and K. T. Parthiban. 2005. A Textbook on Social Forestry and Agroforestry. Satish Serial Publishing, New Delhi (ISBN: 9384988952)

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=1LWlFPYKp6U
2. https://www.youtube.com/watch?v=jLZ0KtNx354

WEB RESOURCES:

1. https://www.cifor-icraf.org/publications/pdf/books/Agroforestry-primer.pdf
2. https://apps.worldagroforestry.org/Units/Library/Books/PDFs/32_An_introduction_to_agroforestry.pdf

B.Sc. Hons. (Agri) – VI Semester

S. No.	Course Code	Course Title	Contact Periods per Week			
			L	T	P	Total
1.	24BIOT101	Fundamentals of Agricultural Biotechnology	2	-	1	3
2.	24STAT103	Basic and Applied Agricultural Statistics	2	-	1	3
3.	24GPBR104	Crop Improvement - II (*Rabi* crops)	1	-	1	2
4.	24AENG102	Renewable energy in Agriculture and Allied Sector	1	-	1	2
5.	24AGRN109	Dryland agriculture/Rainfed agriculture and watershed management	1	-	1	2
6.	24PATH103	Diseases of Horticultural Crops and their Management	1	-	1	2
7.	24PATH104	Agricultural Microbiology and Phyto - remediation	1	-	1	2
8.	24AECO104	Agricultural Finance and Cooperation	1	-	1	2
9.	24BCHE101	Essentials of Plant Biochemistry	2	-	1	3
10.	24GPBR105	Fundamentals of Seed Science & Technology	1	-	1	2
		Total	**13**	**-**	**10**	**23**

B.Sc. Hons. (Agri) – VI Semester

Course Code	Course Title	L	T	P	S	C
24BIOT101	FUNDAMENTALS OF AGRICULTURAL BIOTECHNOLOGY 3(2+1)	2	-	1		3

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

COURSE DESCRIPTION: This course is designed to provide an overview about theTo familiarize the students with the fundamental principles of biotechnology, various developments in biotechnology and its potential applications.

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

CO1. To gain knowledge about the Plant Tissue Culture and Genetic Engineering
CO2. To familiarize with embryo rescue technique and its significance in hybrid development
CO3. To get knowledge on Somatic hybridization (somatic hybrids and cybrids) and its application in crop improvement
CO4. To gain knowledge on DNA structure, structure and function
CO5. Gain the skills on recombinant DNA technology, DNA sequencing, PCR and its applications.
CO6. Work independently or in teams to solve problems with effective molecular tools.

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

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

COURSE CONTENT

Module 1: Introduction to Plant Tissue Culture and Genetic Engineering ***(04 Periods)***

History; Cellular tot potency and cytodifferentiation; Callus culture, Single-cell/suspension culture and their applications

Module 2: Organogenesis and somatic embryogenesis ***(06 Periods)***

Somaclonal variation and its use in crop improvement; Embryo rescue technique and its significance in hybrid development; In vitro fertilization, ovule culture and its significance in hybrid development; Protoplast isolation, culture and regeneration.

Module 3: Somatic hybridization and Micropropagation techniques ***(08 Periods)***

Somatic hybridization (somatic hybrids and cybrids) and its application in crop improvement; Anther and pollen culture for haploid production; Development of disease-free (virus free) plants through apical meristem culture; Micropropagation technique for the generation of quality planting material; Synthetic seeds and its applications; National

certification and Quality management of TC plants-secondary metabolite production- in vitro germplasm conservation.

Module 4: Introduction to Molecular Biology ***06 Periods)***

DNA structure, structure and function; DNA replication, transcription and translation, RNA, types and function; Structure of prokaryotic and eukaryotic gene; Central dogma of life - DNA replication, transcription, genetic codes-translation and protein synthesis; Lac Operon concept - Nucleic acid hybridization; Polymerase chain reaction- DNA sequencing – Sanger method; PCR and its applications.

Module 5: Introduction to recombinant DNA technology ***(08 Periods)***

DNA modifying enzymes and vectors; plant genetic transformation – physical (Gene gun method), chemical (PEG mediated) and Agrobacterium-mediated gene transfer methods; Transgenic and its importance in crop improvement with successful stories; biosafety. Introduction to various molecular markers: RFLP, RAPD, SSR, SNP etc.; Marker-assisted breeding in crop improvement.

Total Periods:**32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction to Plant Tissue Culture Laboratory
2. Good Laboratory Practices
3. Media Preparation and sterilization
4. Glassware sterilization
5. Micropropagation
6. Callus induction and culture
7. Anther culture and Apical meristem culture
8. Preparation of synthetic seeds
9. Isolation of plasmid DNA
10. Quantification of DNA
11. Agarose Gel Electrophoresis and visualization of plasmid DNA
12. Restriction digestion of plasmid DNA and agarose gel electrophoresis
13. Isolation of Plant genomic DNA
14. PCR amplification of DNA
15. Gel electrophoresis of amplified DNA
16. Visit to tissue culture units /biotech labs.

RESOURCES

TEXT BOOKS:

1. Bhojwani SS. 1983. Plant Tissue Culture: Theory and Practice. Elsevier
2. Singh BD. 2007. Biotechnology: Expanding Horiozon. Kalyani
3. Christou P and Klee H. 2004. Handbook of Plant Biotechnology. John Wiley & Sons.

REFERENCE BOOKS:

1. Lewin B. 2008. Gene IX. Peterson Publications/ Panima. W.H. Freeman & Co.
2. Primrose SB. 2001. Molecular Biotechnology. Panima.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=LheBf2UTkCY&list=PL1rNBQjzkmLasrasmswLHiau9XAPKIKVm
2. https://www.youtube.com/watch?v=uy4UsvBl4Pw
3. https://www.youtube.com/watch?v=gADVXSGOnqw
4. https://www.youtube.com/watch?v=EwrYpyCbieA

WEB RESOURCES:

1. https://annamalaiuniversity.ac.in/studport/download/agri/gen/resources/GPB%20316%20PLANT%20BIOTECHNOLOGY%20(2+1)%20-%20Online%20Study%20Material.pdf
2. https://ecourses.icar.gov.in/
3. http://ecoursesonline.iasri.res.in/Courses/Principles%20of%20Plant%20Biotechnology/GPBR311/Start%20to%20read%20the%20Course.html

Course Code	Course Title	L	T	P	S	C
24STAT103	**Basic and Applied Agricultural Statistics**	2	-	1	-	3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview of the fundamentals of agricultural statistics and its applications in agricultural research. The course emphasizes the role of statistics in experimental design, data collection, analysis, and interpretation for decision-making in agriculture. Students will learn descriptive statistics, probability distributions, correlation and regression, analysis of variance, and statistical tests. Special focus will be given to applying these methods to agricultural experiments, yield analysis, crop performance evaluation, and socio-economic data in agriculture.

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

CO1 Understand the fundamental concepts of statistics, types of data, and their role in agricultural research

CO2 Apply descriptive statistics (mean, median, mode, variance, standard deviation, etc.) to summarize agricultural data..

CO3 Use probability distributions and sampling methods to solve problems in agricultural experiments.

CO4 Apply correlation and regression techniques to study relationships among agricultural variables.

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

CO6 Work independently or in teams to design experiments, analyze results, and communicate findings clearly in agricultural research.

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: Introduction to Statistics ***(06 Periods)***

Introduction to Statistics and its Applications in Agriculture. Types of Data. Scales of measurements of Data. Summarization of Data. Classification of Data. Frequency Distribution. Methods of Classification. Definition of Grouped and Ungrouped Data.

Definition of Class Interval (formula for determining the no. of class interval), Width of CI, Class Limits (Boundaries), MidPoints. Types of Frequency Distribution. Diagrammatic Presentation of Data. Bar Diagrams –Simple, Multiple, Sub-divided and Percentage Bar Diagrams. Pie-diagram. Graphical Presentation of Data – Histogram, Frequency Polygon and Ogives..

Module 2: Central Tendency, MEAN, MEDIAN AND MODE (08 Periods)

Measures of Central Tendency. Requisites for an Ideal Measure of Central Tendency. Different Types of Measure. Arithmetic Mean– Definition, Properties, Merits, Demerits and Uses. A.M. (examples) for Grouped and Ungrouped Data. Step-deviation Method. Weighted Mean. Definition of Geometric Mean and Harmonic Mean. Relationship between A.M., G.M. and H.M. MedianDefinition, Merits, Demerits and Uses. Graphical Location of Median. Mode- Definition, Merits, Demerits and Uses. Graphical Location of Mode. Relationship between Mean, Median and Mode

Module 3: Measures of Dispersion, Probability and Standard Deviation ***(08 Periods)***

Measures of Dispersion. Characteristics for an Ideal Measure of Dispersion. Different Types of Measures of Dispersions. Definition of Range, Interquartile Range, Quartile Deviation and Mean Deviation. Standard Deviation- Definition, Properties. S.D. and Variance for Grouped and Ungrouped Data. Variance of Combined Series. Co-efficients of Dispersions. Co-efficient of Variation. Measures of Skewness and Kurtosis. Definition of Symmetrical Distribution. Definition of Skewness, Measures of Skewness. Definition of Kurtosis. Measure of Kurtosis. Relationship between Mean, Median and Mode for Symmetrical and Skewed Distribution. Probability Theory and Normal Distribution. Introduction to Probability. Basic Terminologies. Classical Probability-Definition and Limitations. Empirical Probability- Definition and Limitations. Axiomatic Probability.

Module 4: Correlation and Regression ***(06 Periods)***

Addition and Multiplication Theorem (without proof). Conditional Probability. Independent Events. Simple Problems based on Probability. Definition of Random Variable. Discrete and Continuous Random Variable. Normal Distribution- Definition, Prob. Distribution, Mean and Variance. Assumptions of Normal Distribution. Normal Probability Curve. Correlation and Regression. Definition of Correlation. Scatter Diagram. Karl Pearson's Coefficient of Correlation. Types of Correlation Coefficient. Properties of Correlation Coefficient. Definition of Linear Regression. Regression Equations. Regression Coefficients. Properties of Regression Coefficients. Tests of Significance. Definition. Null and Alternative Hypothesis. Type I and Type II Error. Critical Region and Level of Significance. One Tailed and Two Tailed Tests. Test Statistic. One Sample, Two Sample and Paired t-test with Examples

Module 5: ANOVA and Experimental Designs ***(04 Periods)***

Definition of ANOVA. Assignable and Non assignable Factors. Analysis of One-way Classified Data. Basic Examples of Experimental Designs. Terminologies. Completely Randomized Design (CRD). Sampling Theory. Introduction. Definition of Population, Sample, Parameter and Statistic. Sampling Vs Complete Enumeration. Sampling Methods. Simple Random Sampling with Replacement and without Replacement. Use of Random Number Table.

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:	
	1. Diagrammatic
	2. Graphical representation of data.
	3. Calculation of A.M.,
	4. Calculation of Median
	5. Calculation of Mode

	6.	Calculation of S.D.
	7.	Calculation of C.V. (Ungrouped and Grouped data).
	8.	Correlation
	9.	Regression analysis.
	10.	Application of t-test (one sample)
	11.	Application of t-test (two sample).
	12.	Application of t-test (independent).
	13.	Application of t-test (dependent).
	14.	Analysis of variance one-way classification. CRD
	15.	CRD
	16.	Selection of random sample using simple random sampling

RESOURCES

TEXT BOOKS:

3. Rangaswamy, R. (2015). A Textbook of Agricultural Statistics. New Age International Publishers
4. Panse, V.G. and Sukhatme, P.V. (1985). Statistical Methods for Agricultural Workers*. ICAR, New Delhi.

REFERENCE BOOKS:

4. Anderson, T.W., Sweeney, D.J. and Williams, T.A. (2019). Statistics for Business and Economics. Cengage
5. Freedman, D., Pisani, R. and Purves, R. (2007). Statistics. W\.W. Norton & Company
6. Steel, R.G.D. and Torrie, J.H. (1980). Principles and Procedures of Statistics: A Biometrical Approach*. McGraw Hill

VIDEO LECTURES:

5. https://www.youtube.com/@nptelhrd

6. https://www.youtube.com/@FAOvideo

WEB RESOURCES:

3. https://ecourses.ic
4. https://www.statisticshow

Course Code	Course Title	L	T	P	S	C
24GPBR104	CROP IMPROVEMENT (RABI CROPS)-II 2(1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the.To Techniques and strategies for the improvement of rabi crops, including wheat, barley, mustard, and legumes. It covers breeding methods for both self-pollinated and cross-pollinated crops, focusing on yield enhancement, disease resistance, and quality traits. Students will learn about the application of molecular breeding and selection methods, with an emphasis on sustainable agricultural practices tailored to the rabi season. The course provides a comprehensive understanding of how genetic improvement can address challenges in rabi crop production.

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

CO1. Understand the key principles and methods of crop improvement specific to rabi crops, including the genetic improvement of self-pollinated and cross-pollinated species.

CO2. Apply various breeding techniques such as hybridization, selection methods, and molecular breeding to enhance the yield, resistance, and quality of rabi crops.

CO3. Analyze the impact of environmental factors on the performance of rabi crops and integrate sustainable practices in crop improvement strategies.

CO4. Evaluate the potential of molecular markers in crop improvement and their application in marker-assisted selection for rabi crops.

CO5. Create strategies for the development of high-yielding, disease-resistant, and climate-resilient rabi crop varieties by integrating conventional and modern breeding 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	2	-	-	-	-	-	-	3	-	-		-
CO2	3	3	-	-	-	-	-	-	-	3	-	-		-
CO3	3	3	-	1	-	-	-	-	-	3	-	-		-
CO4	3	2	-	2	-	-	-	-	-	3	-	-		-
CO5	3	1	-	2	-	-			-	3	-	-		-
CO6	-	-	-	-	-	-	3	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 Plant Genetic Resources ***(03 Periods)***

Centers of Origin: The concept of centers of origin as proposed by Nikolai Vavilov and their significance in crop improvement. Importance in Crop Breeding, Case Studies: Centers of origin for key Rabi crops such as wheat, oat, chickpea, rapeseed. Wild relatives in crop improvement and their genetic potential, Utilization of Wild Relatives: Global and Indian Context: Major regions for the cultivation of key Rabi crops

Module 2: Genetics of Qualitative and Quantitative Characters in ***(03 Periods)***

Rabi Crops

The study of both qualitative and quantitative genetic traits in crops. The inheritance patterns of traits such as disease resistance, drought tolerance, and yield, genetic variation influences these traits ,use of genetic principles to improve crop characteristics, the genetic basis of biotic and abiotic stress tolerance.

Module 3: Breeding Self-Pollinated, Cross-Pollinated, and Vegetatively Propagated Crops ***(03 Periods)***

Self-Pollination Mechanism: Characteristics of self-pollinated crops and their implications for breeding, Breeding Methods: Pure-line selection, mass selection, and pedigree selection. Examples: Self-pollinated Rabi crops like wheat, oat, and chick pea. Cross-Pollination Mechanism: Characteristics and benefits of cross-pollinated crops, including higher genetic diversity. Hybridization Techniques: Controlled pollination, hybrid vigor, and the development of hybrids. Examples: wheat, oat, chickpea, rapeseed and mustard. Breeding Strategies: Clonal selection and vegetative propagation for improving traits like size, quality, and pest resistance. Techniques used for improving vegetatively propagated crops.

Module 4: Crop Improvement for Rabi Crops ***04 Periods)***

Crop Improvement for Yield and Stress Tolerance, Improvement Goals: Focusing on improving yield potential, abiotic stress tolerance (drought, heat), and biotic stress resistance (pests, diseases).Quality Enhancement: Breeding for improved nutritional quality, taste, and marketability of Rabi crops. Examples: Breeding for higher yield in Rabi cereals, disease resistance in wheat and chick pea, and drought tolerance in Rabi crops. Conventional Crop Improvement Approaches Methods: Selection, hybridization, mutation breeding, and polyploidy. Case Studies: Successful examples in Rabi crops like hybrid varieties ofwheat and oat.Challenges: Limitations of conventional breeding, including time-consuming processes and difficulty in improving complex traits. Modern and Innovative Crop Improvement Techniques Biotechnological Approaches: Marker-assisted selection (MAS), gene editing (CRISPR), and transgenic crops. Climate Resilient Varieties: Breeding crops that can withstand changing climates and extreme weather events.

Module 5: Future of Crop Improvement in Rabi Crops ***(03 Periods)***

Ideotype Concept in Crop Improvement, Definition and Application: Developing an ideal plant type (ideotype) suited for specific environments or agricultural practices. Examples in Rabi Crops: Ideotypes for high yield, disease resistance, and abiotic stress tolerance. Challenges and Opportunities: Adapting the ideotype concept to modern breeding programs.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Introduction to Botany of Rabi Crops
2. Floral Biology of Rabi Crops: Structure and Function
3. Emasculation Techniques in Wheat and Oat
4. Hybridization Techniques in Rapeseed and Mustard
5. Floral Biology and Hybridization in Pulses
6. Potato Pollination and Hybridization Techniques
7. Hybridization and Seed Production Techniques in Sugarcane
8. Tomato Hybridization and Quality Seed Production
9. Chilli Hybridization and Seed Production Methods
10. Onion Pollination and Hybrid Seed Production Techniques
11. Field Techniques for Seed Production in Rabi Crops
12. Estimation of Heterosis and Inbreeding Depression in Rabi Crops
13. Heritability Studies in Crop Breeding

14. Study of Quality Characters in Rabi Crops
15. Identification of Donor Parents for Desired Traits
16. Visit to Seed Production Plots and AICRP Breeding Sites

RESOURCES

TEXT BOOKS:

1. Chopra, V.L. 1987. Breeding Field Crops – I. Oxford & IBH Publishing Co., New Delhi
2. Singh, C.B. and Khare, D. 2012. Genetic Improvement of Field Crops. Kalyani Publishers, New Delhi.
3. Singh, D.P. 2005. Genetics and Breeding of Pulse Crops. Indian Council of Agricultural Research, New Delhi
4. Ram, H.H. 2003. Vegetable Breeding – Principles and Practices. Kalyani Publishers, New Delhi.G. 2012. Principles of Plant Genetics and Breeding. Wiley-Blackwell, Oxford.

REFERENCE BOOKS:

1. Sleper, D.A. and Poehlman, J.M. 2006. Breeding Field Crops. Blackwell Publishing, Iowa, USA.
2. Gupta, S.K. 2004. Plant Breeding – Theory and Practice. Kalyani Publishers, New Delhi.
3. Poehlman, J.M. and Barthakur, D.N. 2003. Breeding Asian Field Crops. Oxford & IBH Publishing Co., New Delhi
4. Yadav, R.K. 2014. Practical Manuals on Crop Improvement I (Rabi Crops). Agri-Bios, Hisar, India..

VIDEO LECTURES:

1. NPTEL - Crop Improment:https://youtu.be/be5b9Dr_Ckc
2. https://www.youtube.com/playlist?list=PLmVYuxv4mIil1yNrudAoGL1Ilqd2rkAjI- Lecture series developed by Cornell University

WEB RESOURCES:

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

Course Code	Course Title	L	T	P	S	C
24AENG102	**RENEWABLE ENERGY IN AGRICULTURE AND ALLIED SECTOR2(1+1)**	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about theKnowledge about various materials used in renewable energy, emphasize the significance of renewable energy technologies and their applications, and offer practical training in the use of solar thermal technology.

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

CO7. To gain knowledge about classification of energy resources

CO8. To familiarize with bio mass utilization

CO9. To get knowledge on types of bio gas plants and gasifiers

CO10. To create awareness on solar energy collection and their utilisation

CO11. Gain the skills to manage energy consumption efficiently, incorporating renewable sources into an integrated farm energy plan.

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

CO-PO-PSO Mapping Table:

Course Outcomes	Program Outcomes									Program Specific Outcomes				
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	1	-	-	-	-	-	-	-	-	-	3
CO2	2	3	-	2	-	2	-	-	-	-	-	-	-	3
CO3	2	3	-	3	-	-	-	-	-	-	-	-	-	3
CO4	3	3	-	2	-	1	-	-	-	-	-	-	-	3
CO5	3	2	-	-	-	-	-	-	-	-	-	-	-	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: Classification of energy sources ***(04 Periods)***

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

Module 2: Biofuel production and their applications ***(04 Periods)***

Familiarization with biomass utilization for biofuel production and their application. Availability of bio mass and their application in different places.

Module 3: Types of bio gas plants and gasifiers ***(04 Periods)***

Familiarization with types of biogas plants and gasifiers, biogas, bio alcohol, biodiesel and biooil production and their utilization as bioenergy resource,

Module 4: Solar and Wind energy collection and their application ***04 Periods)***

Introduction of solar energy, collection and their application, 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, introduction

of wind energy and their application

Module 5: Bioenergy for Heating and Power ***(04 Periods)***

Using biomass for heating greenhouses, barns, and other farm infrastructure

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Familiarization with renewable energy gadgets
2. To study biogas plants
3. To study gasifier
4. To study the production process of biodiesel
5. To study the briquetting machine
6. To study the production process of bio-fuels
7. Familiarization with different solar energy gadgets
8. To study solar photovoltaic system: solar light
9. To study solar photovoltaic system:solar pumping
10. To study solar photovoltaic system: solar fencing
11. To study the design and working of solar cooker
12. To study solar drying system
13. To study solar distillation
14. To study solar pond
15. To Study the solar wind hybrid system
16. Field visit to solar or wind farm.

RESOURCES

TEXT BOOKS:

1. B.B. Parulekar Rao, S. Energy technology - Non conventional, renewable and conventional, Khanna Publishers, New Delhi, India, 2002.
2. C.S. Solanki. 2011. Solar Photovoltaic – Fundamentals, Technologies and Applications. PHI Learning Pvt. Ltd.
3. S. Sukhatme and J. Nayak. 2008. Solar Energy: Principles of Thermal Collection and Storage. Third Edition (Tata McGraw-Hill).
4. Rai G.D, Solar Energy Utilization, Khanna Publishers, New Delhi, 2005.

REFERENCE BOOKS:

1. Non-Conventional Energy Sources, Rai GD 2001. Khanna publishers, New Delhi
2. John Twidell and Tony Weir, Renewable Energy Resources - (Paperback - 24 Nov 2005).

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=AODqoAhTXJA&list=PLvSukZ-l0KuOcctMi6JKBBZOgrL2iXC71
2. https://www.youtube.com/watch?v=4bVXdVqeJCM&list=PLvSukZ-l0KuOcctMi6JKBBZOgrL2iXC71&index=2
3. https://www.youtube.com/watch?v=Dzrqv08Bltk&list=PLvSukZ-l0KuOcctMi6JKBBZOgrL2iXC71&index=3

4. https://www.youtube.com/watch?v=AODqoAhTXJA&list=PLvSukZ-l0KuOcctMi6JKBBZOgrL2iXC71

WEB RESOURCES:

1. www.agricoop.nic.in/dacdivision/Machinery1/directory.htm
2. http://ecoursesonline.iasri.res.in/course/view.php?id=71
3. http://ecoursesonline.iasri.res.in/course/view.php?id=524
4. www.freesolaronline.com

Course Code	Course Title	L	T	P	S	C
24AGRN109		1	-	1		2

DRYLAND/ RAINFED AGRICULTURE AND WATERSHED MANAGEMENT2(1+1)

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

COURSE DESCRIPTION: This course is designed to provide an overview about the.To learn about characteristics and conditions of dryland/rainfed agriculture gain knowledge about drought and its mitigation impart knowledge on water harvesting and watershed management

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

CO1. Understanding history of rainfed/ylan agriculture
CO2. Remerging sail and climatic condition of dryfield areas
CO3. Formulate water harvesting techniques
CO4. Apply knowledge and management and drought
CO5. Appling skills on constructing model watershed
CO6. Work independently or in teams to solve problems with effective molecular tools.

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	2	-	2	-	-	-	-	-	3	-	-	-	-
CO5	3	3	-	2	-	-	-	-	-	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: DRYLAND/RAINFED AGRICULTURE ***(03 Periods)***

Dryland/Rainfed agriculture: Introduction, types and characteristics; History of dry land/ rainfed agriculture in India; Problems and prospects of dry land/rainfed agriculture in India;

Module 2: CLIMATIC CONDITIONS IN RAINFED AGRICULTURE ***(03 Periods)***

Soil and climatic conditions prevalent in dry land/rainfed areas; Length of Growing Period (LGP) and Soil Moisture Availability (SMA) and its impact on crop and cropping system; Soil and water conservation techniques

Module 3: WATER HARVESTING TECHNIQUES , MANAGEMENT OF DROUGHT ***(06 Periods)***

Water harvesting: importance, its techniques, Efficient utilization of water through soil and crop management practices; Crops and cropping systems in dry land/rainfed areas;

Management of crops in dry land/rainfed areas; Contingent crop planning for aberrant weather conditions; ; Drought: types, effect of water deficit on physio- morphological characteristics of the plants; Crop adaptation and mitigation to drought

Module 4: WATERSHED MANAGEMENT ***(04 Periods)***

Concept, history, objective, principles and components of watershed management, factors affecting watershed management. Log term rainfall analysis in relation to simple mathematical models and forecasting the weather abnormalities; Alternate land use system location; regional and crop specific dryland principles and practices for profitable and sustainable dryland farming and allied enterprises.

Total Periods: **16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Studies on climate classification
2. Studies on rainfall pattern in rainfed areas of the country and pattern of onset and withdrawal of monsoons.
3. Calculation of Length of Growing Period (LGP) and Soil Moisture Availability
4. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed area on map of India.
5. scheduling of supplemental irrigation on the basis of evapo-transpiration demand of crops.
6. Critical analysis of rainfall and possible drought period in the country
7. Effective rainfall and its calculation
8. Studies on cultural practices for mitigating moisture stress including mechanical and agronomic measure
9. Soil moisture determination under different land situations
10. Importance of seed priming to mitigate drought.
11. Assessment of meteorological drought.
12. Characterization and delineation of model watershed
13. Seed treatment
14. Field demonstration on soil and moisture conservation measures.
15. Field demonstration on construction of water harvesting structures.
16. Visit to rainfed research station/watershed

RESOURCES

TEXT BOOKS:

1. A.K. Srivastava and P.K. Tyagi. 2011. Practical Agricultural Meteorology. New Delhi Publishing Agency, New Delhi.
2. D. Lenka. 2006. Climate, Weather and Crops in India. Kalyani Publishers, New Delhi.
3. G.S.L.H.V. Prasad Rao. 2008. Agricultural Meteorology. Prentice Hall of India Pvt. Ltd., New Delhi.

REFERENCE BOOKS:

1. H.S. Mavi. 1994. Introduction to Agrometeorology. Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi.
2. S.R. Reddy. 1999. Principles of Agronomy. Kalyani Publishers, New Delhi.

3. T. Yellamanda Reddy and G.H. Sankara Reddi. 2010. Principles of Agronomy. Kalyani Publishers, New Delhi.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=TRJQXgJf0u4

WEB RESOURCES:

1. AGR-303-Rainfed Agriculture & Watershed Management.pdf - Google Drive
2. Central Research Institute for Dryland Agriculture, Hyderabad. 24 p..pdf

Course Code	Course Title	L	T	P	S	C
24PATH103	DISEASES OF HORTICULTURAL CROPS AND THEIR MANAGEMENT 3(2+1)	2	-	1	-	3
Pre-Requisite	NA					
Anti-Requisite	-					
Co-Requisite	-					

COURSE DESCRIPTION: This course is designed to provide an overview of major diseases of 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 horticultural crops.

CO3 Analyze the impact of host-pathogen interactions on disease development in 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 horticultural crops and suggest disease management measures for various agricultural plants.

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

CO-PO-PSO Mapping Table:

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

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

COURSE CONTENT

Module 1: Symptoms and etiology of Citrus, Guava and Banana (7 Periods)

Symptoms, etiology, disease cycle and management of following diseases: Citrus: canker, gummosis; Guava: wilt, anthracnose; Banana: sigatoka, Panama wilt, bacterial wilt, bunchy top

Module 2: Symptoms and etiology of Papaya, Pomegranate, Apple, Peach, Grapevine and Strawberry (6 Periods)

Papaya: foot rot, leaf curl, mosaic; Pomegranate: bacterial blight; Apple: scab, powdery mildew, fire blight, crown gall: Peach: leaf curl; Grapevine: downy mildew, powdery mildew, anthracnose; Strawberry: leafspot

Module 3: Symptoms and etiology of Coconut, Tea, Coffee, Mango, Potato and Tomato **(8 Periods)**

Coconut: bud rot, Ganoderma wilt; Tea: blister blight; Coffee: rust; Mango: anthracnose, malformation, bacterial blight, powdery mildew; Potato: early and late blight, black scurf, leaf roll, mosaic; Tomato: damping off, wilt, early and late blight, leaf curl, mosaic

Module 4: Symptoms and etiology of Brinjal, Chilli, Cucurbits, Cruciferous vegetables, Beans and Okra **(5 Periods)**

Brinjal: phomopsis blight and fruit rot, sclerotinia blight; Chilli: anthracnose and fruit rot, wilt, leaf curl; Cucurbits: powdery and downy mildew, wilts; Cruciferous vegetables: Alternaria leaf spot, black rot, cauliflower mosaic; Beans: anthracnose, bacterial blight; Okra: yellow vein mosaic

Module 5: Symptoms and etiology of Ginger, Turmeric, Coriander, Rose and Marigold **(6 Periods)**

Ginger: soft rot; Turmeric: leaf Spot; Coriander: stem gall; Rose: dieback, powdery mildew, black leaf spot; Marigold: botrytis blight, leaf spots

Total Periods:32

EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

17. Diseases of potato and Tomato
18. Diseases of Tomato
19. Diseases of pea and Coriander
20. Diseases of Chilli and Turmeric
21. Acquaintance with fungicides
22. Acquaintance with Antibiotics
23. Acquaintance with Biopesticides
24. Field Visit
25. Diseases of Citrus, Guava and Banana
26. Diseases of Apple, Peach, Grapevine and Strawberry
27. Diseases of Cucurbits
28. Diseases of Cruciferous vegetables
29. Diseases of Beans and Okra
30. Diseases of Rose and Marigold
31. Field visit
32. Field visit

RESOURCES / STUDY MATERIALS

B.Sc. (Hons) Agriculture

TEXT BOOKS:

1. Arjunan, G. Karthikeyan, G, Dinakaran, D. and T. Raguchander. 1999. Diseases of horticultural Crops, AE Publications, Coimbatore.
2. Das Gupta M.K. and W.C. Mandel.1989. Post-harvest pathogens of Perishables. Oxford and IBH Publishing Company, New Delhi.
3. Integrated Plant Disease Management By R.C. Sharma
4. Plant Diseases By R.S. Singh
5. Plant Disease Management: Principles and Practices By Hriday Chaube
6. Plant Pathology By G.N. Agrios

Reference Books

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

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

VIDEO LECTURES:

https://www.youtube.com/watch?v=hf-0dIVC9tI&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3
https://www.youtube.com/watch?v=Xrc2UDiM1KU&list=PL9NKTtgDSTn1MeCTCmYrmcpC1LjvEx3o3&index=4

WEB RESOURCES:

1. chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://agritech.tnau.ac.in/pdf/9.pdf
2. http://www.eagri.org/eagri50/PATH371/index.html

Course Code	Course Title	L	T	P	S	C
24PATH104	AGRICULTURAL MICROBIOLOGY AND PHYTO-REMEDIATION 2(1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about theKnowledge on History of Microbiology, Genetic recombination- transformation, conjugation and transduction, genetic engineering, Soil Microbiology, Food Microbiology, Water Microbiology and Industrial Microbiology etc.,

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

CO1. To get an introduction to microbiology with specific focus on its significance in agriculture science

CO2. To get acquainted with the bacterial structure and the function of the different bacterial components

CO3. To get highlights on different fields of microbiology

CO4. To get highlights on the bioremediation of polluted soils using microbial mediators and phytoremediation

CO5. To get a concept of biological control and the role of biopesticides in plant disease management.

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

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

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

COURSE CONTENT

Module 1: Introduction to Microbiology ***(03 Periods)***

: Definition, applied areas of Microbiology and Importance of Microbiology. History of Microbiology: Discovery of microorganisms, spontaneous generation theory, Germ theory of diseases, Immunization, fermentation, and origin of life.

Module 2: Biofuel production and their applications ***(03 Periods)***

Familiarization with biomass utilization for biofuel production and their application. Availability of bio mass and their application in different places.

Module 3: Soil Microbiology ***(03 Periods)***

Bacterial cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination- transformation, conjugation and transduction, genetic engineering.Soil Microbiology: Nutrient mineralization and transformation, Air Microbiology: Phyllosphere microflora, Phylloplane microflora, microflora of floral parts etc,

Module 4: Food Microbiology and Industrial Microbiology ***03 Periods)***

Food Microbiology: Microbial spoilage and principles of food preservations, Food poisoning. Water Microbiology: Types of water, water microorganisms, and microbial analysis of water e.g. coliform test, Purification of water. Industrial Microbiology: Microbial products, Biodegradation, Biogas production, Biodegradable plastics etc,

Module 5: Biological Control ***(04 Periods)***

Biological control: Microbial biopesticides for plant disease management Concepts of rhizosphere microbiology- Rhizodeposits -biochemical nature, release mechanism in rhizosphere, function, Carbon flow in rhizosphere, Rhizosphere microbiome-residents and their roles. Potential of plant growth promoting rhizobacteria (PGPR) and endophytes on soil health and sustainability. Bioremediation of polluted soils using microbial mediators. Phytoremediation of polluted soils.

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of the microscope
2. Acquaintance with laboratory material and equipment
3. Microscopic observation of different groups of microorganisms: moulds (Fungi)
4. Direct staining of bacteria by crystal violet
5. Negative or indirect staining of bacteria by nigrosin
6. Gram staining of bacteria
7. Study of phyllosphere and rhizosphere microflora
8. Measurement of microorganisms
9. Preparation of culture media
10. Isolation and purification of rhizospheric microbes
11. Isolation and purification of N-fixers
12. Isolation and purification of Nutrient solubilizers
13. Isolation and purification of Endophytes.
14. Isolation and purification of Biopesticides
15. Isolation and purification of Biocontrol agents
16. Visit to Biocontrol Lab

RESOURCES

TEXT BOOKS:

1. Pelczar, M.J., Chan, E.C.S. and Kreig, N.R. 2002. Microbiology. 5th Edition, Tata McGraw-Hill, New Delhi.
2. Rangaswami, G. and Bagyaraj, D. J. 2005. Agricultural Microbiology. Prentice-Hall of India Pvt. Ltd., New Delhi.
3. Mukherjee, N. and Ghosh, T. 2004. Agricultural Microbiology. Kalyani Publishers, Calcutta.
4. Dubey, H.C. 2007. A Textbook of Fungi, Bacteria and Viruses. Vikas Publishing House Ltd., New Delhi – 10014.

REFERENCE BOOKS:

1. Salyers, A. A. and Whitt, D. D. 2001. Microbiology: diversity, disease, and the environment. Fitzgerald Science Press, Inc.

2. Prescott, L. M. 2002. Microbiology 5th Edition. McGraw-Hill Inc, US.

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. http://ecoursesonline.iasri.res.in/Courses/Agricultural%20Microbiology/AMBE101/Start%20to%20read%20the%20Course.html
2. http://ecoursesonline.iasri.res.in/Courses/Bsc_Agri_index.html
3. https://microbenotes.com/category/agricultural-microbiology/
4. https://www.rvskvv.net/images/I-Year-II-Sem_Agricultural-Microbiology_ANGRAU_20.04.2020.pdf

Course Code	Course Title	L	T	P	S	C
24AECO104	AGRICULTURAL FINANCE AND COOPERATIO2(1+1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the. To impart knowledge on issues related to lending to priority sector credit management and financial risk management

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

CO1. Understand the basic concepts of Agriculture finance, credit needs in Indian and 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 repots

CO4. Understand the concept of agriculture cooperation and developments of agricultural comparatives, there significance in Indian agriculture and different services provided by agriculture cooperative

CO5. Get knowledge on crop insurance and the potential of the newly launched crop insurance

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

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	2	2	1	3	-	-	-	-	-	-	-	-	3	-
CO6	-	-	-	-	-	-	3	3	-	-	-	-	3	-
Course correlation mapping	3	3	1	3	-	1	3	3	-	-	-	-	3	-

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

COURSE CONTENT

Module 1: Nature and scope of agriculture finance ***(02 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 ***(03 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 ***(03 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 ***04 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

Module 5: Crop Insurance scheme in India ***(04 Periods)***

Crop insurance: its scope, significance and limitations and the potential of the newly launched 'Pradhan Mantri Fasal Bima Yojana' (Prime Minister's Crop Insurance 103 Scheme). Successful cooperative systems in Gujarat (AMUL), Tamil Nadu (Aavin), Karnataka (Nandini), Maharashtra and Punjab

Total Periods:**16**

PRACTICALS/ EXPERIENTIAL 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. Estimation of Credit Requirement of Farm Business – A Case Study
4. Preparation and Analysis of Balance Sheet and Cash Flow Statement – A Case study
5. Preparation and Analysis of Income Statement - A Case Study
6. Exercise on Financial Ration Analysis, Appraisal of Loan Proposals- A Case study
7. Preparation of Repayment Plans
8. Estimation of Undiscounted Methods
9. Estimation of Discounted Methods
10. Preparation of Bankable Projects/Farm Credit Proposals and Appraisal
11. Techno- Economic Parameters for Preparation of Projects for Various Agricultural Products and its Value-Added Products
12. Analysis of Progress and Performance of Cooperatives Using Published Data
13. Analysis of Progress and Performance of Commercial Banks and RRB's Using Published Data
14. Visit to a Commercial Bank, Cooperative Bank/ Cooperative society to acquire first- hand knowledge of their management, schemes and procedures
15. Visit to a District Central Co-operative Bank (DCCB) to study its role, functions and procedures for availing loan- Fixation of Scale of Finance
16. Seminar on Various Topics

RESOURCES

TEXT BOOKS:

1. Gittinger, J.P. 1982. Economic Analysis of Agricultural Projects. The Johns Hopkins Univ. Press.
2. Reddy, S. S. and Ram, P.R. 1996. Agricultural Finance and Management. Oxford & IBH.

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
24BCHE101	**ESSENTIALS OF PLANT BIOCHEMISTRY 3(2+1)**	2	-	1		3

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about the Knowledge to impart the fundamental knowledge on structure and function of cellular components, biomolecules and the biological processes in plants.

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

CO7. To get an introduction and importance, Properties of water, pH and buffer, plant cell and its components.

CO8. To get acquainted bio-moleculesStructure, classification, properties and function of carbohydrates, amino acids, proteins, lipids and nucleic acids.

CO9. To get highlights on different fields Biosynthetic Pathways Photosynthesis, Gluconeogenesis, nitrogen fixation, fatty acid and starch formation.

CO10. To get highlights on the regulation of metabolic pathways.

CO11. To get a concept of secondary metabolites, Terpenoids, Alkaloids, Phenolic and their applications in food and pharmaceutical industries

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

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

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

COURSE CONTENT

Module 1: Introduction to Biochemistry ***(08 Periods)***

Biochemistry – Introduction and importance, Properties of water, pH and buffer, plant cell and its components. Bio-molecules – Structure, classification, properties and function of carbohydrates, amino acids, proteins, lipids and nucleic acids.

Module 2: Vitamins and Enzymes ***(08 Periods)***

Vitamins – physiological and metabolic role. Enzymes: General properties; Classification; Mechanism of action; Michaelis and Menten and Line Weaver Burk equation and plots; Introduction to allosteric enzymes, use of enzymes.

Module 3: Metabolic energy and its generation ***(08 Periods)***

Metabolism – Basic concepts, Glycolysis, Citric acid Cycle, Pentose phosphate pathway, oxidative phosphorylation, Fatty acid oxidation.

Module 4: Biosynthetic Pathways ***04 Periods)***

Photosynthesis, Gluconeogenesis, nitrogen fixation, fatty acid and starch formation. Regulation of metabolic pathways.

Module 5: Secondary metabolites ***(04 Periods)***

Terpenoids, Alkaloids, Phenolic and their applications in food and pharmaceutical industries.

Total Periods:**32**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Preparation of standard solutions and reagents
2. Determination of pH
3. Qualitative tests of carbohydrates and amino acids
4. Quantitative estimation of soluble sugars
5. Quantitative estimation of soluble starch
6. Estimation of protein by Kjeldhal method
7. Estimation of protein by Lowry's method
8. Preparation of mineral solution from ash
9. Estimation of fat by Soxhlet method
10. Determination of acid value
11. Saponification value
12. Saponification of iodine number
13. Estimation of ascorbic acid
14. Qualitativetests of secondary metabolites.
15. Quantitative tests of secondary metabolites.
16. Visit to Biochemistry Laboratory

RESOURCES

TEXT BOOKS:

1. Nelson and Cox. 2008. Lehninger Principles of Biochemistry. Fourth/Fifth edition. Freeman (Can be downloaded)
2. Conn, Stumpf, Bruening and Doi. 2006. Outlines of Biochemistry. Fifth Edition. Wiley
3. Horton, Moran, Rawn, Scrimgeour, Perry. 2011. Principles of Biochemistry. Fifth Edition. Pearson/Prentice Hall (Can be downloaded)
4. Heldt. 2005. Plant Biochemistry. Elsevier (Can be downloaded)

REFERENCE BOOKS:

1. Goodwin and Mercer. 2005. Introduction to Plant Biochemistry. 2nd edition. CBS
2. Rajan Katoch. 2018. Fundamentals Of Plant Biochemistry and Biotechnology. Kalyani Publications.

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=0upJHV-Mv-c

2. https://www.youtube.com/watch?v=UWYUUA7T9E8
3. https://www.youtube.com/watch?v=9UhUEK-1Xh4
4. https://www.youtube.com/watch?v=ANQFd1rcPTg

WEB RESOURCES:

1. http://ecoursesonline.iasri.res.in/course/view.php?id=140
2. https://ecourses.icar.gov.in/e-Leaarningdownload3_new.aspx?Degree_Id=07
3. https://agrimoon.com/fundamentals-of-biochemistry-pdf-book/
4. https://bscagriculture.com/fundamentals-of-plant-biochemistry-and-biotechnology/

Course Code	Course Title	L	T	P	S	C
24GPBR105	FUNDAMENTALS OF SEED SCIENCE AND TECHNOLOGY2 (1 + 1)	1	-	1		2

Pre-Requisite -

Anti-Requisite -

Co-Requisite -

COURSE DESCRIPTION: This course is designed to provide an overview about theTo impart basic and fundamental knowledge on principles and practices seed science and technology impart practical skills on scientific seed production and post-harvest quality management

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

CO1. Students will comprehend the critical role that high-quality seeds play in enhancing agricultural productivity, crop yield, and overall farm sustainability.

CO2. Students will identify and explain the various factors that lead to grain deterioration, including environmental conditions, pests, diseases, and improper storage practices

CO3. Students will learn and apply advanced seed production techniques specific to cereals, pulses, oilseeds, and vegetables, ensuring high-quality seed output for various crops.

CO4. Students will gain insights into the Seed storage and seed certification

CO5. Students will acquire knowledge of the principles underlying seed treatment processes, including the use of chemicals and biological agents, and will understand best practices for seed storage to maintain seed viability and vigor.

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

CO-PO-PSO Mapping Table:

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

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

COURSE CONTENT

Module 1: Seed technology-introduction and importance ***(02 Periods)***

Introduction to seed technology, definition and importance; Seed quality -definition, characters of good quality seed

Module 2: Deterioration and maintenance of genetic purity ***(04 Periods)***

Causes of deterioration of varietal purity and assessment of genetic purity, different classes of seed. Foundation and certified seed production of important cereals, pulses and oilseed, field inspection, importance and procedures

Module 3: Seed production and seed processing ***(04 Periods)***

Post-harvest seed quality management; seed processing procedures, seed drying; Seed treatment, its importance, method of application and seed packing;

Module 4: Seed storage and seed certification ***04 Periods)***

seed storage - general principles, stages and factors affecting seed longevity during

storage; Seed health management during storage. Seed Certification and legislation;

Module 5: Principle of seed act ***(02 Periods)***

Seed Act and Seed Act enforcement, duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983, basics of seed quality testing; New Seed Bill 2019; Seed quality enhancement techniques.

Total Periods: **16**

PRACTICALS/ EXPERIENTIAL LEARNING

LIST OF PRACTICAL (LABORATORY / RESEARCH FARM) EXERCISES:

1. Study of Seed Structure
2. Study of Seed sampling
3. Physical purity analysis
4. Study of seed Moisture determination
5. Study of seed Germination test
6. Seed and seedling vigour test
7. Seed Viability
8. Genetic purity test
9. Grow out test
10. Field inspection
11. Seed health testing using blotter method.
12. Seed health testing using agar plate method
13. Visit to seed production farms
14. Visit to seed testing laboratories.
15. Visit to seed processing plant
16. Genetics purity test :grow out test and electrophoresis

RESOURCES

TEXT BOOKS:

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

REFERENCE BOOKS:

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

VIDEO LECTURES:

1. https://www.youtube.com/watch?v=j6MwsmmYql8&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP
2. https://www.youtube.com/watch?v=AD1PoUJQ_GM&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP&index=2
3. https://www.youtube.com/watch?v=sqR80LdT6UY&list=PLMwQyDnbQLRWkULTTg3wMpi8YK04PnzzP&index=3

WEB RESOURCES:

1. Chromeextension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.rvskvv.net/images/II-Year-II-Sem_Seed-Technology_ANGRAU_20.04.2020.pdf
2. Chromeextension://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.pd