K.R. MANGALAM UNIVERSITY

THE COMPLETE WORLD OF EDUCATION

SCHOOL OF AGRICULTURAL SCIENCES

Programme Handbook

(Programme Structure and Evaluation Scheme)

Bachelor of Science (Hons.) in Agriculture

Programme Code: 82

FOUR YEAR UNDERGRADUATE PROGRAMME

(with effect from 2025-26)

Index

Preface

1. Introduction

School of Agricultural Sciences, K R Mangalam University welcome to the Bachelor of Science in Agriculture, four year degree programme. This handbook is designed to guide you through the academic journey ahead and provide essential information about your course structure, policies, and opportunities during your studies. Agriculture is the backbone of many economies, and with a rapidly growing global population, the demand for innovative, sustainable agricultural practices has never been greater. As a student of agriculture, you are about to embark on a program that will not only deepen your understanding of farming systems but also equip you with the skills and knowledge needed to address pressing issues such as food security, climate change, and sustainable land management. This handbook serves as a roadmap for navigating the various academic, extracurricular, and professional opportunities available throughout your degree. The B.Sc. Agriculture curriculum is designed as per ICAR Vth Dean's Committee Report and to offer a comprehensive understanding of agronomy, horticulture, animal husbandry, soil science, plant breeding, and agricultural economics, among other fields. You will also be encouraged to gain hands-on experience through practical training, internships, and fieldwork, ensuring that your education is both theoretical and practical.It outlines the degree requirements, course descriptions, important policies, and the support systems in place to assist you. We hope this handbook will help you make the most of your time in the program and prepare you to contribute meaningfully to the future of agriculture.

University Vision and Mission

Vision

K.R. Mangalam University aspires to become an internationally recognized institution of higher learning through excellence in inter-disciplinary education, research, and innovation, preparing socially responsible life-long learners contributing to nation building.

Mission

- Foster employability and entrepreneurship through futuristic curriculum and progressive
- pedagogy with cutting-edge technology
- Instill notion of lifelong learning through stimulating research, Outcomes-based education, and innovative thinking
- Integrate global needs and expectations through collaborative programs with premier universities, research centres, industries, and professional bodies.

- Enhance leadership qualities among the youth having understanding of ethical values and environmental realities.

About School

School of Agricultural Sciences at K. R. Mangalam University is fully equipped with the facilities of laboratories and agriculture farms to carry out the Teaching, Practical, and Research work. All the faculty members are well qualified (Ph.D. in their respective fields) and well experienced. The faculty remains in constant touch with various experts in the relevant fields and is willing to experiment with the latest ideas in teaching and research. The School of Agricultural Sciences imparts students' technical knowledge, enhances their practical skill and ability, motivates them to think creatively, and helps them to act independently and make decisions accordingly in all their technical pursuits and other endeavors. It strives to empower its students and faculty members to contribute to the development of society and the Nation.

School Vision and Mission

Vision

To be an internationally recognized Agri-institute for agriculture education, research innovation, and Agri-entrepreneurship.

Mission

- Interdisciplinary approach, innovative pedagogy, stimulating research to foster Agri-based employability and entrepreneurship.
- Integrate global needs and expectations through collaborative programs with premier universities, research centers, industries, and professional bodies within India and abroad for global exposure & real-life work experience.
- Practicing cutting-edge-technologies, tools, techniques, practices, and processes in the field of agriculture
- Developing leadership, ethical values, and sensitivity to the environment.

About the Programme:

The School of Agricultural Sciences on inception in the year 2019 has started the undergraduate degree programme of B.Sc. (Hons.) in Agriculture. It is designed to impart theoretical and practical knowledge and

extension work. The hands-on experience helps to enrich student's skills and competence, as required by the industries and farmers today. Realizing the potential of agricultural industry, rising food demands and in lined requirement of trained human resource, the course of B.Sc. (Hons.) Agriculture has been developed. The School of Agricultural Sciences provides knowledge on a wide array of agricultural sciences and its related areas. Students will gain fundamental skills and knowledge in agriculture and related domains. The programme focuses on developing professional capabilities, skills and competence required in the field of agriculture. The Courses are composed of theory classes and practical in labs as well as on agriculture farms. The students are exposed to farmers' fields and attached with the farmers in the villages and agri-based Industries. Lab's work, site visits, seminars, workshops and educational tours in different Indian Agriculture Universities along with excursion tours are aimed to develop conceptual and analytical abilities of students as well as giving them practical and real time experience. The students are being trained in Agri- based and entrepreneurial skills like Organic farming, Herbal and Medicinal plant cultivation, Protected cultivation, Bee-keeping, Mushroom cultivation and Value-added Fruit and Vegetable Products preparation.

As per the NEP- 2020 recommendations, the Sixth Deans' Committee has incorporated following several new initiatives in the proposed restructured UG curricula.

Classification of level of courses with targeted outcomes

The courses have been classified as per the level of teaching and also based on targeted outcome.

- The 1st year of the UG programme (NHEQF Level 4. 5) include the Foundation courses, introductory courses and skills enhancement courses/training in the chosen area, ability enhancement courses. It is aimed that students will acquire the basic knowledge in respective disciplines and adequate skill in some selected areas, to enable them for employment/ entrepreneurship.
- The 2nd year (NHEQF Level 5) includes the basic core courses and additional skill enhancement in chosen areas/ courses. It is aimed that the students will acquire the higher-level knowledge in respective disciplines and adequate skills in some selected areas, to enable them employment at middle level/ supervisory level or for entrepreneurship.
- The 3rd year includes the advanced core subjects and their practical applications with an objective that the student will have deeper understanding of the subjects and their major application areas.
- The 4th year (NHEQF Level 6) will have specialization/ elective courses and advanced skill enhancement through projects and internship. The student will acquire advanced knowledge and skill in different areas

to meet the higher order requirements of society and industry as well as other prospective employers. It will also enable the graduates to become a job provider rather than a job seeker through establishment of enterprises in concerned fields.

Multiple Entry and Exit

- There is provision of multiple entry and exit at different levels. The students will have the option to exit after the 1st year. He/she must complete 10 weeks of internship (10 credits) after 1st year (2 semesters) to be eligible for award of UG-Certificate.
- The student has another option to exit after the 2nd year. The student must complete another 10 weeks of internship (10 credits) after 2nd year (4 semesters) to be eligible for award of UG-Diploma.
- No exit after 3 years (6 semesters) is recommended considering the professional nature of the courses.
- After four years of study, the student will be awarded a UG degree in concerned discipline.
- The lateral entry at 3rd semester will be for the candidates having UG-certificate or those who have completed Diploma (3 years course after 10th) in recognized HAEIs. The lateral entry in the 5th semester will be for candidates who have completed UG-Diploma.

Programme Outline:

B.Sc. (Hons.) Agriculture undergraduate programme has been carried out as per National Education Policy-2020 guidelines to build among students a strong foundation of knowledge and increased practical exposure to install competence and confidence for application of the professional knowledge coupled with hard and soft skills. New scientific advancements in the field of agriculture have been also given due emphasis with inclusion of courses with contents from such areas.

More emphasis has been given on Skill Enhancement Courses, industry attachments, flexibility in choice of courses via electives offered in fourth year and also through online courses along with provision of project work and internship. Provision of UG-Certificate in Agriculture, UG-Diploma in Agriculture and B.Sc. (Hons) Agriculture degree with internship with amalgamation of multiple exit and entry options as per NEP-2020 is important change in the course curriculum.

The restructuring has been done based on the following NHEQF levels:

- Year 1, Certificate Course, NEP-NHEQF Level 4.5
- Year-2, Diploma Course, NEP-NHEQF Level 5.0

❖ Year 4, B.Sc. (Hons.) NEP-NHEQF Level 6.0

The restructured program for the undergraduate agriculture education with multiple entry and exit options is illustrated in the below-mentioned Figure.

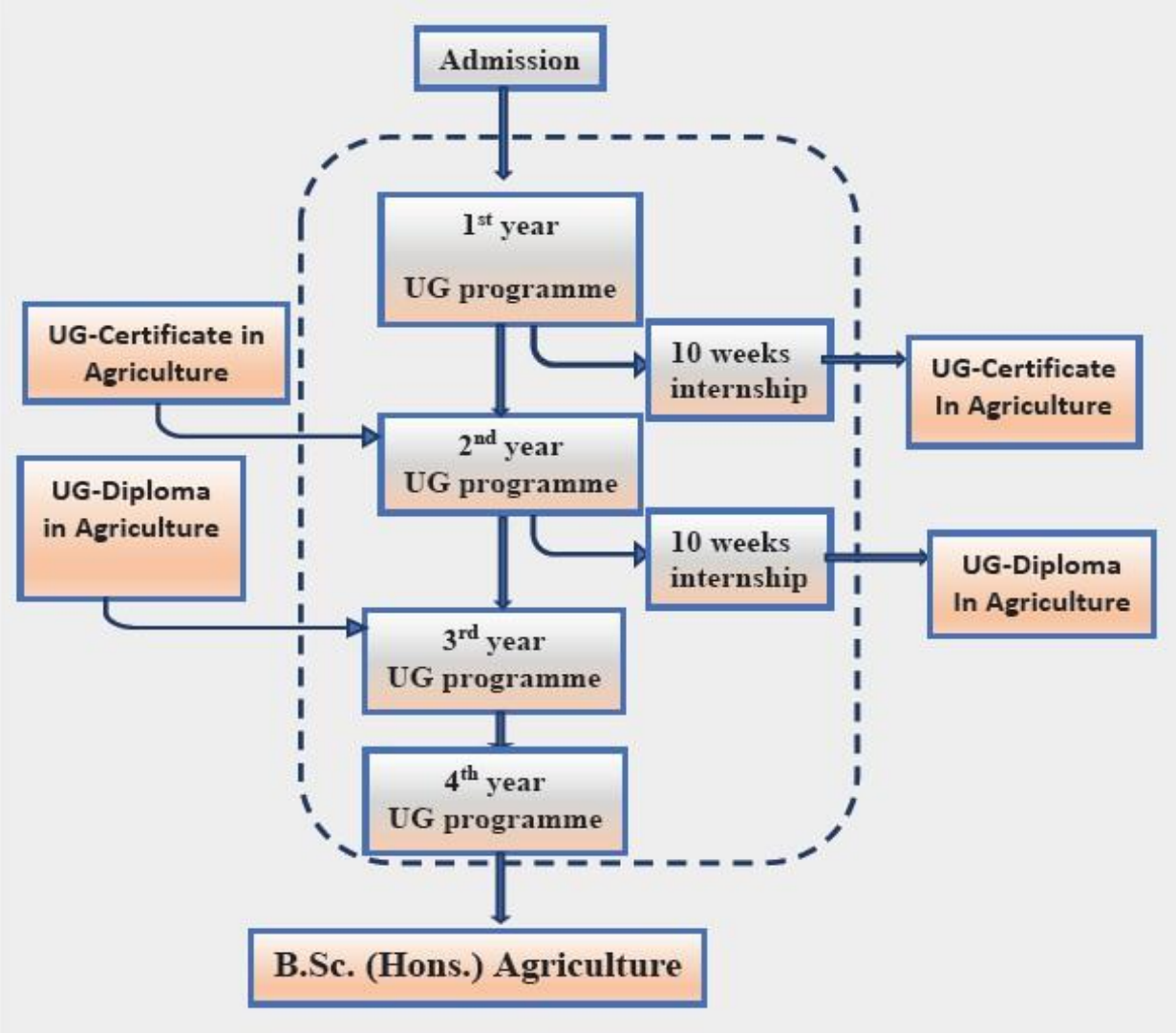

Fig. Entry and Exit options for the UG programme in Agriculture

Program Educational Objectives (PEOs): Programme Educational Objectives of a degree programme are the statements that describe the expected achievements of graduates in their career, and what the graduates are expected to perform and achieve during the first few years after graduation.

PEO 1: Encourage personal growth among students and boost their self-confidence, giving them opportunities to be an integral part of the agro-industry.

PEO 2: Successful agricultural professionals, entrepreneurs, administrators, and agri-industry

PEO 3: Ethical in conduct, good human in respect to good character.

Program Outcomes (PO); Programme Outcomes are statements that describe what the students are expected to know and would be able to do upon graduation. These relate to the skills, knowledge, and behavior that students acquire through the programme.

On completion of B. Sc (Hons.) Agriculture programme, the students will be: -

PO1: Acquiring in-depth knowledge of agriculture and its allied branches to apply packages of practices for crop cultivation.

PO2: Having the ability to solve agricultural problems with creativity.

PO3: Developing abilities to work successfully in a team with all the stakeholders of agricultural sectors.

PO4: Capable of dealing with people and resolving their interpersonal relationship issues.

PO5: Recognizing and meeting emerging challenges in the agriculture of global society in the 21st century and developing leadership and strong linkages in the agro-industrial setup.

PO6: Applying ethical principles, professional ethics, and norms of scientific practices.

PO7: Employing improved scientific know-how for raising the income of farmers with forestry, horticulture, poultry, organic farming, beekeeping, mushroom cultivation, through integrated farming systems, etc. so that the farming community might be contributing to Viksit Bharat.

PO8: Having the ability to design layouts, conduct experiments, analyse and interpret data.

PO9: Having good communication skills.

PO10: To develop critical opinions and approaches to solve the most important practical problems by applying modern technologies.

Programme Specific Outcomes (PSOs): Programme Specific Outcomes define what the students should be able to do at the time of graduation and they are programme specific. There are two to four PSOs for a programme.

On completion of B. Sc (Hons.) Agriculture programme, the students will be: -

PSO1: Understanding the concepts, theories, tools, techniques, models, methods, and principles in the agricultural sciences.

PSO2: Applying concepts/methodologies, theories, tools, techniques, models, and procedures in the packages of practices for sustainable crop cultivation and higher production.

PSO3: Evaluating complex conditions specific to agricultural problems, and conceptualization of agricultural issues.

PSO4 Developing innovative practices, processes, techniques, and technologies to meet the challenges in the

agricultural & farming sectors.

PSO5: Evaluating modern practices and options for agricultural problems solutions.

Career Options:

Government Jobs in the State Department of Agriculture as Agricultural Development Officer, Agriculture Inspector, Horticulture Development Officer, District Horticulture Officer, Soil Conservator, Soil Testing Officer, Plant Protection Inspector, and Plant Protection Officer. Plant Protection Quarantines, National Diary Institutes, and Jobs in the finance sector/institutes like Banks and NABARD as Agriculture Assistant, Agriculture Development Officer, and many more. **Jobs in Corporate sectors such** as Food Corporation of India, State warehouses, fertilizer companies like IFFCO, NFL, National and State, Seed Companies like National Seed Corporation, Haryana Seed Development Corporation, Central State Farms, Indo–Israeli, Precision Farming projects. • Private Seed Companies like MAHYCO and Pioneer Seed Company Pesticide Companies like BAYER, HIL, SYNGENTA, DOW, CYNAMID INDIA LTD, LUPIN and Biotech International PVT Ltd, and many more.

Self-entrepreneurships as a business in agriculture inputs like Fertilizers, Seed, Pesticides, Mushroom cultivation, and high-value fruit crops production like Strawberry cultivation, Poultry, Piggery Farms, and Organic Farming etc., Jobs in National and International Universities/Institutions after PG as Scientist or Professor, Can Appear in all National and state competitive examinations, To excel in all above positions, it requires a high-level skill and competence in respective field, high standard personal grooming and presentation.

Programme Duration:

The minimum period required for the B.Sc. (Hons.) Agriculture programme offered by the university shall extend over a period of four Academic Years, i.e., 8 semesters. The Programme will be considered complete when the candidate has earned the minimum courses and credits required by the programme curriculum.

- Students who exit with a UG- Certificate or UG- Diploma are permitted to re-enter within three academic years and complete the degree programme.
- Students may be permitted to take a break from the study during the period of study but the total duration for completing the programme shall not exceed 7 years.

Eligibility Criteria:

Candidate must have passed 10+2 with 50% marks in PCB/PCM/ Agriculture with English as a compulsory subject from a recognized State/Central Board or Equivalent.

Eligibility Criteria for Award of Degree:

Degree Eligibility: For successful completion of programme, the students should secure a minimum of 168+ 10 (online) credits at the end of the final year of the program.

Student's Structured Learning Experience

- **Education Philosophy and Purpose**:

- **Learn to Earn a Living:**
  At KRMU we believe in equipping students with the skills, knowledge, and qualifications necessary to succeed in the job market and achieve financial stability. All the programmes are tailored to meet industry demands, preparing students to enter specific careers and contributing to economic development.
- **Learn to Live:**
  The University believes in learners' holistic development, fostering critical thinking, creativity, emotional intelligence, and a deeper understanding of the world. Our aim is to nurture well-rounded individuals who can contribute meaningfully to society, lead fulfilling lives, and engage with the complexities of human experience.

- **University Education Objective:** Focus on Employability and Entrepreneurship through Holistic Education using Bloom's Taxonomy

By targeting all levels of Bloom's Taxonomy—remembering, understanding, applying, analyzing, evaluating, and creating—students are equipped with the knowledge, skills, and attitudes necessary for the workforce and entrepreneurial success. At KRMU we emphasize on learners critical thinking, problem-solving, and innovation, ensuring application of theoretical knowledge in practical settings. This approach nurtures adaptability, creativity, and ethical decision-making, enabling graduates to excel in diverse professional environments and to innovate in entrepreneurial endeavours, contributing to economic growth and societal well-being.

- **Importance of Structured Learning Experiences**

A structured learning experience (SLE) is crucial for effective education as it provides a clear and organized framework for acquiring knowledge and skills. By following a well-defined curriculum, teaching-learning methods and assessment strategies, learners can build on prior knowledge systematically, ensuring that foundational concepts are understood before moving on to more complex topics. This approach not only enhances comprehension but also fosters critical thinking by allowing learners to connect ideas and apply them in various contexts. Moreover, a structured learning experience helps in setting clear goals and benchmarks, enabling both educators and students to track progress and make necessary adjustments. Ultimately, it creates a conducive environment for sustained intellectual growth, encouraging learners to achieve their full

potential. At K.R. Mangalam University SLE is designed as rigorous activities that are integrated into the curriculum and provide students with opportunities for learning in two parts:

- Inside classroom teaching emphasizes a student-centric learning approach that prioritizes cognitive outcomes through active learning methods. Techniques such as discussions, presentations, demonstrations, use of web resources, group work, and use of multimedia tools foster engagement and critical thinking. By integrating diverse approaches, faculty members create an interactive environment that enhances understanding and retention of knowledge, preparing students for real-world applications.
- Outside classroom teaching enhances people skills and psychomotor skills through diverse activities in industry in terms of internships and apprenticeships, community outreach and programs, and outdoor and studio activities. Engaging in hands-on experiences, collaborative projects, and studio work fosters teamwork, communication, and practical application of knowledge. This experiential learning approach prepares students for real-world challenges and cultivates essential life skills.

➢ **Educational Planning and Execution: What, when and how learning will happen**

The Bachelor of Science in Agriculture programme is designed around the educational philosophy of "Learn to Earn Living" and "Learn to Live," providing a holistic learning experience from entry to exit.

Educational planning and execution in the B.Sc. (Hons.) Agriculture program centers on the philosophies of "Learn to Earn Living" and "Learn to Live," fostering a holistic educational experience. At the beginning of each academic year, a comprehensive academic and event calendar is developed, outlining key activities and milestones for the semesters ahead. Faculty members are selected based on their expertise and alignment with course objectives, ensuring high-quality instruction. As the academic year unfolds, the planned curriculum is executed with attention to engagement and skill development. Continuous monitoring and review processes are implemented to assess student progress and the effectiveness of teaching methods. Following these evaluations, necessary corrections are identified and made, promoting adaptive learning. This iterative process of planning, execution, review, and improvement enhances both academic experience and personal growth, preparing students for the challenges of the agriculture sector while instilling lifelong learning principles.

Co-Curricular and Extra-Curricular Activities

Students actively participate in 13 clubs and societies within the university, ranging from media production to cultural expression. These clubs facilitate peer interaction, teamwork, and leadership opportunities, helping students develop a well-rounded personality. Regular industry visits, guest lectures, and workshops by industry experts ensure that students remain connected to real-world media practices, bridging the gap between academic learning and professional expectations.

Community Connect

Community connects programmes enhance students' social awareness and responsibility, allowing them to engage with various societal issues. Participation in sports and cultural activities further contributes to a balanced lifestyle, promoting teamwork and resilience.

Ethics and Values

The programme places a strong emphasis on ethics, values, and a code of conduct. Students are encouraged to embody professionalism and integrity in their work, preparing them to be responsible communicators and active citizens.

Career Counselling and Entrepreneurship

Career counselling services provide guidance on job placements, internships, and skill development, helping students navigate their career paths. Additionally, the university's incubation centre fosters entrepreneurial and leadership qualities, encouraging students to explore innovative ideas and start their ventures.

- **Course Registration**
  - Core, Electives, and Allied Sciences Selection – Every student has to register at the beginning of each semester for the courses offered in the given semester. Core and allied sciences courses (as per mentioned ICAR Vth Dean's Committee Report) are registered centrally for the students. However, for elective courses the students must register by themselves through ERP.
  - Internships/Projects/Dissertations/Apprenticeships – Students will use to do summer internship, duration being 4-6 weeks per internship, during the summer breaks. In the seventh and eighth semesters students will do RAWE& AIA and ELP Projects. Projects are also mapped along with the Lab/ Practical Courses and Experiential Learning Activities.
  - **Co-curricular / Extracurricular activities:** The School proactively organizes numerous co-curricular activities with a 360-degree exposure to various trends, helping to build diverse viewpoints. Participative Learning is inculcated through organising various co-curricular activities such as, guest lectures, webinars, seminars, Inter and Intra University competitions. Group discussions on social, national, and global issues. The university has 13 student lead societies/clubs like E-Yantra, Computer Society of India, Investment Club, Management Society, Mediaverse, Chetna Club, Model United Nations Club, DIA, Rhetoric Club, Cultural, Entrepreneurship, Sports club and 6 Centres of Excellence. Students are encouraged to become a part of these societies. These societies organize events year-round helping in overall development of the students. The university has sports, music, dance, dramatics, street play, art, photography and sports society to name a few allowing students an opportunity to explore their potential and pursue their interest. Presentations and Guest lectures by eminent and renowned national and international speakers from academia, industry and alumni are also conducted to provide opportunity exchange innovative ideas and for fostering analytical skills.
- Academic Support Services (Differential learning needs): Academic Support Services for Agriculture students are designed to cater to diverse learning needs, ensuring that every student fairs well. These services include:

- Personalized Tutoring: One-on-one sessions with experienced tutors focus on specific areas such as writing, hands-on trainings, field projects, event management, photography, video production, marketing, research projects and others tailored to individual skill levels.
- Workshops and Seminars: Regular workshops/seminars on topics like digital storytelling, production, media ethics, other experiential learning activities and industrial connect help students enhance their practical skills and theoretical understanding.
- Peer Mentoring Programs: Advance learner students mentor the students by becoming team leaders, providing guidance on course components, assignments and projects, fostering a supportive system.
- Accessible Learning Resources: Online platforms offer access to a range of resources, including video lectures, articles, and interactive tools, accommodating different learning styles.
- Production and Outcome based activities: Students are encouraged to get more involved in practical and hands-on based activities to come up with productivity which is showcased and appreciated. This way it gives a boost to the students.
- Diversity and Inclusion Initiatives: Programs aimed at promoting inclusivity ensure that all voices are heard and valued, enriching the learning environment.
- Feedback and Assessment: Continuous feedback mechanisms allow students to receive constructive review of their work, facilitating growth and improvement.

➢ **Student Support Services**

- **Mentor-Mentee:** The Mentor-Mentee Program is an essential component for fostering successful careers as it acts as a bridge between faculty and students. Mentor-mentee relationships often go beyond academic and professional growth at KRMU.
- **Counselling and Wellness Services:** Counselling and Wellness Services for agriculture students are designed to support their mental health and overall well-being in a demanding academic environment. These services include confidential individual counselling sessions, where trained professionals provide guidance on stress management, time management and personal challenges. Group therapy sessions and workshops focus on topics such as resilience, coping strategies and mindfulness, promoting a sense of community and shared experiences. The school conducts sessions on mental health awareness from time to time. Wellness initiatives may include fitness programs, relaxation activities and access to health resources that promote physical and mental health. By creating a supportive environment, these services help students navigate the pressures of their studies while fostering a balanced and healthy lifestyle.
- **Career Services and Training:** The Career Development Center (CDC) at KRMU provides comprehensive career services and training for Agriculture students, focusing on creating ample placement opportunities. In addition to inviting corporate recruiters to campus, the Centre hosts various counselling and training programs aimed at enhancing students' academic and professional skills. These programs equip students

with the essential tools needed to secure lucrative careers in their field. Each year, prominent companies visit the KRMU campus, offering attractive job packages to emerging talent. The faculty members and the mentors also ensure that students are well-prepared for the competitive job market.

- **Assessment and Evaluation**
  - Grading Policies and Procedures for theory courses, practical courses, projects, Internships, Dissertation: As per university examination policy of K R Mangalam University, the Program Outcome assessments is done by aggregating both direct and indirect assessments, typically assigning 80% weightage to direct assessments and 20% to indirect assessments, to compute the final course attainment.
  - **Feedback and Continuous Improvement Mechanisms:** Teaching-learning is driven by outcomes. Assessment strategies and andragogy are aligned to course outcomes. Every CO is assessed using multiple components. The attainment of COs is calculated for every course to know the gaps between the desired and actual outcomes. These gaps are analyzed to understand where does the student lags in terms of learning levels. Thereafter each student's learning levels are ascertained, if found below desirable level, and intervention strategy is affected in the following semester to make necessary corrections. To cater to the diverse learning needs of its student body, K.R. Mangalam University employs a comprehensive assessment framework to identify both slow and advanced learners. Students' learning levels are continually assessed based on their performance at various stages. If a student's performance in internal assessments falls below or equal to 55%, they are categorized as slow learners. Conversely, if a student's performance score in internal assessments is greater than or equal to 80%, they are identified as advanced learners. Such students are encouraged to participate in advanced learning activities. Through periodic evaluations and the utilization of modern management systems, the institution adeptly tracks students' performance across various courses, allowing for targeted interventions and support mechanisms.
  - **Academic Integrity and Ethics:** The School of Agricultural Sciences places a strong emphasis on academic integrity and ethics, fostering a culture of honesty and responsibility among students. Clear guidelines are established to educate students about the importance of plagiarism prevention, proper citation practices, and ethical sourcing in their work. Regular Hands-on Trainings, Kisan Mela, Industrial Visit, Field Projects Extension Activities workshops and seminars are conducted to discuss case studies and real-world scenarios, encouraging critical thinking about ethical dilemmas in journalism and media. Faculty members serve as role models, promoting transparency and accountability in their interactions and evaluations. By instilling these values, the school prepares students to uphold high ethical standards in their professional careers, emphasizing the critical role that integrity plays in the agricultural professional.

Program Total Credits

Batch 2029-29

Type of courses	Credits
Core courses (Major & Minor/s)	112
Common courses (MDC+VAC+AEC)	24
Skill Enhancement Courses (SEC)	12
Internship/ Student READY	20
**MOOCS/SWAYAM	10 (Online Courses)
Total	**168+10**

Credits Allocation Scheme of B.Sc. (Hons.) Agriculture Program

Semester	Core Courses (Major + Minor)	Multi-Disciplinary Course (MDC)	Value Added Course (VAC)	Ability Enhancement Course (AEC)	Skill Enhancement Course (SEC)	Internship/ Project/ Student READY	Total Credits	Non-Gradial	Online Courses/ MOOC
I	**11**	Farming based Livelihood systems **3(2+1)**		NCC/NSS **1(0+1),** Communication Skills **2(1+1)**	**SEC-I 2(0+2) & II 2(0+2)**	**-**	**21**	Deeksharambh 1 Week, Introductory Mathematics **1(1+0),**	**10**
II	**11**		Environmental Studies and Disaster management **3(2+1)**	NCC/NSS **1(0+1),** Personality Development **2(1+1)**	**SEC-III 2(0+2), & IV 2(0+2)**	**-**	**21**		
Post-II Sem.						**Exit Certificate 10 (0+10)**			
III	**14**	Entrepreneurship Development and Business Management **(2+1)**		Physical Education, First Aid and Yoga Practices **2(0+2)**	**SEC-V 2(0+2)**		**21**		
IV	**16**		Agricultural Informatics and Artificial Intelligence **3(2+1)**	**--**	**SEC-VI 2(0+2)**		**21**		

Post-IV Sem						**Exit Diploma 10 (0+10)**			
V	**19**	Agricultural Marketing and Trade **3(2+1)**	-	-	-	-	**22**	Study tour **2(0+2)**	
VI	**21**	-	-	-	-	-	**21**		
VII	**20**	-	-	-	-	-	**20 (EC)**		
VIII	-					READY/ RAWE & AIA **20(0+20)**	**20**		
Total	**112**	**9**	**6**	**8**	**12**	**20**	**168**	**4**	**10**

Course Structure

SOAS	**B.Sc. (Hons.) Agriculture, Course Structure, 2025-29**

SEMESTER-I									**SEMESTER-II**						
SNo	**TYPE OF COURSE**	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**	**TYPE OF COURSE**	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1	NG		Deeksharambh	1 week				SEC-III	As per Table 1 As per Table 1	Skill Enhancement course-III*	0	0	4	2
2	SEC-I	As per Table 1	Skill Enhancement course-I*	0	0	4	2	SEC-IV		Skill Enhancement course-IV*	0	0	4	2
3	SEC-II	As per Table 1	Skill Enhancement course-II*	0	0	4	2	AEC-III	**ACAD Office**	Personality Development	1	0	2	2
4	AEC-I	**ACAD Office**	Communication Skills	1	0	2	2	VAC-I	ASVAES201	Environmental Studies and Disaster Management	2	0	2	3
5	MDC-I	ASAGFB101	Farming based livelihood systems	2	0	2	3	Core	ASAGSS201	Soil Fertility Management	2	0	2	3
6	Core	ASAGRS102	Rural Sociology and Educational Psychology	2	0	0	2	Core	ASAGET202	Fundamentals of Entomology	2	0	2	3

7	Core	ASAG AG103	Fundamentals of Agronomy	2	0	2	3		Core	ASAGLP203	Livestock and Poultry Management	1	0	2	2
8	Core	ASAG SS104	Fundamentals of Soil Science	2	0	2	3		Core	ASAGPP 204	Fundamentals of Plant Pathology	2	0	2	3
9	Core	ASAG HR105	Fundamentals of Horticulture	2	0	2	3		AEC-IV/ COMMUNITY SERVICES	**ACAD Office**	National Service Scheme (NSS-I)/ National Cadet Corps (NCC-I)	0	0	1	1
10	AEC-II/ COMMUNITY SERVICES	**ACAD Office**	National Service Scheme (NSS-I)/ National Cadet Corps (NCC-I)	0	0	2	1		CS001	CS001	Club and Societies	0	0	1	1
11	NG	AGAG MA106 /AGAG BI107	Introductory mathematics / Basic Biology	1	0	0	1								
TOTAL				**11**	**0**	**20**	**21**					**10**		**22**	**22**
										ASAGIN 205	Internship	**0**	**0**	**20**	**10**
										(43+10) Exit Certificate					
Entry															
SEMESTER-III										**SEMESTER-IV**					
1	SEC-V	As per Table 1	Skill Enhancement course-V*	0	0	4	2		SEC-VI	As per Table 1	Skill Enhancement course-VI*	0	0	4	2
2	MDC-II	ASAG ED301	Entrepreneurship Development and Business Communication	2	0	2	3		VAC-II(Workshop Model)	AGVAA I401	Agricultural Informatics and Artificial Intelligence	2	0	2	3
3	AEC-V	**ACAD Office**	Physical Education, First Aid, Yoga Practices and Meditation	0	0	4	2		Core	ASAGP T402	Production Technology of Vegetables and Spices	1	0	2	2
4	Core	ASAG GE302	Principles of Genetics	2	0	2	3		Core	ASAGA E402	Principles of Agricultural Economics and Farm Management	2	0	0	2

5	Core	ASAG CP303	Crop Production Technology-I (Kharif crops)	1	0	4	3		Core	ASAGC P403	Crop Production Technology-II (Rabi Crops)	1	0	4	3
6	Core	ASAG PT304	Production Technology of Fruit and Plantation Crops	1	0	2	2		Core	ASAGF M405	Farm Machinery and Power	1	0	2	2
7	Core	ASAG EE305	Fundamentals of Extension Education	1	0	2	2		Core	ASAGW M406	Water Management	1	0	2	2
8	Core	ASAG NE306	Fundamentals of Nematology	1	0	2	2		Core	ASAGPS 407	Problematic Soils and their management	1	0	2	2
9	Core	ASAG NF307	Principles and Practices of Natural Farming	1	0	2	2		Core	ASAGP B408	Basics of Plant Breeding	2	0	2	3
		TOTAL		**9**	**0**	**24**	**21**					**11**	**0**	**20**	**21**
										ASAGIN 409	Internship	**0**	**0**	**20**	**10**
											(85+10) Exit Diploma				
			Entry												
SEMESTER-V										**SEMESTER-VI**					
1	MDC -III	ASAG AM501	Agricultural Marketing and Trade	2	0	2	3			ASAGA B601	Fundamentals of Agri Biotechnology	2	0	2	3
2	Core	ASAG AM502	Introduction to Agro-meteorology	1	0	2	2			ASAGA S602	Basic and Applied Agril Statistics	2	0	2	3
3	Core	ASAG CP503	Fundamentals of Crop Physiology	2	0	2	3		Core	ASAGCI 603	Crop Improvement (Rabi crops) - II	1	0	2	2
4	Core	ASAG PM504	Pest management in Crops and Stored Grains	2	0	2	3		Core	ASAGR E604	Renewable energy in Agriculture and Allied Sector	1	0	2	2
5	Core	ASAG DF505	Diseases of Field & Horticultural Crops & their Management	2	0	2	3		Core	ASAGD A605	Dryland agriculture/ Rainfed agriculture and watershed management	1	0	2	2
6	Core	ASAG CI506	Crop Improvement (kharif crops) - I	1	0	2	2		Core	ASAGA M606	Agricultural Microbiology and Phyto - remediation	1	0	2	2

	7	Core	ASAG WM507	Weed Management	1	0	2	2		Core	ASAGAF607	Agricultural Finance & Cooperation	1	0	2	2
	8	Core	ASAG OC508	Ornamental Crops, MAPs and Landscaping	1	0	2	2		Core	ASAGPB608	Essentials of Plant Biochemistry	2	0	2	3
	9	Core	ASAG AF509	Introductory Agro Forestry	1	0	2	2		Core	ASAGSS609	Fundamentals of Seed Science & Technology	1	0	2	2
	10	NG		Education Tour	2 Weeks											
	TOTAL				**13**	**0**	**18**	**22**					**12**	**0**	**18**	**21**
	SEMESTER-VII										**SEMESTER-VIII**					
	1	Core (DSEs)	ASAG AB701 to ASAG PH720 (As Per Table-2)	5 Elective Courses out of 20, Each of 4 (3+1) credits	15	0	10	20		Student Rural Entrepreneurship Awareness Development Yojana/ Rural Agricultural Work Experience	ASAGRE801	Student READY/RAWE- General Orientation and training by different faculties/Village attachment/Unit attachment in Univ. / College. KVK/ Research Station attachment, Component-I	0	0	40	20
	2									Internship	ASAGAI802	Agro-Industrial attachment/Plant clinic /Project report preparation, presentation and evaluation, Component-II				
				TOTAL			**0**	**20**					**0**	**0**	**0**	**20**
	Online Courses (MOOCS/SWAYAM, etc.)															**10**
	G. Total															**168 + 10**

Table-1 Skill Enhancement Courses

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	ASAGSE101	Biofertilizer and biopesticide production	0	0	4	2
2	ASAGSE102	Production Technology of Bioagents	0	0	4	2
3	ASAGSE103	Seed Production and Testing Technology	0	0	4	2
4	ASAGSE104	Mushroom Production Technology	0	0	4	2
5	ASAGSE105	Soil, Plant and Water Testing	0	0	4	2
6	ASAGSE106	Post-harvest Processing Technology	0	0	4	2
7	ASAGSE107	Beneficial Insect Farming	0	0	4	2
8	ASAGSE108	Plantation Crop Production and Processing	0	0	4	2
9	ASAGSE109	Poultry Production Technology	0	0	4	2
10	ASAGSE110	Piggery Production Technology	0	0	4	2
11	ASAGSE111	Commercial Horticulture	0	0	4	2
12	ASAGSE112	Floriculture and Landscaping	0	0	4	2
13	ASAGSE113	Food Processing	0	0	4	2
14	ASAGSE114	Agriculture Waste Management	0	0	4	2

15	ASAGSE115	Organic Production Technology	0	0	4	2
16	ASAGSE116	Commercial Sericulture	0	0	4	2
17	ASAGSE117	Video Production	0	0	4	2

Table-2, Discipline Elective Courses

S. No.	COURSE CODE	COURSE TITLE	L	T	P	C
1	ASAGAB701	Agri-Business Management	3	0	2	4
2	ASAGMN702	Management of natural resources	3	0	2	4
3	ASAGAC703	Agrochemicals	3	0	2	4
4	ASAGAJ704	Agricultural Journalism	3	0	2	4
5	ASAGLS705	Landscaping	3	0	2	4
6	ASAGPB706	Commercial Plant breeding	3	0	2	4
7	ASAGFS707	Food safety and standards	3	0	2	4
8	ASAGBN708	Bioformulation and Nano formulation	3	0	2	4
9	ASAGBB709	Biopesticides and Biofertilizers	3	0	2	4
10	ASAGSS710	System Simulation and Agro advisory	3	0	2	4
11	ASAGHH711	Hi-tech Horticulture	3	0	2	4
12	ASAGPC712	Protected cultivation	3	0	2	4
13	ASAGCR713	Climate Resilient Agriculture	3	0	2	4

14	ASAGBC714	Biotechnology of Crop Improvement	3	0	2	4
15	ASAGGI715	Geoinformatics and Remote Sensing, precision farming	3	0	2	4
16	ASAGMP716	Micro-propagation Technologies	3	0	2	4
17	ASAGCS717	Commercial Seed Production	3	0	2	4
18	ASAGOF718	Principles and Practices of Organic Farming/ Conservation Agriculture	3	0	2	4
19	ASAGFS719	Food Science and Nutrition	3	0	2	4
20	ASAGPH720	Post-Harvest Technology and Value Addition	3	0	2	4

B.Sc. (Hons.) Agriculture

Semester-Wise-Syllabi

Semester-I

Course Code	Course Title	L	T	P	C
NG	*Deeksharambh* (Induction-cum-Foundation Programme)	1 Week			
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course: -

CO1: Nurture students by blossoming their hidden potentials to pursue the academic and professional studies in a diligent, honest and responsible manner.

CO2: To develop a sense of integrity with diverse faculties and build linkages with peers, society and community as a whole and lastly be proficient in earning livelihood independently along with sustaining society and nature.

Course Prospective: The *Deeksharambh* course is an orientation program aimed at easing the transition of students into higher education by familiarizing them with the institutional culture, academic environment, and student support systems. It helps in building a strong foundation by fostering interpersonal relationships, emotional well-being, and a sense of belonging. Through interactive sessions, mentorship, and value-based discussions, students gain insights into career planning, ethics, and life skills. The course promotes holistic development by encouraging curiosity, critical thinking, and self-discipline. Deeksharambh plays a vital role in shaping responsible, confident, and motivated learners, ready to engage meaningfully with their academic and social environment.

Course Content

S. No.	Name of Activity
1.	Discussions on operational framework of academic process in the university, as well as interactions with academic and research managers of the University.
2.	Creating awareness on the subject of study and the traditional values, and indigenous cultures along with diverse potentialities both in indigenous and developed scenario.
3.	Interaction with alumni, business leaders, perspective employers, outstanding achievers in related fields and people with inspiring life experiences.
4.	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.

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

Course Code	Course Title	L	T	P	C
AEC	**National Service Scheme (NSS-I) / National Cadet Corps (NCC-I)**	0	0	2	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course: -

CO-1: Understand NSS, its organizational structure and the significance of its symbols and badges.

CO-2: Analyze and guide financial patterns of NSS schemes and effectively maintain activity diaries.

CO-3: Understand the various definitions, profiles, and challenges faced by youth, recognizing their potential as agents of social change and exploring opportunities available through youth programs.

CO-4: Develop skills in mapping community stakeholders, crafting culturally relevant messages, and utilizing effective methods for youth-adult partnership in mobilization efforts.

Course Perspective: The National Service Scheme (NSS-I) course is designed to install the spirit of voluntary service, discipline, and civic responsibility among students. It provides opportunities to engage in community service, develop leadership qualities, and promote social harmony through various outreach activities. The course encourages active participation in rural development, environmental conservation, health awareness, literacy campaigns, and disaster management. By participating in NSS-I, students cultivate empathy, teamwork, and problem-solving abilities while contributing meaningfully to nation-building. The program also enhances personality development and a sense of national integration, making it an essential component of holistic education and socially responsible citizenship.

Course Content
Practical

Introduction and Basic Components of NSS

- Orientation: History, Objectives, Principles, Symbol, Badge; Regular Programs under NSS.
- Organizational structure of NSS, Code of conduct for NSS volunteers, Points to be considered by NSS Volunteers' awareness about Health.
- NSS program activities. Concept of regular activities, Special camping, Day camps, Basis

of adoption of village/slums, Conducting survey, Analysing Guiding financial patterns of scheme, Youth program/schemes of GOI, Coordination with different agencies and maintenance of diary. Understanding youth. Definition, Profile, Categories, Issues and Challenges of youth; and Opportunities for youth who is agent of the social change.

- Community mobilization. Mapping of community stakeholders, Designing the message as per problems and their culture; Identifying methods of mobilization involving youth- adult partnership. Social harmony and National integration.
- Indian history and culture, role of youth in nation building, Conflict resolution and peace building. Volunteerism and Shramdaan. Indian tradition of volunteerism, its need, importance, motivation and constraints; Shaman as part of volunteerism.
- Citizenship, Constitution, and Human rights. Basic features of constitution of India, Fundamental rights and duties, Human rights, Consumer awareness and rights and Right to information. Family and Society. Concept of family, Community (PRIs and other

Course Code	Course Title	L	T	P	C
AEC	Communication Skills	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: In building confidence and speaking confidently.

CO2: Improve communication activities in functional and situational contexts

CO3: Enhance the language skills of reading, writing,

CO4: Understanding the listening and speaking through real-life and professional situations.

Course Perspective: This course aims to enhance students' comprehension and communication abilities in English, with an emphasis on reading, writing, listening, and speaking skills. It focuses on developing proficiency in academic and professional communication, including report writing, presentations, and effective verbal and non-verbal communication. The course also encourages critical thinking, the ability to comprehend technical texts, and the development of formal writing skills essential for the agricultural sector.

Course Contents

Theory

Unit-I

Communication Process: 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.

Unit-II

Linguistic and non- linguistic barriers to communication and reasons behind communication gap/ miscommunication. Basic Communication Skills: Listening, Speaking, Reading and Writing Skills; Precis writing/ Abstracting/ Summarizing; Style of technical communication.

Unit-III

Curriculum vitae/resume writing; Innovative methods to enhance vocabulary, analogy questions; Structural and Functional Grammar: Sentence structure, modifiers, connecting words and verbals; Phrases and clauses.

Unit-IV

Case: subjective case, possessive case, objective case; 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.

Practical

Listening and note taking; Writing skills: precis writing, summarizing and abstracting; Reading and comprehension (written and oral) of general and technical articles; Micro-presentations and Impromptu Presentations: Feedback on presentations; Stage manners: grooming, body language, voice modulation,

speed; Group discussions; Public speaking exercises; Vocabulary building exercises; Interview techniques; Organization of events.

Reference Book

1. Bhaskar,W.W.S. and Prabhu,N.S., English Through Reading, Publisher MacMillan, 1978

Textbooks

2. Business Correspondence and Report Writing" -Sharma, R.C. and Mohan K. Publisher: Tata Mc Graw Hill1994
3. Business Communication-K.K.Sinha
4. Essentials of Business Communication by Marey Ellen Guffey, Publisher: Thompson Press

Course Code	Course Title	L	T	P	C
ASAGFB101	**Farming-based Livelihood Systems**	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, students will be able to: -

CO-1: To aware about agriculture status and farming systems in India.

CO-2: To know the components and enterprises of farming systems.

CO-3: To understand feasibility of different models through case studies.

CO-4: To know about innovative initiatives taken by public and private sector in 21st Century

Course Perspective: The Farming-based Livelihood Systems course offers a comprehensive understanding of sustainable agricultural practices, integrated farming approaches, and rural resource management. It prepares students to enhance farm productivity, diversify income sources, and improve the socio-economic status of farming communities. This course is vital for building resilient, eco-friendly, and economically viable livelihoods in rural and agrarian regions

Course Content:

Theory

Unit-I

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, Definition of farming systems and farming-based livelihood systems.

Unit-II

Prevalent Farming systems in India contributing to livelihood. Types of traditional and modern farming systems. Components of farming system/ farming-based livelihood systems: Crops and cropping systems, Livestock, (Dairy, Piggery, Goatry, Poultry, Duckry etc.), Horticultural crops, Agroforestry systems, Aquaculture, 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.

Unit-III

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 farming. Risk and success factors in farming-based livelihood systems.

Unit-IV

Schemes and programs by Central and State Governments; 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.

Practical

Survey of farming systems and agriculture-based livelihood enterprises, Study of components of important farming-based livelihood models/systems in different agro-climatic zones, Study of production and profitability of crop based, livestock based, processing-based and integrated farming-based livelihood models, Field Visit of innovative farming system models. Visit of Agri-based enterprises and their functional aspects for integration of production, processing and distribution sectors and Study of agri-enterprises involved in industry and service sectors (Value Chain Models), Learning about concept of project formulation on farming-based livelihood systems along with cost and profit analysis, Case study of Start-Ups in agri-sectors.

Suggested Readings:

Reference Book

1. Gopal, De, Chandra. Fundamentals of Agronomy, CBSPD, Delhi.

Textbooks

2. Reddy. T.Y and Reddy, G.H.S.1995. Principles of Agronomy, Kalyani Publishers, Ludhiana.
3. Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, NewDelhi.
4. Upadhyay, P.K . 2022. Principles of Seed Technology, Kalyani Publishers, Ludhiana.

Course Code	Course Title	L	T	P	C
ASAGRS102	**Rural Sociology and Educational Psychology**	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, students will be able to: -

CO-1. Explain key concepts of extension education and rural sociology in agricultural contexts.

CO-2. Analyze how rural groups, institutions, and culture influence rural behavior.

CO-3. Evaluate how leadership, training, and social change affect extension and rural development.

CO-4. Apply educational psychology to enhance extension communication.

Course Perspective: This course is designed to introduce students to the foundational principles of Extension Education, Rural Sociology, and Educational Psychology, emphasizing their interrelationship and relevance in agricultural development. The primary aim is to equip students with a comprehensive understanding of rural society, social structures, cultural dynamics, and psychological principles that influence rural behavior, communication, and learning processes.

Course Contents:

Theory

Unit 1

Extension Education and Agricultural Extension: Meaning, Definition, Scope and Importance. Sociology and Rural Sociology: Meaning, Definition, Scope, Importance of Rural Sociology in Agricultural Extension, 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 in formation and organization of groups, Motivation in group formation, Role of social groups in Agricultural Extension.

Unit 2

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 their Role in Agricultural Extension.

Unit 3

Social Institutions: Meaning, Definition, Major institutions in Rural Society, Functions and their Role in Agricultural Extension. Social Organizations: Meaning, Definition, Types of organizations, Role in Agricultural Extension. Social Control: Meaning, Definition, Need and Means of social control, Social Change: Meaning, Definition, Nature, Dimensions and Factors of social change.

Unit 4

Leadership: Meaning, Definition, Classification, Roles of leaders, Methods of selection of Professional and Lay leaders. Training of Leaders: Meaning, Definition, Methods of training, Advantages and limitations of using local leaders in Agricultural Extension. Psychology and Educational Psychology: Meaning, Definition, Scope and their Importance in Agricultural Extension. Intelligence and Personality: Meaning, Types, Factors, Role in Extension. Teaching - Learning Process: Meaning and Definition of Teaching and Learning, Learning experience, Learning situation, Elements and characteristics of learning situation, Principles of learning and their implication in teaching.

Suggested Readings:

Sr. No.	**Reference Book**
1.	Ray, G.L. 2017. Extension Communication and Management (8th ed.). Kalyani Publishers, Ludhiana
	Textbooks
2.	Mondal, Sagar. 2005. Rural Sociology & Educational Psychology. Kalyani Publishers, Ludhiana
3.	Sharma, O.P. and Somani, L.L. 2012. Fundamentals of Rural Sociology & Educational Psychology. Agrotech Publishing Academy, Udaipur.

Course Code	Course Title	L	T	P	C
ASAGAG103	**Fundamentals of Agronomy**	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be students: -

CO1 Able to define agronomy, outlines its history, and explains its significance in modern agriculture.

CO2 Analyze different crop classifications based on criteria such as life span, seed size, root depth, and water requirements, and apply this knowledge to recommend appropriate crops for specific agro-ecological conditions.

CO3 Evaluate soil health and fertility factors, assess their impact on crop productivity, and design management strategies for degraded soils.

CO4 Develop a comprehensive cropping system plan incorporating the appropriate use of manures and fertilizers, including timing and methods of application, tailored to the nutrient requirements of major crops in Haryana.

Course Perspective: This course provides a comprehensive overview of agronomy, covering its definition, history, and significance in agriculture. Students will explore crop classification based on various criteria, seed characteristics, and multiplication techniques. The curriculum emphasizes soil fertility, productivity, and management practices, alongside an analysis of cropping systems and patterns. Practical aspects such as the use of manures and fertilizers, including their nutrient content and application methods for major crops in Haryana, are also addressed, equipping students with essential knowledge for effective crop production.

Course Contents
Theory

Unit-I

Agronomy and its scope: Definition, meaning and scope of Agronomy; Art, science and business of crop production, Relation of Agronomy with other disciplines of Agricultural Science. Field crops: Classification, Importance, Ecology and ecosystem. Seeds and sowing: Definitions of Crop, Variety and Seed. Factors affecting crop stands establishment: good quality seed, proper tillage, time of sowing, seed rate, depth and methods of sowing (broadcasting, drilling, dibbling, sowing behind country plough and transplanting etc.).

Unit-II

Tillage and tilth: Definition, Objectives, types, advantages and disadvantages of tillage including Conservation tillage, Modern Concept of Tillage. Crop density and Geometry: Plant geometry and Planting geometry, its effect on growth and yield.

Unit-III

Crop nutrition: Definition of essential nutrients, Criteria of essentiality, Functional elements, Classification of essential nutrients, Role of macro and micronutrients. 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 biofertilizers; 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 manures- role in crop production: Definition, objectives, types of green manuring, desirable characteristics, advantages and limitations of green manuring.

Unit-IV

Water management: Water resources of the World, India and the State; Soil Moisture Constants: gravitational water, capillary water, hygroscopic water. Weeds: Definition, importance and basis of classification of weeds and their control. Agro-climatic zones of India and the State. Cropping systems: Factors affecting cropping systems, major cropping patterns and systems in the country. Sustainable crop production: Definition, importance and practices, natural resources and conservation, pollution and pollutants. Allelopathy: Meaning and importance in crop production. Growth and development of crops: Definition, meaning and factors affecting growth and development.

Practical

A visit to Instructional Crop Farm and study of field crops, Identification of crops, seeds, fertilizers, pesticides; Crops and cropping systems in different Agro-climatic zones of the state; Study of some preparatory tillage implements; Study of inter-tillage implements, Practice of ploughing/ puddling; Study and practice of inter-cultivation in field crops; Numerical exercises on calculation of seed, plant population and fertilizer requirement; Study of yield contributing characters and yield estimation of crops; Identification of weeds in different crops; Seed germination and viability test of seed; Practice on time and method of application of manures and fertilizers.

Suggested Readings:

Textbooks

5. Gopal, De, Chandra. Fundamentals of Agronomy, CBSPD, Delhi.

Reference Book

6. Reddy. T.Y and Reddy, G.H.S.1995. Principles of Agronomy, Kalyani Publishers, Ludhiana.
7. Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, NewDelhi.
8. Upadhyay, P.K . 2022. Principles of Seed Technology, Kalyani Publishers, Ludhiana.

Course Code	Course Title	L	T	P	C
ASAGSS104	**Fundamentals of Soil Science**	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Understand the soil genesis and how the rocks are forming in the soil..

CO-2 Understand the soil structure and texture during forming with their porosity.

CO- 3 Understand the soil reaction-pH, acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids - inorganic and organic.

CO-4 Illustrate the macro and micro-organism availability in the soil and they are polluted the soils.

CO-5 Determine of soil fertility and physico-chemical analysis viz. Organic carbon, pH, EC etc.

Course Perspective: This course introduces students to the basic concepts of soil science, including the origin, formation, and classification of soils, as well as the physical, chemical, and biological properties that influence soil behavior and its role in plant nutrition. It also covers the principles of soil fertility, soil management, and the sustainable use of soil resources in agriculture. Special emphasis is placed on understanding soil's interaction with water, nutrients, and organic matter, and its importance in sustainable farming practices.

Course Contents

Unit- 1

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: Elementary knowledge of soil taxonomy classification and soils of India; soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil.

Unit- 2

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

Unit- 3

Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids-inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation.

Unit- 4

Soil organic matter: composition, properties and its influence on soil properties; humic substances - nature and properties; soil organisms: macro and micro-organisms, their beneficial and harmful effects; Soil pollution - behavior of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Practical

Study of soil profile in field. Study of soil sampling tools, collection of representative soil samples, its processing and storage. Study of soil forming rocks and minerals. Determination of soil density, moisture content and porosity. Determination of soil texture by feel and Bouyoucos methods. Studies of capillary rise phenomenon of water in soil column and water movement in soil. Determination of soil pH and electrical conductivity. Determination of cation exchange capacity of soil. Study of soil map. Determination of soil colour. Demonstration of heat transfer in soil. Estimation of the organic matter content of the soil.

Suggested Readings:

Textbooks

1. Biswas, T.D. and Mukherjee, S.K. 2001. Text Book of Soil Science. Tata Graw Hill Publishing Co.,New Delhi

Reference Book

2. Das.D.K, 1997. Introductory Soil Science. Kalyani Publishers, New Delhi.
3. Foth, H.D. and Turk, L. M. 1972. Fundamental of Soil Science. 5th Edn. ley Eastern Pvt.Ltd., NewDelhi
4. Gupta, P.K. 2007. Soil, Plant, Water and Fertilizer Analysis. Published by ROBIOS (India),Jodhpur

Course Code	Course Title	L	T	P	C
ASAGHR105	**Fundamentals of Horticulture**	2	0	1	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of the course, student will be: -

CO1: Understanding the importance and scope of horticulture.

CO2: Evaluating various plant propagation methods.

CO3: Analyzing the orchard establishment and cultivation packages and practices for vegetables and fruits.

CO4: Applying irrigation methods, fertilizer use, and bio-regulators for effective crop management.

CO5: Demonstrating practical skills in propagation, nursery preparation, orchard layout, training, pruning, and fertilization.

Course Perspective: The course "Fundamentals of Horticulture" provides students with foundational knowledge and practical skills essential for growing fruits, vegetables, and other horticultural crops that play a vital role in enhancing nutrition and food security. By learning propagation techniques, cultivation practices, and orchard management, students will understand how horticulture contributes to diversified diets, improved health, and sustainable agricultural systems. This course equips learners to support agricultural productivity and nutritional well-being in farming communities.

Unit –1

Introduction to Horticulture- Horticulture - Its definition and branches, importance and scope, Horticultural and botanical classification, Climate and soil for horticultural crops.

Unit-2

Plant Propagation- Plant propagation-methods and propagating structures, Seed dormancy, Seed

germination, Merits and demerits of sexual and asexual propagation, Stock-Scion relationship.

Unit-3

Orchard Management- Principles of orchard establishment, Principles and methods of training and pruning, Chilling requirement, bud dormancy, juvenility, Flower bud differentiation, fruit development and fruit ripening. Unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy, Medicinal and aromatic plants, Spices and condiments, Importance of plant bio-regulators in horticultural crops

Unit -4

Crop Management and Gardening - Irrigation and its methods; Fertilizers application in horticultural crops; Principles, features and styles and types of gardens; Types of vegetable gardening; Kitchen gardening.

Practical

Identification of garden tools; Identification and nomenclature of fruits; Layout of an orchard; Pit making and system of planting; Nursery raising techniques of fruit crops; Understanding of plant propagation structures; Propagation through seeds and plant parts, Propagation techniques for horticultural crops, Container, potting mixture, potting and repotting; Training and pruning methods on fruit crops; Preparation of fertilizer mixture and application, Preparation and application of PGR; Layout of different irrigation systems; Maturity studies and harvesting; Grading, packaging and storage.

Suggested Readings

Textbooks

1. Bose, T. K., Mitra, S. K., & Sanyal, D. (2002). Fruits: Tropical and Subtropical (Vols. I & II). Naya Udyog.

Reference Book

2. Reiley, E. H., & Shry, C. L., Jr. (2006). Introductory horticulture.

3. Muthukumar, P., & Selvakumar, R. (2017). Glaustas horticulture. Agrobios.

Course Code	Course Title	L	T	P	C
AGAGMA106	**Introductory mathematics**	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Understanding basics of algebra, Matrices, Trigonometry and calculus

CO2: Coordinated geometry

CO3: Draw slope of a line, forms of the equation of a line,

CO4: Analyzing trigonometric ratios

Course Perspective: This course introduces basic mathematical concepts and their applications in agriculture. It covers algebraic operations, equations, functions, trigonometry, and basic calculus. The course emphasizes problem-solving techniques and their use in analyzing data, optimizing resources, and improving decision-making in agricultural practices.

Course Content-

Theory

Unit-I

Progressions- Arithmetic; Geometric and Harmonic Progressions. 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.

Unit-II

Definition - Differentiation of function using first principle, Derivatives of sum, difference, product and quotient of two functions, Methods, Increasing and Decreasing Functions.

Unit-III

Application of Differentiation- Growth rate, Average Cost, and Marginal cost, Marginal Cost, Marginal Revenue. Maxima and Minima of the functions of the form y = f (x).

Unit-IV

Integration -Definite and Indefinite Integrals-Methods- Integration by substitution, Integration by parts, Area under simple well-known curves. Agricultural systems - Mathematical models - classification of mathematical models, Fitting of Linear, quadratic and exponential models to experimental data.

Suggested Readings:
Textbooks:

- Algebra by D. C. Kapoor and GurbaxSingh

Reference Book

- Algebra by T. N. Nagpal and K. K.Gupta.
- Trigonometry by Jiwan

Course Code	**Course Title**	**L**	**T**	**P**	**C**
AGAGBI107	**Basic Biology**	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understand the characteristics of living organisms

CO 2. Understand the concept of origin of life

CO 3. Know the basis of evolution

CO 4. Learning the morphological features of plants

CO 5. Understand the distinguishing features of angiosperm families.

Course Perspective: This course introduces the fundamental concepts of biology, including the characteristics of living organisms, cell structure and function, biological diversity, genetics, evolution, and ecology. It provides students with the necessary knowledge to understand the basic processes that govern life and prepares them to apply these concepts in agricultural science.

Course Content

Theory

Unit-I

Introduction to the living world, Diversity and characteristics of life.

Unit-II

Origin of life, Evolution and Eugenics. Genetics and Basics concepts. Binomial nomenclature and Classification.

Unit-III

Cell and cell division. Morphology of flowing plants. Seed and Seed germination.

Unit-IV

Plant systematics- *viz*., Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Suggested Readings:

Textbooks:

1. A.C. Dutta: Text Book of Botany (Latest Ed.). Oxford University Press- India, 2000.

Reference Book

2. Vidyarthi: Text Book of Botany Part – I. S. Chand and Company, New Delhi, 2002.

3. Introductory Biology by Dr. Anil Kumar Chaudhary, Dr. Bhupendra Kumar Tripathi.

Rama Publishing House.

SEMESTER-II

SEC-III and SEC IV as per Table-1

Course Code	Course Title	L	T	P	C
ACAD Office	**Personality Development**	1	0	2	2
Pre-requisites/Exposure	Communication Skills				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: In building confidence and speaking confidently.

CO2: Improve communication activities in functional and situational contexts

CO3: Enhance the language skills of reading, writing,

CO4: Understanding the listening and speaking through real-life and professional situations.

Course Perspective: This course aims to develop students' communication abilities and enhance their personal and professional skills. It includes training in effective verbal and written communication, presentation skills, interpersonal skills, and personality development techniques. Students will engage in various activities designed to improve their confidence, self-awareness, and overall effectiveness in communication.

Course Contents

Unit –1

Personality Definition, Nature of personality, theories of personality and its types. The humanistic approach- Maslow's self-actualization theory, 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.

Unit –2

Foundations of individual behavior and factors influencing individual behavior, Models of individual behavior, Perception and attributes and factors affecting perception.

Unit –3

Attribution theory and case studies on Perception and Attribution. Learning: Meaning and definition, theories and principles of learning, Learning and organizational behavior, Learning and training, learning feedback.

Unit –4

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.

Practical

MBTI personality analysis, Learning Styles and Strategies, Motivational needs Firo-B, Interpersonal Communication, Teamwork and team building, Group Dynamics, Win-win game, Conflict Management, Leadership styles, Case studies on Personality and Organizational Behavior.

Suggested Readings:

Sr. No.	Textbooks
1.	Krishnaswamy N. and Sriraman, T. 1995. Current english for colleges, macmillan India Limited, Madras
	Reference Book
2.	A Dilemma: A layman looks at science raymond B. Fosdick
3.	Improve your writing, ed. V.N Arora & Laxmi Chandra, Oxford University press2001, New Delhi.

Course Code	Course Title	L	T	P	C
ASVAES201	**Environmental Studies & Disaster Management**	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, students will be able to: -

CO-1. Understand the basics of environment and natural resources.

CO-2. Explain ecosystems and ways to conserve biodiversity.

CO-3. Apply methods to control pollution and promote sustainability.

CO-4. Analyze major environmental problems and their impacts.

CO-5. Evaluate and create strategies for disaster management.

Course Perspective:

This course Environmental Studies and Disaster Management aims to develop awareness and understanding of the interrelationship between the environment, natural resources, and human activities, with a focus on sustainable agriculture and rural development. It emphasizes the multidisciplinary nature of environmental studies, conservation of natural resources, ecosystem functioning, and biodiversity protection, along with the study of environmental pollution, climate change, and relevant environmental laws. The course also highlights the importance of disaster management by exploring the causes, effects, and mitigation strategies for natural and man-made disasters, equipping students with the knowledge to promote sustainable practices, ensure environmental protection, and enhance resilience in agricultural and rural settings.

Course Contents

Unit –1

Multidisciplinary nature of environmental studies. Definition, scope and importance. Natural Resources: renewable and non-renewable resources. Natural resources and associated problems: a) forest resources, b) water resources, c) mineral resources, d) food resources, e) energy resources, f) land resources. Use and over-exploitation. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

Unit –2

Sources Ecosystems: Concept of an ecosystem, structure and function of an ecosystem. Producers, consumers and decomposers. Energy flow in the ecosystem. Ecological succession, food chains, food webs and ecological pyramids. Introduction, types, characteristic features, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-3

Biodiversity and its conservation: Introduction, definition, genetic, species & ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels, India as a mega- diversity nation. Hot spots of biodiversity. Threats to biodiversity: habitat loss, endangered and endemic species of India. Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Environmental pollution: definition, cause, effects and control measures of a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. nuclear hazards. Solid Waste Management: causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Social Issues and the Environment: From Unsustainable to Sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management. Environmental ethics: Issues and possible solutions, climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. dies. Wasteland reclamation. Consumerism and waste products. Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act. Issues involved in enforcement of environmental legislation. Public awareness. Human Population and the Environment: population growth, variation among nations, population

explosion, Family Welfare Programme. Environment and human health: Human Rights, Value Education, HIV/AIDS. Women and Child Welfare. Role of Information Technology in the Environment and human health.

Unit –4

Disaster Management: meaning and nature of natural disasters, their types and effects. Floods, drought, cyclone, earthquakes, landslides, volcanic eruptions, heat and cold waves. Climatic change: global warming, sea level rise, ozone depletion. Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation, industrial waste-water pollution, road accidents, rail accidents, air accidents, sea accidents. Disaster Management: effect to migrate natural disaster at national and global levels. International strategy for disaster reduction. Concept of disaster management and national disaster management framework. Financial arrangements; role of NGOs, community –based organizations and media. Central, state, district and local administration; Armed forces in disaster response; Disaster response; Police and other organizations.

Practical

Pollution case studies: field work - visit to a local area to document environmental assets river/forest/grassland/hill/mountain; visit to a local polluted site-urban/rural/industrial/agricultural. Impact of pollution on agriculture. Study of simple ecosystems-pond, river, hill slopes etc.

Suggested Readings:

Reference Books

1. Gupta SR and Singh JS, 2015, Ecology Environmental Science and Conservation, S.Chand Publisher.
2. Rajagopalan, R. (2011). Environmental Studies: From Crisis to Cure (2nd ed.). Oxford University Press

Course Code	Course Title	L	T	P	C
ASAGSS201	**Soil Fertility Management**	2	0	2	3
Pre-requisites/Exposure	Fundamentals of Soil Sciences				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1: Understanding the importance of organic manures and Integrated nutrient management (INM).

CO-2: Applying appropriate fertilizer dose to the field.

CO-3: Evaluating soil fertility and plant nutrition deficiency in soil.

CO-4: Understanding soil chemistry and critical levels of different soil nutrients.

CO-5: Application of nutrients under rainfed and irrigated conditions.

Course Perspective: This course provides an in-depth understanding of soil fertility management, emphasizing the importance of manures and fertilizers in enhancing crop productivity. Students will learn about the chemistry and biology of soil, nutrient requirements of crops, and the application of different soil fertility management practices to optimize crop yields sustainably.

Course Contents

Unit –1

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

Unit –2

Chemical fertilizers and types: classification, composition and properties of major nitrogenous, phosphatic and potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano- fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

Unit –3

Soil fertility and productivity, plant nutrition. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Unit –4

Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Fertilizers Indicator plants (crop). Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils. Estimation of soil extractable S in soils. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants.

Suggested Readings:

Sr. No.	Textbooks
1.	Burges, A, and Raw, F. 1967. Soil Biology. Acad. Press, New York
	Reference Book
2.	Donahu, L. R., Miller, W. R. and Shickuluna, 1977. Soils. Prentice Hall of India Pvt. Ltd., New Delhi

3.	Mengel, K.J. and Kirkby, A. 1978. Principles of Plant Nutrition. International Potash Institute,Switzerland
4.	Nyle.C. Brady 1995. The Nature and Properties of Soils. 10th Edn. Printice Hall India Pvt.. Ltd. NewDelhi
5.	Raymond W Miller and Roy L. Donahue. 1992. Soils and Introduction to Soils and Plant Growth. 6th edn. Printice Hall India pvt. Ltd. New Delhi

Course Code	**Course Title**	**L**	**T**	**P**	**C**
ASAGET202	**Fundamentals of Entomology**	2		2	3
Pre-requisites/Exposure	Biology				
Co-requisites	--				

Course Outcomes: On completion of course: -

CO1: Describe the structure and function of insect along with their ecology.

CO2: Classify insects according to their morphology, anatomy and physiology.

CO3: Demonstrate the relationship of insect appendages with their habit and habitat.

CO4: Analyze the effect of climatic conditions on insect life.

CO5: Evaluate the insect behavior in relation to other organisms present in their niche and ecosystem.

Course Perspective: The course *Fundamentals of Entomology* provides a foundational understanding of insect biology, including their morphology, classification, development, and ecological roles. It equips students with essential knowledge and practical skills for identifying, collecting, and managing insects, with a focus on their significance in agriculture, environment, and human health. This course lays the groundwork for advanced studies in applied entomology and integrated pest management, fostering awareness of insect diversity, conservation, and sustainable pest control practices.

Theory

Unit –I

Introduction to Entomology: History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda.

Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae.

Unit –II

Insect Physiology: Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretary (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor.

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

Unit -III

Integrated Pest Management: Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical controlimportance, hazards and limitations.

Recent methods of pest control: repellents, anti-feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.

Unit –IV

Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order.

Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like

Hemimetabolous orders: Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera:

Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae;

Holometabolous orders: 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.

Practical

- Methods of collection and preservation of insects including immature stages; External features of Grasshopper/Blister beetle
- Types of insect antennae, mouthparts and legs; Wing venation
- types of wings and wing coupling apparatus.
- Types of insect larvae and pupae.
- Dissection of digestive system in insects (Grasshopper).
- Dissection of male and female reproductive systems in insects (Grasshopper).
- Study of characters of orders Orthoptera, Dictyoptera, Odonata, Isoptera, Thysanoptera, Hemiptera, Lepidoptera, Neuroptera, Coleoptera, Hymenoptera, Diptera and their families of agricultural importance.
- Insecticides and their formulations.
- Pesticide appliances and their maintenance. Sampling techniques for estimation of insect population and damage.

Suggested readings

1. Fundamentals of Ecology - Eugene. P. Odum and Gray W. Barrett
2. Imm's General Text book of Entomology- O.W. Rechards and R.G. Davies
3. Introduction to the study of Insects -D. J. Borror and DeLong's

Course Code	Course Title	L	T	P	C

ASAGPP204	**Fundamentals of Plant Pathology**	2		2	3
Pre-requisites/Exposure	Biology				
Co-requisites	--				

Course Outcomes:

CO1: Identify the major groups of plant pathogens, including fungi, bacteria, viruses, and nematodes.

CO2: Describe the role of environmental factors in disease outbreaks and pathogen spread.

CO3: Apply diagnostic techniques to identify plant diseases in various crops.

CO4: Analyze the disease triangle (host, pathogen, environment) and its influence on the development and spread of plant diseases.

CO5: Evaluate the effectiveness of different disease management strategies, including chemical, biological, and cultural methods.

Course Perspective: The course *Plant Pathology* introduces students to the scientific study of plant diseases caused by fungi, bacteria, viruses, nematodes, and abiotic factors. It emphasizes the understanding of disease development, symptoms, diagnosis, and the life cycles of plant pathogens. The course provides a foundation for identifying, preventing, and managing plant diseases through integrated and sustainable approaches. It prepares students for roles in agriculture, horticulture, research, and plant health management by fostering critical skills in disease diagnosis and crop protection.

Theory

Unit –I

Introduction: History, Scope and objectives of Plant Pathology with special reference to Indian work. Importance, concepts and classification of plant diseases. Terms and concepts in Plant Pathology.

Important plant pathogenic organisms: different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes. Causes / factors affecting disease development: disease triangle and tetrahedron.

Unit –II

Fungi: Definition of fungus, general characters, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Binomial system of nomenclature, rules of nomenclature, classification of fungi.

Bacteria: general morphological character and basic methods of classification and reproduction.

Unit –III

Viruses: Nature, structure, replication and transmission. Study of phanerogamic plant parasites.

Nematodes: General morphology and reproduction, symptoms and nature of damage caused by plant nematodes (*Heterodera, Meloidogyne*, *Anguina, Radopholus*etc.) Liberation / dispersal and survival of plant pathogens.

Unit –IV

Plant-Pathogen Interactions: Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants.

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

Practical:

- Acquaintance with various laboratory equipment's and microscopy.
- Collection and preservation of disease specimen.
- Preparation of media, isolation and Koch's postulates.
- General study of different structures of fungi.
- Study of symptoms of various plant diseases. Study of representative fungal genera.
- Staining and identification of plant pathogenic bacteria.
- Transmission of plant viruses.
- Study of morphological features and identification of plant parasitic nematodes.
- Sampling and extraction of nematodes from soil.
- Study of fungicides and their formulations.
- Methods of pesticide application and their safe use.
- Calculation of fungicide sprays concentrations.

Course Code	Course Title	L	T	P	C
ASAGLP203	**Livestock and Poultry Management**	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Identify the nutrient requirement for growth, maintenance, reproduction and lactation.

CO-2 Understand the concepts related to herd health, vaccination in livestock and poultry production.

CO-3 Analyzing the animal and poultry and their management.

CO-4 Create ration formulation for a specify period of animals and poultry

Course Perspective: This course provides a comprehensive understanding of livestock and poultry management, emphasizing the importance of animal production in agriculture. Students will learn about the various types of livestock and poultry, their husbandry practices, and the economic implications of livestock production. The course aims to equip students with the knowledge and skills necessary for effective management of livestock and poultry enterprises.

Course Contents

Unit –1

Role of livestock in the national economy. Present status and future prospectus of various livestock programme. Reproduction in farm animals and poultry. Housing principles, space requirements for different species of livestock and poultry.

Unit –2

Management of calves, growing heifers, and milch animals. Management of sheep, goats and

swine. Incubation, hatching, and brooding. Management of growers and layers.

Unit –3

Important Indian and exotic breeds of cattle, buffalo, sheep, goat, swine, and poultry. Improvement of farm animals and poultry. Digestion in livestock and poultry. Classification of feedstuffs. Proximate principles of feed.

Unit –4

Feeding and management of calves, growing heifers and milch animals, etc. Introduction of livestock and poultry diseases. Prevention (including vaccination schedule) and control of important diseases of livestock and poultry.

Practical

External body parts of cattle, buffalo, sheep, goat, swine and poultry. Handling and restraining of livestock. Identification methods of farm animals and poultry. Visit IDF and IPF to study breeds of livestock and poultry and daily routine farm operations and farm records. Judging of cattle, buffalo, and poultry. Culling of livestock and poultry. Planning and layout of housing for different types of livestock. Computation of rations for livestock. Formulation of concentrate mixtures. Clean milk production, and milking methods. Hatchery operations, incubation, and hatching equipment. Management of chicks, growers, and layers. Debeaking, dusting, and vaccination. Economics of cattle, buffalo, sheep, goat, swine and poultry production.

Suggested Readings:

Sr. No.	Textbooks
1.	Banerjee, G.C. 2018. A Text Book of Animal Husbandry. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi

	Reference Book
2.	Dairy India Year Book 2001. A-25, Priyadarshini Vihar, DELHI.
3.	Handbook of Animal husbandry-Indian Council of Agricultural Research Publication, New Delhi, Third Edition, 2002
4.	Sastry, N.S.R & Thomas C.K, 2018 : Livestock Production and Management, Kalyani Publishers, India
5.	Harbans Singh & Moore, E.N., 1982: Livestock and Poultry Production, Prentice-Hall of India.

Course Code	**Course Title**	**L**	**T**	**P**	**C**
AEC	**National Service Scheme (NSS-I) / National Cadet Corps (NCC-I)**	0	0	2	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course: -

CO-1: Understand NSS, its organizational structure and the significance of its symbols and badges.

CO-2: Analyze and guide financial patterns of NSS schemes and effectively maintain activity diaries.

CO-3: Understand the various definitions, profiles, and challenges faced by youth, recognizing their potential as agents of social change and exploring opportunities available through youth programs.

CO-4: Develop skills in mapping community stakeholders, crafting culturally relevant messages, and utilizing effective methods for youth-adult partnership in mobilization efforts.

Course Perspective: The National Service Scheme (NSS-I) course is designed to install the spirit of

voluntary service, discipline, and civic responsibility among students. It provides opportunities to engage in community service, develop leadership qualities, and promote social harmony through various outreach activities. The course encourages active participation in rural development, environmental conservation, health awareness, literacy campaigns, and disaster management. By participating in NSS-I, students cultivate empathy, teamwork, and problem-solving abilities while contributing meaningfully to nation-building. The program also enhances personality development and a sense of national integration, making it an essential component of holistic education and socially responsible citizenship.

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

Semester-III

SEC-V as per Table-1

Course Code	Course Title	L	T	P	C
ASAGED301	**Entrepreneurship Development and Business Communication**	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: After completion of course, students will be able to:

CO No	Course Outcome (COs)
CO1	Explain entrepreneurship concepts, evolution, types, functions, and development processes.
CO2	Apply methods of environment scanning and opportunity identification using available support systems.
CO3	Analyze steps in enterprise formation including product selection, ownership, registration, planning, and project formulation.
CO4	Evaluate enterprise management practices in production, personnel, finance, and marketing.
CO5	Prepare project reports and strategies for effective enterprise operation and crisis management.

Course Perspective: This course provides an in-depth understanding of entrepreneurship concepts, characteristics, and the role of government policies in promoting entrepreneurial growth, especially in agribusiness. It explores the impact of economic reforms on agricultural enterprises and focuses on essential business leadership and managerial skills. Students will engage in project planning, financial management, and identify opportunities for agri-entrepreneurship and rural enterprise development.

Theory

Unit –1

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.

Unit –2

Environment scanning and opportunity identification need for scanning: spotting of opportunity, scanning of environment, identification of product/service: starting a project; factors influencing sensing the opportunities. Infrastructure and support systems: good policies, schemes for entrepreneurship development; role of financial institutions, and other agencies in entrepreneurship development.

Unit –3

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.

Unit –4

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. 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.

Practical

Visit to small scale industries/agro-industries, Interaction with successful entrepreneurs/agric-

entrepreneurs. Visit to financial institutions and support agencies. Preparation of project proposal for funding by different agencies..

Suggested Readings:

1. Mishra, N.K., Tripathi, C.K. and Yadav, P.K. 2022. Entrepreneurship Development And Business Communication. Kushal Publications and Distributors.
2. Bisarya, S., Bisarya, R. and Singh, C. 2021. Entrepreneurship Development and Business Skills. Notion Press.
3. Chole R. R. Deshmukh P. R. Kapse P. S. 2012. Entrepreneurship Development And Communication Skills. Scientific Publishers India Ltd.

Course Code	**Course Title**	L	T	P	C
ACAD	Physical Yoga. First Aid, Yoga Practices and meditation	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Practical

Physical education; Training and Coaching - Meaning and Concept; Methods of Training; aerobic and aerobic exercises; Calisthenics, weight training, circuit training, interval training, Fartlek training; Effects of Exercise on Muscular, Respiratory, Circulatory and Digestive systems; Balanced Diet and Nutrition: Effects of Diet on Performance; Physiological changes due to ageing and role of regular exercise on ageing process; Personality, its dimensions and types; Role of sports in personality development; Motivation and Achievements in Sports; Learning and Theories of learning; Adolescent Problems and its Management; Posture; Postural Deformities; Exercises for good posture.

Course Code	Course Title	L	T	P	C
ASAGGE302	**Fundamentals of Genetics**	2	0	2	3
Pre-requisites/Exposure	Biology				
Co-requisites	--				

Course outcome: On completion of course, student will be: -

CO 1. Understanding the concepts and principles of mendelian inheritance

CO 2. Analyze the chromosome structure and cell division of eukaryotic and prokaryotic organisms.

CO 3. Understanding the structure and function of genetic material.

CO 4.Use of haploids, diploids and mutation.

CO 5.Understanding of the concept of the genes, genetic disorders and their characteristics.

Course Perspective: This course covers the essential concepts of genetics, focusing on the structure, function, transmission, and variation of genetic material. It aims to provide students with a foundational understanding of both classical and molecular genetics, including the application of genetics in crop improvement and breeding programs. The course also explores modern genetic techniques and technologies used in agricultural research and practices.

Course Contents

Unit –1

Pre and Post Mendelian concepts of heredity and Mendelian principles of heredity. Architecture of chromosomes i.e. chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction, and telomere; special types of chromosomes and Chromosomal theory of inheritance.

Unit –2

Cell cycle and cell division- mitosis and meiosis. Probability and Chi-square Test. Dominance relationships and Epistatic interactions with example. Multiple alleles, pleiotropism and pseudo alleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics.

Unit –3

Linkage and its estimation, crossing-over mechanisms and chromosome mapping. Structural and numerical variations in chromosomes and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique and mutagenic agents. Qualitative & Quantitative traits, Polygenes and continuous variations and multiple factor hypotheses.

Unit –4

Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operon.

Practical

Study of the microscope. Study of cell structure. Mitosis and Meiosis cell division. Experiments on monohybrid, dihybrid, trihybrid, test cross, and back cross. Experiments on epistatic interactions including test cross and back cross. Practice on mitotic and meiotic cell division. Experiments on probability and Chi-square test. Determination of linkage and cross-over analysis (through two-point test cross and three-point test cross data). Study on sex-linked inheritance in Drosophila. Study of models on DNA and RNA structures.

Suggested Readings:

	Text Books
1.	Gupta, P. K. 2007. Cytogenetics Rastogi Publishers, Meerut
	Reference Book
2.	Phundan Singh 1995, Elements of genetics Kalyani Publishers, Ludhiana
3.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
4.	Singh B. D., Genetics. Kalyani publisher, New Delhi.
5.	Winchester A M 1967 Genetics (3 rd edn)Oxford and IBH Publishing Co New Delhi

Course Code	Course Title	L	T	P	C
ASAGCP303	**Crop Production Technology – I (*Kharif* Crops)**	1	0	4	3
Pre-requisites/Exposure	Fundamentals of agronomy				
Co-requisites	--				

Course Outcomes (COs): Upon successful completion of this course, students will be able to:

CO1: Understand the origin, distribution, and economic importance of major Kharif crops.

CO2: Analyse the soil and climatic requirements for optimal growth of cereals, pulses, oilseeds, fibre, and forage crops.

CO3: Demonstrate knowledge of crop varieties, cultural practices, and management techniques to improve

yield.

CO4: Identify common weeds, crop varieties, and assess the impact of seed and sowing factors on germination.

CO5: Apply practical skills in field preparation, nursery management, sowing, and crop observation through hands-on experience.

Course Perspective (Course Rationale): This course provides comprehensive knowledge on the production technology of major Kharif crops including cereals, pulses, oilseeds, fibres, and forages. It covers origin, distribution, soil and climatic needs, varieties, and cultural practices to enhance crop yield. Emphasis is placed on practical skills such as nursery preparation, sowing, and field experiments. The course aims to develop a scientific approach to crop management and improve productivity.

Course Content:

Theory

Unit- I

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Cereals- Rice, Maize, Sorghum, Pearl millet and other minor millets.

Unit- II

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Pulses- Pigeonpea, Mungbean and Urdbean.

Unit- III

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Oilseeds- Groundnut and Soybean, Sesame, Castor; Fibre crops- Cotton and Jute.

Unit- IV

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices and yield of Kharif crops: Forage crops- Sorghum, Cowpea, Cluster bean, Maize, Guinea and Napier.

Practical

Rice nursery preparation, transplanting of rice, sowing of soybean, pigeon pea and mungbean, maize, groundnut and cotton, effect of seed size on germination and seedling vigour of Kharif crops, effect of sowing depth on

germination of Kharif crops, identification of weeds in Kharif crops, top dressing and foliar feeding of nutrients, study of yield contributing characters and yield calculation of Kharif crops, study of crop varieties and important agronomic experiments at experiential farm, recording biometric observations, Study of forage experiments, morphological description of Kharif crops, silage and hay making, visit to research centres of related crops.

Suggested Readings:

Reference Book

1. Reddy, T. Y., & Reddi, G. H. S. (2017). Crop Production and Management (2nd ed.). Kalyani Publishers.
2. Chhidda Singh, Singh, P., & Roy, S. (2016). Manual on Kharif Crops. ICAR.

Textbook:

1. Singh, C., Singh, P. and Singh, R. 2003. Modern Techniques of Raising Filed Crops (2nd Ed.). Oxford and IBH. New Delhi.

2. Lalitha, B.S. Mavarkar, N. and Premalath, B.R. 2020.Crop Production Technology I & II – Kharif and Rabi Crops- As per 5th Deans Committee Recommendations. Brillion Publishing.

3. Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxford and IBH. New Delhi.

Course Code	**Course Title**	L	T	P	C
ASAGPT304	**Production Technology of Fruit and Plantation Crops**	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Understand the scope and significance of fruit and plantation crops.

CO2: Evaluate propagation methods and environmental needs of crops.

CO3: Analyze production practices of major fruit crops.

CO4: Apply techniques in managing plantation and palm crops.

CO5: Demonstrate skills in propagation, nursery, and orchard practices.

Course Perspective (Course Rationale- In 4 to 5 lines): The course on Production **Technology of Fruit and Plantation Crops aims** to provide students with a comprehensive understanding of the economic, nutritional, and ecological significance of fruit and plantation crops in India. It emphasizes scientific crop production

techniques suitable for tropical, sub-tropical, and temperate regions, including the latest advancements in high-density planting, fertigation, and value addition.

Students will gain knowledge about the climate and soil suitability, varietal selection, propagation, and management practices of both fruit and plantation crops such as mango, banana, citrus, coconut, tea, coffee, and more. The course integrates theory with hands-on practicals involving propagation methods, nursery techniques, orchard layout, and crop management. By the end of the course, learners will be equipped with the technical know-how and practical skills essential for establishing and managing commercial orchards and plantations, contributing to sustainable and profitable horticulture practices.

Theory

Unit –1

Production status of fruit and plantation crops: Importance and scope of fruit and plantation crop industry in India; nutritional value of fruit crops; classification of fruit crops; area, production, productivity and export potential of fruit and plantation crops. Crop production techniques in tropical, sub-tropical and temperate fruit crops: Climate and soil requirements, varieties, propagation and use of rootstocks, planting density and systems of planting: High density and ultra-high density planting, cropping systems, after care training and pruning; water, nutrient and weed management, fertigation, special horticultural techniques, plant growth regulation, important disorders, maturity indices and harvest, value addition.

Unit –2

Production technologies for the cultivation of tropical and sub-tropical fruits- mango, banana, papaya, guava, sapota, citrus, grape, litchi, pineapple, pomegranate, apple, pear, peach, strawberry, nut crops Jackfruit and minor fruits- date, ber, apple, plantation crops-coconut, arecanut, cashew, tea, coffee and rubber.

Unit –3

Crop production techniques in palms and plantation crops: Climate and soil requirements, varieties, propagation, nursery management, planting and planting systems, cropping systems, after care, training and pruning for plantation crops, water, nutrient and weed management, intercropping, multi-tier cropping system, mulching, special horticultural practices, maturity indices, harvest and yield, pests and diseases, processing- value addition

Unit –4

Production technologies for the cultivation of plantation crops- Palms: Coconut, Arecanut, Oil palm and Palmyrah, Plantation crops: Tea, Coffee, Cocoa, Cashewnut, Rubber.

Practical

Practical Propagation techniques, selection of planting material, varieties, important cultural practices for mango, banana, papaya, guava, sapota, grapes, Citrus (mandarin and acid lime), pomegranate, jackfruit, preparation and application of PGR's for propagation, Micro propagation, protocol for mass multiplication and hardening of fruit crops, Identification and description of varieties, mother palm and seed nut selection, nursery practices, seedling selection, fertilizers application, nutritional disorders, pests and diseases of Coconut, Arecanut and cocoa, Tea and coffee, Rubber and cashew, Visit to commercial orchard and plantation industries.

Suggested Readings

Textbooks

Sr. No.	
1.	Amar Singh, 1986. Fruit Physiology and Production. Kalyani Publishers, Delhi.
2.	Bose, T.K, Mitra, S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I and II, Nayaprakash Publications, Calcutta.
3.	Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi.
4.	CPCRI, 2003. Coffee Guide, Central Coffee Research Institute, Coffee Board, Chickamangalur, Karnataka.
5.	Kumar.N, Abdul Khader.J.B.M. Rangaswami.P. and Irulappan., 1993. Introduction to Spices – Plantation Crops, Medicinal and Aromatic Plants, Rajalekshmi Pub, Nagercoil.

Course Code	**Course Title**	L	T	P	C
ASAGCP303	**Crop Production Technology – I (*Kharif* Crops)**	1	0	4	3
Pre-requisites/Exposure	Fundamentals of agronomy				
Co-requisites	--				

Course Outcomes (COs):

CO1: Understand the historical roots and evolution of natural farming, along with its relevance in addressing current agricultural and environmental challenges.

CO2: Explain the concepts, principles, and types of natural farming, and assess their ecological and socio-economic impacts.

CO3: Apply knowledge of farm design, ecosystem services, biodiversity conservation, and integrated farming systems in natural farming practices.

CO4: Develop skills in the preparation and use of on-farm natural inputs, indigenous seed techniques, and sustainable resource management practices.

CO5: Evaluate the economic viability, policy frameworks, certification systems, and entrepreneurship opportunities related to natural farming, including government and NGO initiatives.

Course Perspective: This course offers comprehensive insights into natural farming systems rooted in India's agricultural heritage. It emphasizes sustainable, chemical-free practices that promote soil health, biodiversity, ecological balance, and climate resilience. Students will gain both theoretical and practical knowledge essential for implementing and promoting natural farming techniques aligned with Sustainable Development Goals (SDGs).

Course content:

Theory

UNIT I

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), Concept of natural farming, 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

UNIT II

Methods/types/schools of natural farming, Characteristics and design of a natural farm, Concept of ecological balance, ecological engineering and community responsibility in natural versus other farming systems, Introduction to concept of ecological, water, carbon and nitrogen footprints, Concept and evaluation of ecosystem

services, Integration of crops, trees and animals, Cropping system approaches, Biodiversity, indigenous seed production

UNIT III

Farm waste recycling, Water conservation and renewable energy use approaches on a natural farm, Rearing practices for animals under natural farming, Nutrient management in natural farming and their sources, Insect, pest, disease and weed management under natural farming, Mechanization in natural farming

UNIT IV

Processing, labelling, economic considerations and viability, Certification and standards in natural farming, Marketing and export potential of natural farming produce and products, 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

Practical

Visit of natural farm and chemical free traditional farms to study the various components and operations of natural farming principles at the farm; Indigenous technical knowledge (ITK)for seed, tillage, water, nutrient, insect-pest, disease and weed management; On-farm inputs preparation methods and protocols, Studies in green manuring in-situ and green leaf manuring, Studies on different types of botanicals and animal urine and dung based non-aerated and aerated inputs for plant growth, nutrient, insect and pest and disease management; Weed management practices in natural farming; Techniques of Indigenous seed production -storage and marketing, Partial and complete nutrient and financial budgeting in natural farming; farming; Evaluation of ecosystem services in natural farming (Crop, Field and System).

Suggested readings:

Textbooks

1. **Fukuoka, M. (1978).** *The One-Straw Revolution: An Introduction to Natural Farming.* Rodale Press, Emmaus, PA. 181 pp
2. **Fukuoka, M. (1985).** *The Natural Way of Farming: The Theory and Practice of Green Philosophy.* Japan Publications, Tokyo, 280 pp

3. **FAO. (2018).** *The 10 Elements of Agroecology: Guiding the Transition to Sustainable Food and Agricultural System.*

4. **Ecological Farming – The Seven Principles of a Food System that Has People at Its Heart.** May 2015, Greenpeace

Reference Books

1. **Ayachit, S.M. (2002).** *Kashyapi Krishi Sukti (A Treatise on Agriculture by Kashyapa).* Asian Agri-History Foundation

2. **Boeringa, R. (Ed.). (1980).** *Alternative Methods of Agriculture.* Elsevier, Amsterdam, 199 pp

3. **Das, P., Das, S.K., Arya, H.P.S., Reddy, G. Subba, Mishra, A., and others.** *Inventory of Indigenous Technical Knowledge in Agriculture.* ICAR, New Delhi (Documents 1–7)

4. **Hill, S.B. and Ott, P. (Eds.). (1982).** *Basic Techniques in Ecological Farming.* Berkhauser Verlag, Basel, Germany, 366 pp

5. **Conway, G.R. (1985).** *Agroecosystem Analysis for Research and Development*

Course Code	**Course Title**	L	T	P	C
ASAGEE305	**Fundamentals of Extension Education**	1	0	1	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: After completion of course, students will be able to:

CO No	**Course Outcome (COs)**
CO1	Explain key concepts of extension education and rural development.
CO2	Apply steps of programme planning and evaluation in

	extension
CO3	Analyze different extension systems and communication models
CO4	Evaluate teaching methods and ICT tools in technology transfer

Course Perspective: This course introduces students to the fundamental principles of extension education and rural development, emphasizing their relevance in agricultural transformation. It covers various extension approaches, historical initiatives, programme planning, communication methods, and technology transfer models. Students will also gain insights into rural leadership, extension administration, and the role of ICT in modern extension systems. The course prepares learners to understand and participate in community-based agricultural development and capacity-building initiatives effectively.

Theory

Unit –1

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.

Unit –2

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 etc.

Unit –3

New trends in agriculture extension: 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). Rural Development: concept, meaning, definition; various rural development programs launched by Govt. of India.

Unit –4

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

Practical

To get acquainted with university extension system. Group discussion- exercise; Identification of rural leaders in village situation; preparation and use of AV aids, preparation of extension literature (leaflet, booklet, folder, pamphlet news stories and success stories); Presentation skills exercise; micro teaching exercise; A visit to village to understand the problems being encountered by the villagers/ farmers; to study organization and functioning of DRDA/PRI and other development departments at district level; visit to NGO/FO/FPO and learning from their experience in rural development; understanding PRA techniques and their application in village development planning; exposure to mass media: visit to community radio and television studio for understanding the process of programme production; script writing, writing for print and electronic media, developing script for radio and television..

Suggested Readings:

1. Ray, G. L. (2017). *Extension communication and management* (8th ed.). Kalyani Publishers.
2. Dahama, O. P. and Bhatnagar, O.P. 1998. Education and Communication for Development, Oxford and IBH publishing Co. Pvt. Ltd, New Delhi.
3. Sandhu, A.S. 1993. Text book on Agricultural Communication: Process and Methods. Oxford and IBH Publishing Pvt. Ltd, New Delhi.
4. Singh, A.K., Lakhan Singh, R. and Roy Burman. 2006. Dimensions of Agricultural Extension. Aman Publishing House, Meerut

Course Code	**Course Title**	L	T	P	C
ASAGNE306	**Fundamentals of Nematology**	1	0	1	2
Pre-requisites/Exposure	Fundamentals of Entomology				
Co-requisites	--				

Course Outcomes: On completion of course, students will be able to: -

CO1: Understand the historical development and scope of phyto-nematology, including the diversity, habitats, and economic importance of plant parasitic nematodes.

CO2: Describe the general morphology, biology, and classification of nematodes up to the family level, with emphasis on economically important genera and their feeding habits.

CO3: Identify symptoms caused by nematodes and their role in complex disease development, including interactions with fungi, bacteria, and viruses.

CO4: Recognize major nematode pests affecting key crops such as rice, wheat, vegetables, pulses, oilseeds, fiber crops, and perennial crops like citrus, banana, tea, coffee, and coconut.

CO5: Evaluate various nematode management strategies, including cultural, physical, biological, chemical methods, plant quarantine, host plant resistance, and integrated nematode management (INM).

CO6: Apply knowledge of nematode biology and management principles to develop effective, sustainable approaches for minimizing nematode damage in agricultural systems.

Course Perspective: This course on plant parasitic nematodes provides a comprehensive introduction to the biology, diversity, and economic significance of nematodes affecting crops. It covers their classification, morphology, and the complex interactions between nematodes and other plant pathogens. Students learn to identify key nematode pests across major crops and understand the symptoms and damage they cause. The course also emphasizes sustainable nematode management through cultural, biological, chemical, and integrated approaches, preparing students to effectively address nematode-related challenges in modern agriculture.

Course Contents:

Theory

Unit I

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

Unit II

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

Unit III

Symptomatology, role of nematodes in disease development, Interaction between plant parasitic nematodes and disease-causing fungi, bacteria and viruses.

Unit IV

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

Different methods of nematode management: Cultural methods, physical; methods, Biological methods, Chemical methods, Plant Quarantine, Plant resistance and INM.

Practical

- Sampling methods, collection of soil and plant samples
- Extraction of nematodes from soil and plant tissues following Cobb's sieving and decanting technique, Baermann funnel technique, Picking and counting of plant parasitic nematode.
- Identification of economically important plant nematodes up to generic level with the help of keys and description: Meloidogyne, Pratylenchus; Heterodera, Tylenchulus, Xiphinema, and Helicotylenchus etc.
- Study of symptoms caused by important nematode pests of cereals, vegetables, pulses, plantation crops etc.
- Methods of application of nematicides and organic amendments.

Suggested readings

1. Economic Nematology-Edited by J.M. Webster

2. Plant Parasitic Nematodes (Vol-1) by Zukerman, Mai, Rohde

Plant Parasitic Nematodes ofIndia: Problems and Progress by - Gopal Swarup, D. R. Dasgupta, P. K. Koshy.

4. Text book on Introductory Plant Nematology -R.K. Walia and H.K. Bajaj.

Course Code	**Course Title**	L	T	P	C
ASAGNF307	**Principles and Practices of Natural Farming**	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the microscopy and their handling techniques and staining procedures.

CO-2 Prepare the culture media and their applications and also understand various physical and chemical means of sterilization.

CO-3. Understand the role of microbes in soil fertility and crop production.

CO-4. Develop an understanding about the beneficial effect of soil microorganisms on plant community.

CO-5. Understand the nutrient sources and cycles.

Course Perspective: This course provides an understanding of the microbial world and its impact on agriculture. Students will learn about the various types of microorganisms, their functions, interactions with plants and soil, and their applications in agricultural practices. The course emphasizes the importance of microorganisms in soil health, nutrient cycling, disease suppression, and biocontrol.

Course Contents

Unit –1

Introduction to microbial world: Prokaryotic and eukaryotic microbes.

Unit –2

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

Unit –3

Role of microbes in soil fertility and crop production: Carbon, nitrogen, phosphorus and sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, bluegreen algae and mycorrhiza. Rhizosphere and phyllosphere.

Unit –4

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

Practical

Introduction to microbiology laboratory and its equipments; Microscope- parts, principles of

microscopy, resolving power and numerical aperture. Methods of sterilization. Nutritional media and their preparations. Enumeration of microbial population in soil- bacteria, fungi, actinomycetes. Methods of isolation and purification of microbial cultures. Isolation of *Rhizobium* from legume root nodule. Isolation of *Azotobacter*from soil. Isolation of *Azospirillum*from roots. Isolation of BGA. Staining and microscopic examination of microbes.

Suggested Readings:

Sr. No.	Textbooks
1.	Pelczar MJ, Chan ECS and Kreig NR, 1998, Microbiology. Tata McGraw Hill Publishing Co., Ltd., New Delhi.
	Reference Book
2.	Stanier RY, Ingraham, Wheelis MG and Paintor PR, 1986, The Microbiology World, Prentice Hall, New Jersey.
3.	Tauro P, Kapoor KK and Yadav KS, 1989, An Introduction to Microbiology, Wiley Publications, New Delhi.
4.	Alexander M, 1985, Introduction to Soil Microbiology, John Wiley and Sons , New York.
5.	Subba Rao, NS, 1999, Biofertilizers in Agricultural and Agroforestry, Oxford and IBH, New Delhi.

Semester-IV

SEC-VI as per table-1

Course Code	**Course Title**	L	T	P	C
	Crop Production Technology –II (*Rabi* Crops)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1: Identify the origin, geographical distribution, and economic importance of major Rabi crops, including cereals and pulses.

CO2: Explain the soil and climatic requirements, as well as cultural practices, for optimal cultivation of Rabi crops like wheat, chickpea, and mustard.

CO3: Analyze the yield potential of various Rabi crops by applying knowledge of their varieties and agricultural practices in different regions.

CO4: Develop a comprehensive management plan integrating soil health, crop selection, and cultural practices for sustainable production of Rabi crops, including forage and oilseeds.

Course Perspective: This course provides a comprehensive understanding of Rabi crops, focusing on their origin, distribution, and economic significance. Students will explore the specific soil and climatic requirements for cereals, pulses, oilseeds, and forage crops, gaining insights into their cultivation practices and yield optimization. By examining various varieties and cultural techniques, learners will develop the skills necessary to implement sustainable agricultural practices. Ultimately, the course aims to equip students with the knowledge to contribute to enhanced food security and agricultural productivity in Rabi cropping systems.

Course Contents

Unit –1

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: cereals –wheat and barley,

Unit –2

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: pulses-chickpea, lentil, peas,

Unit –3

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: oilseeds-rapeseed, mustard, and sunflower; sugar crops-sugarcane;

Unit –4

Origin, geographical distribution, economic importance, soil and climatic requirements, varieties, cultural practices, and yield of *Rabi* crops: Forage crops-berseem, lucerne, and oats.

Practical

Sowing methods of wheat and sugarcane, identification of weeds in *rabi*season crops, the study of morphological characteristics of *rabi* crops, the study of yield contributing characters of *rabi* season crops, yield and juice quality analysis of sugarcane, the study of important agronomic experiments of *rabi* crops at experimental farms. Study of *rabi*forage experiments, visits to research stations of related crops.

Suggested Readings:

Sr. No.	Textbooks
1.	Chatterjee, B.N. 1989. Forage Crop Production- Principles and Practices. Oxford and IBH . New Delhi.
	Reference Book
2.	Chidda Singh, Prem Singh and Rajbir Singh. 2003. Modern Techniques of Raising Field Crops (2nd ed.). Oxford and IBH, New Delhi.
3.	ICAR [Indian Council of Agricultural Research].2006. Hand Book of Agriculture. ICAR, New Delhi
4.	Pal, M., Deka, J., and Rai, R.K. 1996. Fundamentals of Cereal Crop Production. Tata McGraw Hill Pub., New Delhi
5.	Prasad, R. (ed.). 1999. A Text Book of Rice Agronomy, Jain Brothers, New Delhi,

Course Code	Course Title	L	T	P	C
	Production Technology for Ornamental Crops, MAP and Landscaping	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Identify different ornamental plants, medicinal and aromatic plants

CO-2. Understand about formal and informal garden

CO-3. Applying production technology of different flowers, medicinal and aromatic plants

CO-4. Prepare layout designs for gardens and other ornamental plants

Course Perspective: Production Technology for Ornamental Crops, Medicinal and Aromatic Plants (MAP), and Landscaping is a specialized course designed to provide in-depth knowledge about the cultivation and management of ornamental plants, medicinal and aromatic plants, and landscape design. This course focuses on production techniques, propagation methods, and maintenance practices tailored to a wide range of ornamental plants such as flowering plants, shrubs, and trees, as well as medicinal and aromatic species used in pharmaceuticals, cosmetics, and perfumery. Students will learn about the growing requirements for these plants, including soil preparation, irrigation, fertilization, pest and disease management, and post-harvest handling. The course also introduces key principles of landscape design, helping students to plan and develop gardens, parks, and urban green spaces that are aesthetically pleasing and environmentally sustainable. Additionally, it covers the economic importance of these crops in the floriculture and MAP industries, with a focus on market trends, value addition, and sustainable practices. By the end of the course, students will have the knowledge and skills to cultivate ornamental and MAP species and apply landscaping techniques to enhance the visual appeal and functional utility of outdoor spaces.

Course Contents

Unit –1

Importance and scope of ornamental crops, medicinal and aromatic plants, and landscaping. Principles of landscaping. Landscape uses trees, shrubs, and climbers.

Unit –2

Production technology of important cut flowers like rose, gerbera, carnation, Lilium, and orchids under protected conditions and gladiolus, tuberose, and chrysanthemum under open conditions. Package of practicesfor loose flowers like marigolds and jasmine under open conditions.

Unit –3

Production technology of important medicinal plants like ashwagandha, asparagus, aloe, coleus, Cinnamomum, periwinkle, isabgol and aromatic plants like mint, lemongrass, citronella, palmarosa, ocimum, rose, geranium, vetiver.

Unit –4

Processing and value addition in ornamental crops and MAPs produce.

Practical

Identification of Ornamental plants. Identification of Medicinal and Aromatic Plants. Nursery bed preparation and seed sowing. Training and pruning of Ornamental plants. Planning and layout of garden. Bed preparation and planting of MAP. Protected structures – care and maintenance. Intercultural operations in flowers and MAP. Harvesting and post-harvest handling of cut and loose flowers. Processing of MAP. Visit to commercial flower/MAP unit.

Suggested Readings:

Sr. No.	Textbooks
1.	Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi
	Reference Book
2.	Kirthikar.K.R. and Basu.B.D. 1993. Indian Medicinal Plants, Vol. 1-4. Lalit Mohan
3.	Kurian, A and Sankar, M.A.2007. Medicinal Plants. New India Publishing Agency, New Delhi

Course Code	Course Title	L	T	P	C
	Renewable Energy and Green Technology	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Familiarizationwith biomass utilization for biofuel production and their application.

CO-2 Handling of bioenergy resources and their utilization.

CO-3 Creating wastes recycling and renewable energy based efficient technologies.

CO-4 Applying techniques of waste and waste management

Course Perspective: This course provides an in-depth understanding of renewable energy sources, their technologies, and their applications in agriculture. Students will learn about the various forms of renewable energy, such as solar, wind, biomass, and hydroelectric power, and how these can be utilized to improve energy efficiency and sustainability in agricultural practices.

Course Contents

Unit –1

Classification of energy sources, contribution of these of sources in agricultural sector, Familiarization with biomass utilization for biofuel production and their application.

Unit –2

Familiarization with types of biogas plants and gasifiers, biogas, bio-alcohol, biodiesel and bio-oil production and their utilization as bioenergy resource.

Unit –3

Introduction of solar energy, collection, and their application. Familiarization with solar energy gadgets: solar cooker, solar water heater.

Unit –4

Application of solar energy: solar drying, solar pond, solar distillation, solar photovoltaic system and their application, introduction of wind energy and their application.

Practical

Familiarization with renewable energy gadgets. To study biogas plants. To study gasifier, To study the production process of biodiesel, To study briquetting machine, To study the production process of bio- fuels. Familiarization with different solar energy gadgets. To study solar photo-voltaic system: solar light, solar pumping, solar fencing. To study solar cooker, To study solar drying system. To study solar distillation and solar pond.

Suggested Readings:

Sr. No.	Textbooks
1.	Jeremy Shere, 2013, Renewable: The World-Changing Power of Alternative Energy, St. Martin's Press
	Reference Book
2.	Robert Ehrlich, 2013, Renewable Energy: A First Course, CRC Press
3.	David M. Buchla, Thomas E. Kissell, Thomas L. Floyd, 2014, Renewable Energy Systems, Pearson Publisher

Course Code	Course Title	L	T	P	C
	Problematic Soils and their Management	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1 Identify problematic soils and associated problems.

CO 2 Analyze soil physical and chemical properties and the factors affecting them.

CO 3 Applying efficient use of treated wastewater for prevention of soil degradation.

O 4 Identify hazards associated with irrigation water including salinity, sodicity and toxicity hazards

Course Perspective: This course provides an in-depth study of problematic soils, including saline, sodic, acidic, and waterlogged soils. Students will learn about the properties of these soils, their effects on plant growth, and the techniques for improving their condition and productivity through appropriate management practices.

Course Contents

Unit –1

Soil quality and health, Distribution of Waste land and problem soils in India. Their categorization based on properties.

Unit- 2

Reclamation and management of Saline and sodic soils, Acid soils, Acid Sulphate soils, Compacted soils, Flooded/ Waterlogged soils.

Unit- 3

Irrigation water – quality and standards, utilization of saline water in agriculture. Remote sensing and GIS in diagnosis and management of problem soils.

Unit- 4

Multipurpose tree species, bioremediation through MPTs of soils, land capability and classification, landsuitability classification. Problematic soils under different Agro-ecosystems.

Suggested Readings:

Sr. No.	Textbooks
1.	Adams, F., 1984. Soil Acidity and Liming. 2nd Edn, American Society of Agronomy, Madison, U.S.A.
	Reference Book
2.	Biswas, T.D. and S.K. Mukherjee .1995.Text book of Soil Science. Tata McGraw-Hill Publishing Company Limited, New Delhi.
3.	Das, D.K. 1997. Introductory Soil Science. Kalyani Publishers,
4.	Brady, N.C. and R.R. Well. 2007. The Nature and Properties of soil. 13th edition. Dorling Kindersley (India) Pvt. Ltd., New Delhi – 110092
5.	Das.D.K, 1997. Introductory Soil Science. Kalyani Publishers, New Delhi.

Course Code	Course Title	L	T	P	C
	Production Technology of Fruit and Plantation Crops	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1 Identify the different fruits and plantation crops.

CO-2 Applying production technology of different fruits and plantation crops

CO-3 Understanding the nutritional and economic value of fruits and plantation crops

CO-4 Use propagation methods for fruit and plantation crops.

CO-5 Preparation of plant bio regulators and their uses in insect & disease management

Course Perspective: Production Technology of Fruit and Plantation Crops is a course designed to provide cultivation technologies of fruit and plantation crops. This course covers the principles of orchard establishment, crop propagation, soil and water management, nutrient requirements, and pest and disease control for major fruit crops such as mango, banana, citrus, apple, and plantation crops like coconut, oil palm, coffee, and tea.

Students will explore climate and soil requirements for these crops, along with advanced cultivation methods like high-density planting, canopy management, and crop regulation. The course also emphasizes post-harvest handling, storage, processing, and marketing strategies to ensure profitability and sustainability in fruit and plantation crop production.

By the end of the course, students will be equipped with the practical and theoretical skills necessary to manage fruit orchards and plantation crops efficiently, ensuring high productivity and quality while addressing environmental and market demands.

Course Contents

Unit –1

Importance and scope of fruit and plantation crop industry in India; Importance of rootstocks;

Unit –2

Production technologies for the cultivation of tropical and sub-tropical fruits- mango, banana, citrus, grape, guava, litchi, papaya, sapota.

Unit –3

Production technologies for the cultivation of temperate fruits: apple, pear, peach, walnut, almond, strawberry and; minor fruits- date, *ber*, pineapple, pomegranate, jackfruit.

Unit –4

Production technologies for the cultivation of plantation crops-coconut, arecanut, cashew, tea, cocoa coffee & rubber.

Practical

Seed propagation. Scarification and stratification of seeds. Propagation methods for fruit and plantation crops. Description and identification of fruits. Preparation of plant bio regulators and their uses, Important pests, diseases and physiological disorders of above fruit and plantation crops, Visit to commercial orchards.

Suggested Readings:

Sr. No.	Textbooks
1.	Amar Singh, 1986. Fruit Physiology and Production. Kalyani Publishers, Delhi.
	Reference Book
2.	Bose, T.K, Mitra, S.K. and Sanyal, D. 2002. Fruits: Tropical and Subtropical. Vol. I and II, Nayaprakash Publications, Calcutta.
3.	Chadha, K.L.2001. Hand Book of Horticulture, ICAR, New Delhi.
4.	CPCRI, 2003. Coffee Guide, Central Coffee Research Institute, Coffee Board, Chickamangalur, Karnataka.
5.	Kumar.N, Abdul Khader.J.B.M. Rangaswami.P. and Irulappan., 1993. Introduction to Spices – Plantation Crops, Medicinal and Aromatic Plants, Rajalekshmi Pub, Nagercoil.

Course Code	Course Title	L	T	P	C
	Principles of Seed Technology	1	0	4	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Apply knowledge for production of quality seeds.

CO-2. Analyzing different methods of seed production and processing.

CO-3. Examine quality seed by using different seed testing methods.

CO-4. Evaluate present status of India for seed production.

Course Perspective: This course provides an in-depth understanding of seed technology, emphasizing the role of seeds in agriculture and their significance in crop production. Students will learn about various aspects of seed technology, including seed development, breeding, production, quality control, and seed marketing.

Course Contents

Unit –1

Seed and seed technology: introduction, definition and importance. Deterioration causes of crop varieties and their control; Maintenance of genetic purity during seed production, seed quality; Definition, Characters of good quality seed, different classes of seed.

Unit –2

Foundation and certified seed production of important cereals, pulses, oilseeds, fodder and vegetables. Seed certification, phases and procedure for seed certification, field inspection. Seed Act and Seed Act enforcement. Duty and powers of seed inspector, offences and penalties. Seeds Control Order 1983. Varietal Identification through Grow Out Test and Electrophoresis - Molecular and Biochemical test.

Unit –3

Detection of genetically modified crops, Transgene contamination in non-GM crops, and organic seed production. Seed drying, processing and their steps, seed testing for quality assessment, seed treatment, its importance, method of application and seed packing. Seed storage; general principles, stages and factors affecting seed longevity during storage. Measures for pest and disease control during storage.

Unit –4

Seed Processing plant and Seed marketing: structure and organization, sales generation activities, promotional media. Factors affecting seed marketing, Role of WTO and OECD in seed marketing. Private and public sectors and their production and marketing strategies.

Practical

Seed production in major cereals: Wheat, Rice, Maize, Sorghum, Bajra and Ragi. Seed production in major pulses: Urd, Mung, Pigeon pea, Lentil, Gram, Field bean, pea. Seed production in major oilseeds: Soybean, Sunflower, Rapeseed, Groundnut and Mustard. Seed production in important vegetable crops. Seed sampling and testing: Physical purity, germination, viability, etc. Seed and seedling vigour test. Genetic purity test: Grow out test and electrophoresis. Visit to seed production farms, seed testing laboratories and seed processing plant.

Suggested Readings:

Sr. No.	Textbooks
1.	Agrawal, P.K. 1994. Principles of Seed Technology, Kalyani Publishers, Ludhiana
	Reference Book
2.	Agrawal, R.L. 1990. Seed Technology Kalyani Publishers, Ludhiana
3.	Agrawal, P.K. and N. Dadlani 1995. Techniques in Seed Science and Technology
4.	Neal C. Stoskopf, Dwight T. Tomes and B.R. Christie. 2006. Plant Breeding Theory and Practice. Scientific Publishers (India), Jodhpur.
5.	Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers, Ludhiana

Course Code	Course Title	L	T	P	C
	Farming System & Sustainable Agriculture	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Define the key concepts of farming systems, including their types, components, and factors affecting their implementation.

CO2: Describe the principles of sustainable agriculture and the challenges it poses, as well as strategies for adaptation and mitigation.

CO3: Application: Evaluate various cropping systems and allied enterprises to determine their efficiencies and contributions to sustainable agriculture.

CO4: Design a site-specific integrated farming system model tailored to different agro-climatic zones, optimizing resource use and promoting environmental sustainability.

Course Perspective: This course delves into the complexities of modern agriculture, addressing both the challenges and opportunities within current farming systems. Students will explore the concept of farming systems, including their components and the factors influencing their effectiveness. Emphasis will be placed on sustainable agricultural practices, integrated farming systems, and resource optimization techniques. Through hands-on learning experiences and evaluations of cropping patterns and allied enterprises, participants will gain insights into the sustainable development of agricultural resources and the importance of environmental stewardship. Ultimately, the course aims to equip students with the skills needed to foster resilient agricultural practices in diverse agro-climatic zones.

Course Contents

Unit –1

Problems and prospects of present-day agriculture. Farming System-scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance,

Unit –2

Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and

efficiencies in cropping and farming system; Sustainable agriculture-problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability,

Unit –3

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

Unit –4

Resource cycling and flow of energy in different farming system, farming system and environment, Wasteland and their development, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

Suggested Readings:

Sr. No.	Textbooks
1.	Dahama,A.K. 2007. Organic Farming for Sustainable Agriculture. 2nd Edn. Published by AGROBIOS (India) Jodhpur
	Reference Book
2.	Gupta, P.K. 2006. Vermi-composting for Sustainable Agriculture. Published by AGROBIOS (India) Jodhpur
3.	Sharma, A.K. 2006. A Hand Book of Organic Farming. Published by AGROBIOS (India) Jodhpur
4.	Sharma, A.K. 2005. Biofertilizers for Sustainable Agriculture. Published by AGROBIOS (India) Jodhpur

Course Code	Course Title	L	T	P	C
	Agricultural Marketing Trade & Prices	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Define key concepts in agricultural marketing

CO2 Explain demand and supply dynamics in agricultural markets.

CO3 Use marketing strategies to enhance agricultural product marketability.

CO4 Assess government policies and their impact on agricultural marketing and trade.

Course Perspective: This course offers an in-depth exploration of marketing concepts within the agricultural sector. It covers definitions and classifications of agricultural markets, demand and supply dynamics. Students will learn about the product life cycle, competitive strategies, and effective pricing and promotion tactics. The course also examines the marketing process, including key functions like storage and transport, as well as marketing channels and the roles of various market functionaries. Additionally, it addresses the government's role in agricultural marketing, risks, agricultural pricing policies, and the implications of international trade frameworks such as GATT and WTO.

Course Contents

Unit –1

Agricultural Marketing: Concepts and definitions of the 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.

Unit –2

Producer's surplus – meaning and its types, marketable and marketed surplus, factors affecting marketablesurplus of agri-commodities; product life cycle (PLC) and competitive strategies: Meaning and stages in PLC; characteristics of PLC; strategies in different stages of PLC; pricing and promotion strategies: pricing considerations and approaches – cost-based and competition based pricing; market promotion – advertising, personal selling, sales

promotion and publicity – their meaning and merits & demerits; marketing process and functions.

Unit –3

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 products; Integration, efficiency, costs, and price spread: Meaning, definition and types of market integration; marketing efficiency; marketing costs, margins and price spread; factors affecting the cost of marketing; reasons for higher marketing costs of farm commodities; ways of reducing marketing costs

Unit –4

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

Practical

Plotting and study of demand and supply curves and calculation of elasticities**;** Study of relationship between market arrivals and prices of some selected commodities; Computation of marketable and marketed surplus of important commodities; Study of price behavior overtime for some selected commodities; Construction of index numbers; Visit to a local market to study various marketing functions performed by different agencies, identification of marketing channels for selected commodity, collectionof data regarding marketing costs, margins and price spread and presentation of report in the class; Visit to market institutions

– NAFED, SWC, CWC, cooperative marketing society, etc. to study their organization and functioning; Application of principles of comparative advantage of international trade.

Suggested Readings:

Sr. No.	Textbooks
1.	Acharya, S.S., Agarwal, N.L.1987. Agricultural Marketing in India. Oxford and IBH, New Delhi.
	Reference Book
2.	Acharya, S.S., Agarwal, N.L.1994. Agricultural Prices and Policy. Oxford and IBH, New Delhi.
3.	Philip, K. 2004. Principles of Marketing. Prentice Hall, New Delhi.

Course Code	Course Title	L	T	P	C
	Introductory Agro-meteorology & Climate Change	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Define key terms and concepts in agricultural meteorology

CO2: Explain the impact of weather patterns and climate variability on agricultural productivity.

CO3: Analyze weather data to assess climatic impacts on crops and livestock.

CO4: Evaluate adaptation strategies to mitigate the effects of climate change on agricultural systems.

Course Perspective: This course provides a foundational understanding of how weather and

climate impact agricultural practices. It covers essential concepts such as weather patterns, climate variability, and their effects on crop production and livestock management. Students will explore agro-meteorological principles, the challenges of climate change, and adaptation strategies. Through practical examples, learners will develop skills to analyze weather data and assess climate-related risks, aiming for sustainable agricultural practices.

Course Contents

Unit –1

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;

Unit –2

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, Energy balance of earth;

Unit –3

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

Unit –4

Agriculture and weather relations; Modifications of crop microclimate, climatic normal for crop and livestock production. Introduction to remote sensing and GIS. 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.

Practical

Visit of Agrometeorological Observatory, site selection of observatory, exposure of instruments and weather data recording. Measurement of total, shortwave, and longwave radiation, and its estimation using Planck's intensity law. Measurement of albedo and sunshine duration, computation of Radiation Intensity using BSS. Measurement of maximum and minimum air temperatures, its tabulation, trend, and variation analysis. Measurement of soil temperature and computation of soil heat flux. Determination of vapor pressure and relative humidity. Determination of dew point temperature. Measurement of atmospheric pressure and analysis of atmospheric conditions. Measurement of wind speed and wind direction, preparation of wind rose. Measurement, tabulation and analysis of rain. Measurement of open pan evaporation and evapotranspiration. Computation of PET and AET.

Suggested Readings:

Sr. No.	Textbooks
1.	Khadekar, S.R. 2001. Meteorology. Agromet publishers, Nagpur
	Reference Book
2.	Prasada Rao, G.S.L.H.V. 2005. Agricultural Meteorology. Second Edition. Keral Agricultural University, Thrissur.
3.	Varshneya, M.C. and Balakrishna Pillai, B. 2003. Textbook of Agricultural Meteorology. ICAR, New Delhi.
4.	Dash, S.K. and Rathore, L.S., 2011.Challenges and Opportunities in Agrometeorology

SEMESTER-V

Course Code	Course Title	L	T	P	C
	Principles of Integrated Pest and Disease Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1: Identify major pest and disease problems in different crops and ecosystems.

CO2: Describe the various tools and techniques used in pest and disease management.

CO3: Implement biological control techniques and cultural practices in an IPDM framework.

CO4: Analyze the relationship between pests, diseases, and environmental factors in crop production systems.

CO5: Assess the risks and benefits of chemical, biological, and cultural control methods within the IPDM approach.

CO6: Develop innovative solutions for complex pest and disease management challenges using an integrated approach.

Course Perspective: This course provides comprehensive knowledge about the various pests that affect crops and stored grains, their life cycles, damage potential, and management strategies. Students will learn to identify common pests, assess pest damage, and implement effective management techniques to reduce pest populations while minimizing environmental impact.

Course Contents

Unit –1

Categories of insect pests and diseases, IPM: Introduction, history, importance, concepts, principles and tools of IPM. Economic importance of insect pests, diseases and pest risk analysis. Methods of detection and diagnosis of insect pests and diseases.

Unit –2

Calculation and dynamics of economic injury level and importance of Economic threshold level. Methods of control: Host plant resistance, cultural, mechanical, physical, legislative, biological, and chemical control. Ecological management of crop environment.

Unit –3

Introduction to conventional pesticides for disease management. Survey surveillance and forecasting of diseases. Development and validation of IPM module.

Unit –4

Implementation and impact of IPM (IPM module for Insect pest and disease). Safety issues in pesticide uses. Political, social, and legal implications of IPM. Case histories of important IPM programmes. Case histories of important IPM program.

Practical

Methods of diagnosis and detection of various insect pests, and plant diseases, Methods of insect pests and plant disease measurement, Assessment of crop yield losses, calculations based on economics of IPM, Identification of biocontrol agents, different predators, and natural enemies. Mass multiplication of Trichoderma, Pseudomonas, Trichogramma, NPV,

etc. Identification and nature of damage of important insect pests and diseases and their management. Crop (agroecosystem) dynamics of a selected insect pest and diseases. Plan & assess preventive strategies (IPM module) and decision-making. crop monitoring attacked by insect, pest and diseases. Awareness campaign at farmers' fields.

Suggested Readings:

Sr. No.	Textbooks
1.	Agrios, G.N. 2003. Plant Pathology Academy Press. New York.
	Reference Book
2.	Dasgupta, M.K. 1998. Principles of Plant Pathology. Allied Publishers Pvt. Ltd. Bangalore
3.	Maloy. O.C. 1993. Plant Disease Control. Principles and Practice. John Wiley and Sons.Inc. New York
4.	Nene,Y.L. and Thapliyal,P.N. 1998. Fungicides in Plant Disease Control. Oxford and IBH New Delhi
5.	Singh. R.S 2002. Introduction to Principles of Plant Pathology. Oxford and IBH Publishing, New Delhi

Course Code	Course Title	L	T	P	C
	Manures, Fertilizers and Soil Fertility Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1: Understanding the importance of organic manures and Integrated nutrient management (INM).

CO-2: Applying appropriate fertilizer dose to the field.

CO-3: Evaluating soil fertility and plant nutrition deficiency in soil.

CO-4: Understanding soil chemistry and critical levels of different soil nutrients.

CO-5: Application of nutrients under rainfed and irrigated conditions.

Course Perspective: This course provides an in-depth understanding of soil fertility management, emphasizing the importance of manures and fertilizers in enhancing crop productivity. Students will learn about the chemistry and biology of soil, nutrient requirements of crops, and the application of different soil fertility management practices to optimize crop yields sustainably.

Course Contents

Unit –1

Introduction and importance of organic manures, properties and methods of preparation of bulky and concentrated manures. Green/leaf manuring. Fertilizer recommendation approaches. Integrated nutrient management.

Unit –2

Chemical fertilizers and types: classification, composition and properties of major nitrogenous, phosphatic and potassic fertilizers, secondary & micronutrient fertilizers, Complex fertilizers, nano- fertilizers Soil amendments, Fertilizer Storage, Fertilizer Control Order.

Unit –3

Soil fertility and productivity, plant nutrition. Criteria of essentiality. Role, deficiency and toxicity symptoms of essential plant nutrients, Mechanisms of nutrient transport to plants, factors affecting nutrient availability to plants.

Unit –4

Chemistry of soil nitrogen, phosphorus, potassium, calcium, magnesium, sulphur and micronutrients. Soil fertility evaluation, Soil testing. Critical levels of different nutrients in soil. Forms of nutrients in soil, plant analysis, rapid plant tissue tests. Fertilizers Indicator

plants (crop). Methods of fertilizer recommendations to crops. Factor influencing nutrient use efficiency (NUE), methods of application under rainfed and irrigated conditions.

Practical

Introduction of analytical instruments and their principles, calibration and applications, Colorimetry and flame photometry. Estimation of soil organic carbon, Estimation of alkaline hydrolysable N in soils. Estimation of soil extractable P in soils. Estimation of exchangeable K; Ca and Mg in soils. Estimation of soil extractable S in soils. Estimation of DTPA extractable Zn in soils. Estimation of N in plants. Estimation of P in plants. Estimation of K in plants. Estimation of S in plants.

Suggested Readings:

Sr. No.	Textbooks
1.	Burges, A, and Raw, F. 1967. Soil Biology. Acad. Press, New York
	Reference Book
2.	Donahu, L. R., Miller, W. R. and Shickuluna, 1977. Soils. Prentice Hall of India Pvt. Ltd., New Delhi
3.	Mengel, K.J. and Kirkby, A. 1978. Principles of Plant Nutrition. International Potash Institute,Switzerland
4.	Nyle.C. Brady 1995. The Nature and Properties of Soils. 10th Edn. Printice Hall India Pvt.. Ltd. NewDelhi
5.	Raymond W Miller and Roy L. Donahue. 1992. Soils and Introduction to Soils and Plant Growth. 6th edn. Printice Hall India pvt. Ltd. New Delhi

Course Code	Course Title	L	T	P	C
	Pests of Crops and Stored Grain and their Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Familiarized with identification of different insect pest of field, horticulture, ornamentals, vegetables and stored grains at the field level.

CO2: Understand identification of nature of damage and symptoms caused by the pest

CO3: Apply suitable technique for pest management for sustainable agriculture.

CO4: Analyze the manipulation in populations of beneficial and destructive species in agro ecosystem

CO 5: Evaluate the environmental impact on pest population.

CO6: Critically think new alternatives for insect pest management sustainably.

Course Perspective: This course provides comprehensive knowledge about the various pests that affect crops and stored grains, their life cycles, damage potential, and management strategies. Students will learn to identify common pests, assess pest damage, and implement effective management techniques to reduce pest populations while minimizing environmental impact.

Course Contents

Unit –1

General account of nature and type of damage by different arthropod pests. Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests of field crops, vegetable, fruit, and plantation crops

Unit –2

Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests of vegetable and fruit crops

Unit –3

Classification, host range, distribution, biology and bionomics, nature of damage, and management of major insect pests of plantation, ornamental, spices, and condiment crops.

Unit –4

Insect pests, mites, rodents, birds, and microorganisms associated with stored grain and their management. Storage structure and methods of grain storage.

Factors affecting losses of stored grain and role of physical, biological, mechanical and chemical factors in deterioration of grain.

Practical

Identification of various insect pests and their nature of damage on Field, Vegetable, Fruit, Plantation, spice crops & condiments. Identification and study of life cycle and seasonal history. Pesticide application techniques. Determination of insect infestation by different methods. Assessment of losses due toinsects. Calculations on the doses of insecticides application technique. Identification of insect pests and Mites, rodents, birds associated with stored grains and their management, assessment of losses due to insect pests. Determination of moisture content of grain. Methods of grain sampling under storage condition. Visit to Indian Storage Management and Research Institute, Hapur, Visit to nearby silos/ FCI godowns.

Suggested Readings:

Sr. No.	Textbooks
1.	Atwal, A. S. 1991. Agricultural Pests of India and South–East Asia. Kalyani Publishers, New Delhi. 529p.
	Reference Book
2.	David, B. V. 2001. Elements of Economic Entomology. Popular Book Depot, Madras, 536p.

3.	Ghosh, S. K. Dubey, S. L. 2003. Integrated Management of Stored Grain Pests. International Book Distributing Company. 263p.
4.	Nair, M. R. G. K. 1986. Insects and Mites of Crops in India. Indian Council of Agricultural Research, New Delhi. 267p.
5.	Pradhan, S. 1983. Agricultural Entomology and Pest Control. Indian Council of Agricultural Research, New Delhi. 267p.

Course Code	Course Title	L	T	P	C
	Diseases of Field and Horticultural Crops and their Management- I	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Identify the causal organisms (fungi, bacteria, viruses, nematodes) of key diseases in field and horticultural crops.

CO2: Describe the environmental factors that influence the occurrence and severity of diseases in crops.

CO3: Apply appropriate diagnostic methods for the identification of diseases in field and horticultural crops.

CO4: Analyze the interactions between crop, pathogen, and environment (disease triangle) in relation to disease development.

CO5: Assess the impact of emerging plant diseases on food security and crop production.

CO6: Develop innovative, environmentally sustainable solutions to manage crop diseases using advanced technology and research findings.

Course Perspective: This course provides an in-depth understanding of the various diseases that affect field and horticultural crops, emphasizing their identification, lifecycle, and management. Students will learn about the pathogens responsible for these diseases, their effects on crop yield and quality, and effective management practices to control them.

Course Contents

Unit –1

Symptoms, etiology, disease cycle and management of major diseases of Field Crops: Rice: blast, brown spot, bacterial blight, sheath blight, false smut, khaira and tungro; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra (pearl millet): downy mildew, powdery mildewand ergot; Groundnut: Tikka and wilt.

Unit –2

Symptoms, etiology, disease cycle and management of major diseases of Soybean: *Rhizoctonia* blight, bacterial spot, and mosaic; Pigeonpea:*Phytophthora* blight, wilt and sterility mosaic; Finger millet: Blast and leaf spot; black & greengram: *Cercospora* leaf spot and anthracnose, web blight and yellow mosaic.

Unit –3

Symptoms, etiology, disease cycle and management of major diseases of Horticultural Crops: Guava: wilt and anthracnose; Banana: Panama wilt, bacterial wilt, *Sigatoka* and bunchy top;

Papaya: foot rot, leaf curl and mosaic, Pomegranate: bacterial blight; Cruciferous vegetables: *Alternaria* leaf spot and black rot; Brinjal: *Phomopsis* blight and fruit rot and *Sclerotinia* blight.

Unit –4

Symptoms, etiology, disease cycle and management of major diseases of Tomato: damping off, wilt, early and late blight, leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot; Colocasia: *Phytophthora* blight; Tea: blister blight; Coffee: rust

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visits for the diagnosis of field problems. Collection and preservation of plant diseased specimens for Herbarium; Note: Students should submit 50 pressed and well-mounted specimens.

Suggested Readings:

Sr. No.	**Textbooks**
1.	Singh, R.S 2001. Plant Disease Management, Oxford and IBH Publishing Co N. Delhi.
	Reference Book
2.	Mehrotra. R. S. Plant Pathology. TATA Mechgrow Hill Pub. Co. N. Delhi.
3.	Ramakrishnan, T. S. 1971. Diseases of Millets. ICAR.
4.	Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.
5.	Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH Publishing Co.

Course Code	**Course Title**	L	T	P	C
	Crop Improvement-I (*Kharif* Crops)	1	0	2	2
Pre-requisites/Exposure	None				

Co-requisites	--

Course Outcomes: On completion of course, student will be: -

CO 1. Students will have knowledge on Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops grown during kharif season.

CO 2. Students will be able to know about plant genetic resources, its utilization and conservation

CO 3. Students will be able to know important concepts of breeding self-pollinated, cross-pollinated and vegetative-propagated crops of kharif season.

CO 4. Students will know about major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids.

CO 5. Students will have adequate practical knowledge on emasculation and hybridization techniques in self & cross pollinated crops of kharif season.

Course Perspective: This course provides comprehensive knowledge on the breeding techniques, varietal development, and genetic improvement of Kharif crops such as rice, maize, sorghum, pearl millet, groundnut, cotton, and pigeon pea. The focus is on improving the productivity, disease resistance, and stress tolerance of these crops, which are crucial to food security and agricultural sustainability in tropical and subtropical regions. The course also covers the role of biotechnology and advanced breeding tools in Kharif crop improvement.

Course Contents

Unit –1

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops.

Unit –2

Plant genetic resources, their utilization and conservation, study of genetics of qualitative and quantitative characters.

Unit –3

Major breeding objectives and procedures include conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and biotic stress

toleranceand quality (physical, chemical, nutritional).

Unit –4

Hybrid seed production technology in Maize, Rice, Sorghum, Pearl millet and Pigeonpea, etc. Ideotype concept and climate resilient crop varieties for the future.

Practical

Floral biology, emasculation and hybridization techniques in different crop species; viz., Rice, Jute, Maize, Sorghum, Pearl millet, Ragi, Pigeonpea, Urd bean, Mungbean, Soybean, Groundnut, Sesame, Caster, Cotton, Cowpea, Tobacco, Brinjal, Okra and Cucurbitaceous crops. Maintenance breeding of different *Kharif* crops. Study of field techniques for seed production and hybrid seeds production in *Kharif*crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, donor parents for different characters; Visit to seed production plots; Visit to AICRPplots of different field crops.

Suggested Readings:

S. No.	**Textbooks**
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B.D.Singh 2015 Plant Breeding. Principles & Methods. Kalyani Publishers.10 th Edition.

Course Code	Course Title	L	T	P	C
	Entrepreneurship Development and Business Communication	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO1. Define key concepts and characteristics of entrepreneurs and relevant government policies.

CO2. Explain the impact of economic reforms on agribusiness and entrepreneurship development.

CO3. Use organizational and managerial skills for effective business leadership in agriculture.

CO4. Analyze project planning and financing strategies to identify agri-entrepreneurship opportunities.

Course Perspective: This course provides an in-depth understanding of entrepreneurship concepts, characteristics, and the role of government policies in promoting entrepreneurial growth, especially in agribusiness. It explores the impact of economic reforms on agricultural enterprises and focuses on essential business leadership and managerial skills. Students will engage in project planning, financial management, and identify opportunities for agri-entrepreneurship and rural enterprise development.

Course Contents

Unit –1

Concept of Entrepreneur, Entrepreneurship Development, Characteristics of entrepreneurs; SWOT Analysis & achievement motivation, Government policy and programs and institutions for entrepreneurship development.

Unit –2

Impact of economic reforms on Agribusiness/ Agri-enterprises, Entrepreneurial Development Process; Business Leadership Skills.

Unit –3

Developing organizational skill (controlling, supervising, problem solving, monitoring & evaluation), Developing Managerial skills, Business Leadership Skills (Communication,

direction and motivation Skills), Problem solving skill, Supply chain management and Total quality management.

Unit –4

Project Planning Formulation and report preparation; Financing of enterprise, Opportunities for agri- entrepreneurship and rural enterprise.

Practical

Assessing entrepreneurial traits, problem solving skills, managerial skills and achievement motivation, exercise in creativity, time audit through planning, monitoring and supervision, identification and selection of business idea, preparation of business plan and proposal writing, visit to entrepreneurship development institute and entrepreneurs.

Suggested Readings:

Sr. No.	Books
1.	Downey,W.D., Troche, J.K. 1981. Agribusiness Management. Mc Graw Hill Inc.,New Delhi
	Reference Book
2.	Gittinger, J.P.1982. Economic Analysis of Agricultural Projects. The Johns Hopkins University Press,Baltimore
3.	Alagumani, T., Chinnaiyan, P.,Elangovan, S.1998. Agricultural Management. Publishers K9 International, Madurai.
4.	Philip,K. 2004. Marketing Management. Prentice Hall, New Delhi.

Course Code	Course Title	L	T	P	C
	Geo-informatics and Nanotechnology and Precision Farming	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO. 1 Define and describe key concepts in precision agriculture, geoinformatics, and their applications in Indian agriculture.

CO2. Apply geospatial technologies and remote sensing techniques to soil mapping, crop discrimination, and yield monitoring.

CO3. Analyze the impact of nanotechnology on agricultural productivity through the use of nano-pesticides, nano-fertilizers, and nano-sensors.

CO4. Design effective land use plans by evaluating soil suitability and land capability for various crops, integrating precision agriculture techniques.

Course Perspective: This course explores the principles and applications of precision agriculture, focusing on innovative techniques and geoinformatics to enhance agricultural practices in India. Students will learn about crop discrimination, yield monitoring, and soil mapping using geospatial technologies and remote sensing. The course also covers the use of crop simulation models and the STCR approach for optimizing agricultural inputs, along with the role of nanotechnology in improving farm productivity through advanced materials. Additionally, it emphasizes land use planning, evaluating soil suitability, and understanding land capability classification to inform effective agricultural decision-making.

Course Contents

Unit –1

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

Unit –2

Crop discrimination and Yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies; Spatial data and their management in GIS; Remote sensing concepts and application in agriculture; Basic concepts of remote sensing and GIS; Global positioning system (GPS), components and its functions.

Unit –3

Introduction to crop Simulation Models and their uses for optimization of Agricultural Inputs; STCR approach for precision agriculture; Nanotechnology, definition, concepts and techniques, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling-up farm productivity.

Unit –4

Land use planning: concept, techniques and factors governing present land use; land evaluation methods and soil suitability evaluation for different crops; land capability classification and constraints in application.

Practical

Introduction to GIS software, spatial data creation and editing. Introduction to image processing software. Visual and digital interpretation of remote sensing images. Use of aerial photographs, RS imagery, toposheets and other maps; ground truth study using GPS and visual markings; supervised and unsupervised classification of digital image; Fertilizers recommendations based of VRT and STCR techniques. Crop stress (biotic/abiotic) monitoring using geospatial technology. Use of GPS for agricultural survey. Formulation, characterization and applications of nanoparticles in agriculture. Projectsformulation and execution related to precision farming

Suggested Readings:

Sr. No.	Textbooks
1.	John V. S. (2005). Precision Agriculture.
	Reference Book

2.	Pedersen, S. M and Martin, K. (2017). Precision Agriculture: Technology and Economic Perspectives.
3.	Srinivasan, A. (2006). Handbook of Precision Agriculture: Principles and Applications
4.	Rattan Lal, B.A. Stewar (2015). Soil-Specific Farming: Precision Agriculture
5.	National Academy Press, Washington, D.C. (1997).Precision Agriculture in the 21st Century: Geospatial and Information Technologies. National Academies

Course Code	**Course Title**	L	T	P	C
	Intellectual Property Rights	1	0	0	1
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course student will be:-

CO 1. Knowledge on meaning of intellectual property, GATT, WTO, TRIPs and WIPO, Treaties for IPR protection.

CO 2. Understand the types of Intellectual Property and legislations covering IPR in India viz., Patents, Copyrights, Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets.

CO 3. Patent Cooperation Treaty, Patent search and patent database.

CO 4. Students CBD, ITPGRFA and Indian Biological Diversity Act, 2002 and its salient features, access and benefit sharing.

Course Perspective: This course provides a foundational understanding of intellectual property rights with a specific focus on agriculture. It addresses the different types of IPR, including patents, trademarks, plant variety protection, and geographical indications, and their significance in the agricultural sector. The course emphasizes how IPR encourages innovation and commercialization of new agricultural technologies, plant varieties, and products.

Course Contents

Unit –1

Introduction and meaning of intellectual property, brief introduction to GATT, WTO, TRIPs and WIPO, Treaties for IPR protection: Madrid protocol, Berne Convention, Budapest treaty, *etc.*

Unit –2

Types of Intellectual Property and legislations covering IPR in India:-Patents, Copyrights Trademark, Industrial design, Geographical indications, Integrated circuits, Trade secrets. Patents Act 1970 and Patent system in India, patentability, process and product patent, filing of patent, patent specification, patent claims, Patent opposition and revocation, infringement, compulsory licensing, Patent Cooperation Treaty, Patent search and patent database.

Unit –3

Origin and history including a brief introduction to UPOV for protection of plant varieties, Protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, Registration of plant varieties under PPV&FR Act 2001, breeders, researcher and farmers rights.

Unit –4

Traditional knowledge-meaning and rights of TK holders. Convention on Biological Diversity, International treaty on plant genetic resources for food and agriculture (ITPGRFA). Indian Biological Diversity Act, 2002 and its salient features access and benefit sharing.

Suggested Readings:

S. No.	**Textbooks**
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B. D. Singh 2015 Plant Breeding. Principles & Methods. Kalyani Publishers.10 th Edition.

Course Code	Course Title	L	T	P	C
	Practical Crop Production – I (*Kharif* crops)	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. The student gains a thorough knowledge on basic production technology of kharif crop production.

CO-2. To aquatint the students with modern technologies right from field preparation to marketing by allotting specific crop to each students.

CO-3. Familiarize on basic techniques of field production of kharif crops.

CO-4. Students will be able to apply different field techniques for the production of kharif crops.

CO-5. Students will be able to apply their knowledge to solve problems related to plant growth, crop production and natural resource management of kharif crops

CO-6. Practical knowledge on management of kharif crops.

Course Perspective: The Practical Crop Production – I (Kharif Crops) course focuses on the hands-on experience and practical skills necessary for the successful cultivation of Kharif crops. This course emphasizes the application of theoretical knowledge gained in lectures and other related courses, enabling students to gain practical insights into crop production practices specific to the Kharif season.

Practical

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

SEMESTER-VI

Course Code	Course Title	L	T	P	C
	Diseases of Field and Horticultural Crops and their Management-II	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1: Identify the causal organisms (fungi, bacteria, viruses, nematodes) of key diseases in field and horticultural crops.

CO2: Describe the environmental factors that influence the occurrence and severity of diseases in crops.

CO3: Apply appropriate diagnostic methods for the identification of diseases in field and horticultural crops.

CO4: Analyze the interactions between crop, pathogen, and environment (disease triangle) in relation to disease development.

CO5: Assess the impact of emerging plant diseases on food security and crop production.

CO6: Develop innovative, environmentally sustainable solutions to manage crop diseases using advanced technology and research findings.

Course Perspective: The Diseases of Field and Horticultural Crops and Their Management - II course focuses on advanced concepts in plant pathology, emphasizing the identification, biology, and management of diseases affecting field and horticultural crops. Building on the foundational knowledge gained in the first part of the course, this module explores additional disease types, their control methods, and emerging trends in disease management.

Course Contents

Unit –1

Symptoms, etiology, disease cycle and management of diseases of Field Crops: Wheat: rusts, loose smut, Karnal bunt, powdery mildew, *Alternaria* blight, and ear cockle/*molya disease*; Sugarcane: red rot, smut, wilt, grassy shoot, ratoon stunting and Pokkah Boeng; Maize: stalk rots, downy mildew, leaf spots; Sorghum: smuts, grain mold and anthracnose, Bajra :downy mildew and ergot; Groundnut: early and late leaf spots, wilt.

Unit –2

Symptoms, etiology, disease cycle and management of diseases of Sunflower: Sclerotinia stem rot and Alternaria blight; Mustard: Alternaria blight, white rust, downy mildew and Sclerotinia stem rot; chickpea: wilt, grey mould and Ascochyta blight; Cotton: anthracnose, vascular wilt, and black arm; Pea: downy mildew, powdery mildew and rust.

Unit –3

Symptoms, etiology, disease cycle and management of diseases of Horticultural Crops: Mango: anthracnose, malformation, bacterial blight and powdery mildew; Citrus: canker and gummosis; Grape vine: downy mildew, Powdery mildew and anthracnose; Apple: scab, powdery mildew, fire blight and crown gall; Peach: leaf curl. Strawberry: leaf spot Potato: early and late blight, leaf roll, and mosaic.

Unit –4

Symptoms, etiology, disease cycle and management of diseases of Cucurbits: downy mildew, powdery mildew, wilt; Onion and garlic: purple blotch, and Stemphylium blight; Chillies: anthracnose and fruit rot, wilt and leaf curl; Turmeric: leaf spot, Rose: dieback, powdery mildew and black leafspot. Brinjal: Phomopsis blight and fruit rot and Sclerotinia blight; Tomato: damping off, wilt, early and late blight, buck eye rot and leaf curl and mosaic; Okra: Yellow Vein Mosaic; Beans: anthracnose and bacterial blight; Ginger: soft rot.

Practical

Identification and histopathological studies of selected diseases of field and horticultural crops covered in theory. Field visit for the diagnosis of field problems. Collection and preservation of plant diseased specimens for herbarium.

Note: Students should submit 50 pressed and well-mounted specimens.

Suggested Readings:

Sr. No.	Textbooks
1.	Singh, R.S 2001. Plant Disease Management, Oxford and IBH Publishing Co. N. Delhi.
	Reference Book
2.	Mehrotra. R. S. Plant Pathology. TATA Mechgrow Hill Pub. Co. N. Delhi.
3.	Ramakrishnan, T. S. 1971. Diseases of Millets. ICAR.
4.	Sharma, P. D. 2001. Plant Pathology, Rastogi Publications, Shivaji Road, Meerut.
5.	Singh, R. S. 1995. Diseases of Vegetables Crops. Oxford and IBH Publishing Co.

Course Code	Course Title	L	T	P	C
	Rainfed Agriculture & Watershed Management	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1 The time concept relates to increasing the intensity of cropping under assured irrigated conditions.

CO -2 Effectively managing water to meet food and Environmental conditions.

CO- 3 The vast potential of rainfed agriculture through knowledge based management of natural resources.

CO -4 To Efficient and sustainable use of natural resources.

CO -5 Low-cost and environment-friendly soil and water conservation measures throughout the top sequence for more equitable benefits to a large number of farmers.

CO- 6 Income-generating activities for the landless and women.

Course Perspective: The Rainfed Agriculture & Watershed Management course focuses on the principles and practices of managing rainfed farming systems and watershed areas. It aims to equip students with the knowledge and skills needed to enhance productivity and sustainability in rainfed agricultural systems while effectively managing water resources and soil health.

Course Contents

Unit –1

Rainfed agriculture: Introduction, types, climatic and edaphic characteristics, History of rainfed agriculture and watershed in India; Problems and prospects of rainfed agriculture in India.

Unit –2

Soil and climatic conditions prevalent in rainfed areas; Soil and water conservation techniques, Drought: types, effect of water deficit on physio-morphological characteristics of the plants, Crop adaptation and mitigation to drought.

Unit –3

Management strategies of rainfed crops; critical stages of life saving irrigations. Water harvesting: importance, its techniques, efficient utilization of water through soil and crop management practices, Management of crops in rainfed areas.

Unit –4

Contingent crop planning for aberrant weather conditions, Concept, objective, principles and components of watershed management, factors affecting watershed management. Study of mulches and anti- transparent; water harvesting and moisture conservation; principles of intercropping, cropping systems/intercropping in rainfed agriculture.

Practical

Studies on climate classification, studies on rainfall patterns in rainfed areas of the country, and pattern of onset and withdrawal of monsoons. Studies on cropping pattern of different rainfed areas in the country and demarcation of rainfed areas on map of India. Interpretation of meteorological data and scheduling of supplemental irrigation on the basis of evapotranspiration demand of crops. Critical analysis of rainfall and possible drought period in the country, effective rainfall and its calculation. Studies on cultural practices for mitigating moisture stress. Characterization and delineation of model watershed. Field demonstration on soil & moisture conservation measures. Field demonstration on construction of water harvesting structures. Visit to rainfed research station/watershed**.**

Suggested Readings:

Sr. No.	Textbooks
1.	Gurmel Singh, C. Venkataraman, G., Sastry,B. and Joshi, P. 1990. Manual of Soil and Water Conservation Practices. Oxford and IBH Publishing Co., New Delhi.
	Reference Book
2.	Hansen, V.E., Israelsen, O.W., and Stringham, G.E. 1979. Irrigation Principles and Practices (4th ed.). John Wiley and Sons, New York
3.	IARI [Indian Agricultural Research Institute]. 1977. Water Requirement and Irrigation Management ofCrops in India, IARI Monograph No.4, Water Technology Centre, IARI, New-Delhi.
4.	Lenka, D. 2001. Irrigation and Drainage. Kalyani Publishers, New-Delhi.
5.	Mal, B. C.2002. Introduction to Soil and Water Conservation Engineering, Kalyani Publishers, New- Delhi.

Course Code	Course Title	L	T	P	C
	Post-harvest Management and Value Addition of Fruits and Vegetables	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcome: On completion of course, student will be: -

CO-1. Understanding of post-harvest management of fruits and vegetables.

CO-2. Understand value added product fruits and vegetables

CO-3. Students will know about maturity indices of different fruits and vegetables

CO-4. Students will able to know about the preparation of jam, jelly etc

CO-5. Students will able to know about preservation of different fruits and vegetables and also able to know about different methods of preservation

CO-6. Students will able to know about the different storage and packaging methods of fruits and vegetables

Course Perspective: Post-Harvest Management and Value Addition of Fruits and Vegetables is a course focused on the techniques and practices used to minimize post-harvest losses and enhance the value of fruits and vegetables. It covers various aspects of handling, storage, and transportation to maintain the quality, freshness, and nutritional value of produce after harvest. Students will learn about the physiological changes that occur post-harvest, as well as the factors affecting shelf life, including temperature, humidity, and microbial spoilage.The course also emphasizes value addition techniques, such as processing, preservation, packaging, and marketing, to extend the usability and profitability of fruits and vegetables. It introduces modern technologies like cold storage, controlled atmosphere storage, and minimally processed foods, along with the principles of food safety and quality control. By the end of the course, students will be equipped with the knowledge and skills to implement effective post-harvest management strategies and develop value-added products that meet consumer demands while reducing food wastage and increasing economic returns.

Course Contents

Unit –1

Importance of post-harvest processing of fruits and vegetables, extent and possible causes of post

harvest losses

Unit –2

Pre-harvest factors affecting postharvest quality, maturity, ripening and changes occurring during ripening; Respiration and factors affecting respiration rate;

Unit –3

Harvesting and field handling; Storage (ZECC, cold storage, CA, MA, and hypobaric); Value addition concept

Unit –4

Principles and methods of preservation; Intermediate moisture food- Jam, jelly, marmalade, preserve, candy – Concepts and Standards; Fermented and non-fermented beverages. Tomato products- Concepts and Standards; Drying/ Dehydration of fruits and vegetables – Concept and methods, osmotic drying. Canning- Concepts and Standards, packaging of products.

Practical

Applications of different types of packaging, containers for shelf life extension. Effect of temperature on shelf life and quality of produce. Demonstration of chilling and freezing injury in vegetables and fruits. Extraction and preservation of pulps and juices. Preparation of jam, jelly, RTS, nectar, squash, osmotically dried products, fruit bar and candy and tomato products, canned products. Quality evaluation of products -- physico-chemical and sensory. Visit to processing unit/ industry.

Suggested Readings:

Sr. No.	Textbooks
1.	Wills, R. B. H. 1998. Postharvest, UNSW Press.
	Reference Book
2.	Shewfelt, R. L. and Stanley, P. E. 1992. Post Harvest Handling: A Systems Approach, Academic Press Inc.
3.	Prusky, D. and Gullino, M. L. 2010. Postharvest Pathology, Springer.

Course Code	Course Title	L	T	P	C
	Protected Cultivation and Secondary Agriculture	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concepts of protected cultivation.

CO -2. Creating a design improved protected cultivation measures.

CO-3. Applying techniques of secondary agriculture.

CO- 4. Analyzing the constructional methods and economy of poly house and greenhouse

CO 5. Space utilization pertains to building up of vertical dimension through multi-tier cropping and farming system approach.

Course Perspective: Protected Cultivation and Secondary Agriculture is a course designed to provide students with an understanding of advanced agricultural practices that enhance crop production through controlled environments. This course focuses on protected cultivation techniques such as greenhouses, shade houses, and net houses, which enable the growth of high-value crops in a regulated setting. Students will learn about the design, construction, and management of these structures, along with environmental control systems, irrigation techniques, and pest management strategies. Additionally, the course explores the concept of secondary agriculture, which includes value-added activities such as processing, packaging, and marketing of agricultural products. Students will gain insights into the economic potential of secondary agriculture and the importance of integrating these practices into the overall agricultural system to maximize profitability and sustainability. By the end of the course, students will be equipped with the knowledge and skills to implement protected cultivation methods and engage in secondary agricultural practices, contributing to increased production efficiency and enhanced marketability of crops.

Course Contents

Unit –1

Green house technology: Introduction, Types of Green Houses, Plant response to Green house environment, Planning and design of greenhouses, Design criteria of green house for cooling and heating purposes.

Unit –2

Green house equipments, materials of construction for traditional and low cost green houses. Irrigation systems used in greenhouses, typical applications, passive solar greenhouse, hot air green house heating systems, green house drying, Cost estimation and economic analysis.

Unit –3

Important Engineering properties such as physical, thermal and aero & hydrodynamic properties of cereals, pulses and oilseed, their application in PHT equipment design and operation.

Unit –4

Drying and dehydration; moisture measurement, EMC, drying theory, various drying method, commercial grain dryer (deep bed dryer, flat bed dryer, tray dryer, fluidized bed dryer, re-circulatory dryer and solar dryer). Material handling equipment; conveyer and elevators, their principle, working and selection.

Practical

Study of different type of green houses based on shape. Determination of the rate of air exchange in an active summer-winter cooling system. Determination of drying rate of agricultural products inside green house. Study of greenhouse equipment's. Visit to various Post Harvest Laboratories. Determination of Moisture content of various grains by oven drying & infrared moisture methods. Determination of engineering properties (shape and size, bulk density and porosity of biomaterials). Determination of Moisture content of various grains by moisture meter. Field visit to seed processing plant.

Suggested Readings:

Sr. No.	Textbooks
1.	Balraj Singh. 2005. Protected Cultivation Of Vegetable Crops, Kalyani Publishers
	Reference Book
2.	Brahma Singh. 2015. Advances in Protected Cultivation, New India Publishing Agency.
3.	Dahiya, B.S.; Rai, K.N. 1995 Seed Technology, Kalyani Publishers, Ludhiana

Course Code	Course Title	L	T	P	C
	Management of Beneficial Insects	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Familiarize with the importance of beneficial insects

CO2 Understand and identify the different species and their utilization for different purposes

CO3 Apply different rearing techniques to multiply the beneficial insects

CO4 Analyze the effect of pathogenic diseases and natural enemies on beneficial insects

CO5 Evaluate the quality of produce by different breeds of silkworm and different crops of lac insect from different season.

Course Perspective: The Management of Beneficial Insects course focuses on the identification, biology, and management of beneficial insects that play a crucial role in agriculture. It emphasizes the importance of these insects in promoting sustainable agricultural practices, enhancing crop yields, and managing pest populations through biological control.

Course Contents

Unit –1

Importance of beneficial Insects, pollinators and their role in cross pollinated crops, Beekeeping, bee biology, Bee pasturage, bee foraging and communication commercial methods of rearing, equipment used, seasonal management, bee enemies, Insect pests and diseases of honey bee.

Unit –2

Types of silkworm, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Rearing, mounting and harvesting of cocoons. Pest and diseases of silkworm, management, rearing appliances of mulberry silkworm and methods of disinfection.

Unit –3

Species of lac insect, morphology, biology, host plant, lac production – seed lac, button lac, shellac, lac- products. Identification of major parasitoids and predators commonly being used in biological control.

Unit –4

Insect orders bearing predators and parasitoids used in pest control and their mass multiplication techniques. Important species of pollinator, weed killers and scavengers with their importance.

Practical

Honey bee species, castes of bees. Beekeeping appliances and seasonal management, bee enemies and disease. Bee pasturage, bee foraging and communication. Types of silkworms, voltinism and biology of silkworm. Mulberry cultivation, mulberry varieties and methods of harvesting and preservation of leaves. Species of lac insect, host plant identification. Identification of other important pollinators, weed killers and scavengers. Visit to research and training institutions devoted to beekeeping, sericulture, lac culture and natural enemies. Identification and techniques for mass multiplication of natural enemies.

Suggested Readings:

Sr. No.	Textbooks
1.	David, B.V. and Kumaraswami, T. 1996 Elements of Economic Entomology. Popular Book Depot, Madras. 536 p.

Course Code	Course Title	L	T	P	C
	Crop Improvement-II (*Rabi* crops)	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Analyzing distribution of species, wild relatives of cereals; pulses; oilseeds; fibers; fodders and cash crops; vegetable and horticultural crops.

CO 2. Identification plant genetic resources, its utilization and conservation

CO3. Handling hybridization techniques for self-pollinated, cross pollinated and vegetative propagated crops including conventional and modern innovative approaches for Rabi season.

CO 4. Applying emasculation and pollination techniques in self & cross pollinated crops.

Course Perspective: This course covers the genetic principles and breeding techniques used in the improvement of major Rabi crops. It focuses on the development of varieties with improved yield, disease resistance, and stress tolerance (frost, drought, and salinity) to ensure stable crop production in winter season agriculture. The role of modern plant breeding technologies, including molecular breeding and biotechnology, in improving Rabi crops is also emphasized.

Course Contents

Unit –1

Centers of origin, distribution of species, wild relatives in different cereals; pulses; oilseeds; fodder crops and cash crops; vegetable and horticultural crops.

Unit –2

Plant genetic resources, its utilization and conservation; study of genetics of qualitative and quantitative characters.

Unit –3

Major breeding objectives and procedures including conventional and modern innovative approaches for development of hybrids and varieties for yield, adaptability, stability, abiotic and

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

Unit –4

Hybrid seed production technology of *rabi* crops. Ideotype concept and climate resilient crop varieties for future.

Practical

Floral biology, emasculation and hybridization techniques in different crop species namely Wheat, Oat, Barley, Chickpea, Lentil, Field pea, Rajma, Horse gram, Rapeseed Mustard, Sunflower, Safflower, Potato, Berseem. Sugarcane, Tomato, Chilli and Onion. Study of field techniques for seed production and hybrid seeds production in *Rabi* crops; Estimation of heterosis, inbreeding depression and heritability; Layout of field experiments; Study of quality characters, study of donor parents for different characters; Visit to seed production plots; Visit to AICRP plots of different field crops

Suggested Readings:

S. No.	**Textbooks**
1.	Strickberger, M.W. 1996. Genetics (3rd edn.). Mac Millan Publishing Co., New Delhi
	Reference Book
2.	B.D.Singh, 2015, Plant Breeding. Principles & Methods,10th edition, Kalyani Publishers, New Delhi.

Course Code	**Course Title**	L	T	P	C
	Practical Crop Production –II (*Rabi* crops)	0	0	4	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Applying package, practices, and technology of *Rabi* crops cultivation.

CO-2. Creating a layout for crop cultivation

CO-3. Analyze the soil and climate condition for selection a variety for cultivation

CO-4. Calculate the seed rate and fertilizer doses and prepare a balance sheet for economics

Course Perspective: The Practical Crop Production – II (Rabi Crops) course focuses on hands-on experience and practical skills necessary for the successful cultivation of Rabi crops. This course builds on the theoretical knowledge acquired in previous courses, allowing students to gain practical insights into crop production practices specific to the Rabi season.

Practical

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

Course Code	Course Title	L	T	P	C
	Principles of Organic Farming	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the concept of organic farming for India

CO-2. Identifying the resources of organic farming

CO-3. Applying the organic component in organic cultivation

CO -4. Understanding the certification process of organic farming

Course Perspective: "Principles of Organic Farming" The course "Principles of Organic Farming" provides a comprehensive understanding of organic farming practices and their significance in the current agricultural landscape. It emphasizes the principles and relevance of organic farming, especially within the context of India, and explores its potential for sustainable agriculture. By the end of the course, students will be well-versed in the principles of organic farming, equipped with practical knowledge to implement sustainable farming practices, and prepared to contribute to the growth and development of organic agriculture in India and beyond.

Course Contents

Unit –1

Organic farming, principles, relevance in the present context and its scope in India; Initiatives taken by Government (central/state), NGOs, and other organizations for the promotion of organic agriculture.

Unit –2

Organic ecosystem and their concepts; Organic nutrient resources and their fortification; Restrictions to nutrient use in organic farming; vermicomposting, green manuring, recycling of organic residues, bio- fertilizers.

Unit –3

Choice of crops and varieties in organic farming; Fundamentals of insect, pest, disease, and weed management under organic mode of production.

Unit –4

Operational structure of NPOP; Certification process and standards of organic farming; Processing, leveling, economic considerations and viability, marketing and export potential of organic products.

Practical

Visit of organic farms to study the various components and their utilization; Preparation of enrich compost, vermicompost, bio-fertilizers/bio-inoculants and their quality analysis; Indigenous technology knowledge (ITK) for nutrient, insect, pest disease and weed management; Cost of the organic production system; Post harvest management; Quality aspect, grading, packaging and handling.

Suggested Readings:

Sr. No.	Textbooks
1.	Wishwall, R. The Organic Farmer's Business Handbook
	Reference Book
2.	Sapna E. Thottathi. India's Organic Farming Revolution: What It Means for Our Global Food System
3.	Tripathy, P. and Thapa, U. Organic Farming In India
4.	Balasubramanian, R., Balakrishnan, K. and Sivasubr, K. Principles &Practices of Organic Farming

Course Code	Course Title	L	T	P	C
	Farm Management, Production & Resource Economics	1	0	2	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concept of farm management, objectives and relationship with other sciences.

CO -2. Evaluate the farm income.

CO -3. Analyzing loss and profit of farm production

CO 4. Understanding the importance of natural resources economics.

Course Perspective: The Farm Management, Production & Resource Economics course provides an in-depth understanding of the principles and practices of farm management and the economic factors influencing agricultural production. The course emphasizes decision-making processes, resource allocation, and financial planning necessary for efficient farm operations.

Course Contents

Unit –1

Meaning and concept of farm management, objectives, and relationship with other sciences. Meaning and definition of farms, their types, and characteristics, factors determining types and size of farms. Principles of farm management: the concept of production function and its type, use of production function in decision- making on a farm, factor-product, factor-factor and product-product relationship, law of equi-marginal/or principles of opportunity cost, and law of comparative advantage.

Unit –2

Meaning and concept of cost, types of costs and their interrelationship, the importance of cost in managing farm business, and estimation of gross farm income, net farm income, family labour income and farm business income. Farm business analysis: meaning and concept of farm income and profitability, technical and economic efficiency measures in crop and livestock enterprises.

Unit –3

Importance of farm records and accounts in managing a farm, various types of farm records needed to maintain on farm, farm inventory, balance sheet, profit and loss accounts. Meaning and importance of farm planning and budgeting, partial and complete budgeting, steps in farm planning and budgeting-linear programming, appraisalof farm resources, selection of crops and livestock's enterprises.

Unit –4

The concept of risk and uncertainty occurs in agriculture production, nature and sources of risks and its management strategies**,** Crop/livestock/machinery insurance– weather-based crop insurance, features, and determinants of compensation. Concepts of resource economics. Differences between NRE and agricultural economics, unique properties of natural resources. Positive and negative externalities in agriculture, Inefficiency and welfare loss, solutions, Important issues in economics and management of common property resources of land, water, pasture and forest resources etc.

Practical

Preparation of farm layout. Determination of cost of fencing of a farm. Computation of depreciation cost offarm assets. Application of equi-marginal returns/opportunity cost principle in allocation of farm resources. Determination of most profitable level of inputs uses in a farm production process. Determination of least cost combination of inputs. Selection of most profitable enterprise combination. Application of cost principles including CACP concepts in the estimation of cost of crop and livestock enterprises. Preparation of farm plan and budget, farm records and accounts and profit & loss accounts. Collection and analysis of data on various resources in India.

Suggested Readings:

Sr. No.	Textbooks
1.	S. Subha Reddy, P. Raghu Ram, V. Neela Kanta Sasgtri, I. Bhavani Devi. Agricultural

	Economics.
	Reference Book
2.	Agrawal, A. N. Indian Agricultural Problems, Progress and Prospects. Vikas Publishing House Pvt. Ltd.
3.	S S. Johl and C.V. Moore. Essentials of Farm Management.
4.	E.O. Heedy and J.L. Dillon. Agricultural Production Functions. Kalyani Publishers.

Course Code	Course Title	L	T	P	C
	Principles of Food Science and Nutrition	2	0	0	2
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the concept of food science.

CO -2. Identify food compositions and chemistry.

CO -3. Preparing processed and fermented food.

CO -4. Identify nutritional disorders

Course Perspective: The Principles of Food Science and Nutrition course provides an interdisciplinary understanding of the science behind food production, processing, preservation, and its nutritional significance. The course emphasizes the importance of food science in ensuring food safety, quality, and nutritional value, enabling students to apply this knowledge in agricultural and food-related fields.

Course Contents

Unit –1

Concepts of Food Science (definitions, measurements, density, phase change, pH, osmosis, surface tension, colloidal systems etc.)

Unit –2

Food composition and chemistry (water, carbohydrates, proteins, fats, vitamins, minerals, flavours, colours, miscellaneous bio-actives, important reactions); Food microbiology (bacteria, yeast, moulds, spoilage of fresh & processed foods, production of fermented foods)

Unit –3

Principles and methods of food processing and preservation (use of heat, low temperature, chemicals, radiation, drying etc.)

Unit –4

Food and nutrition, Malnutrition (over and undernutrition), nutritional disorders; Energy metabolism (carbohydrate, fat, proteins); Balanced/modified diets, Menu planning. New trends in food science and nutrition.

Suggested Readings:

Sr. No.	Textbooks
1.	Janet D. Ward and Larry Ward. 2015. Principles of Food Science
	Reference Book
2.	John Wiley & Sons. 2017. Food Science and Technology
3.	Potter, Norman N.; Hotchkiss, Joseph H. 1998. Food Science. Food science texts series (5th ed.). Springer.

Semester-VII

Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA)

Credits: 20 (0+20)

Course Code	Course Title	L	T	P	C
	RAWE Component-I	0	0	-	14
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Code	Course Title	L	T	P	C
	RAWE Component-II	0	0	-	6
Pre-requisites/Exposure	None				
Co-requisites	--				

No.	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE &AIA)			
	Activities	Code	No. of weeks	Credits

1.	General orientation & on-campus training by different faculties	ASAG401	1	14
2.	**Village attachment**		8	
3.	Unit attachment in Univ./ College. KVK/ Research Station attachment		5	
4.	**Plant clinic**	ASAG403	2	6
5.	**Agro-industrial attachment**		3	
6.	Project report preparation, presentation and evaluation		1	
Total weeks for RAWE & AIA			**20**	**20**

- Agro- Industrial Attachment: The students would be attached with the agro-industries for a period of 3weeks to get an experience of the industrial environment and working.

RAWE & AIA Component-I

Village Attachment Training Programme

Sr. No.	Activity	Duration
1.	Orientation and Survey of Village	1 week
2.	Agronomical Interventions	1 week
3.	Plant Protection Interventions	1 week
4.	Soil Improvement Interventions (Soil sampling and testing)	1 week
5.	Fruit and Vegetable Production Interventions	1 week
6.	Food Processing and Storage Interventions	1 week
7.	Animal Production Interventions	1 week
8.	Extension and Transfer of Technology activities	1 week

RAWE & AIA Component –II

Agro-Industrial Attachment

- Students shall be placed in Agriculture and Cottage industries and Commodities Boards for 03 weeks.
- Industries include Seed/Sapling production, Pesticides-insecticides, Post harvest-processing value addition

  Agri-finance institutions, etc.

Activities and Tasks during the Agro-Industrial Attachment Programme

- Acquaintance with industry and staff
- Study of structure, functioning, objective, and mandates of the industry
- Study of various processing units and hands-on training under the supervision of industry staff
- Ethics of industry
- Employment generated by the industry
- Contribution of the industry promoting environment
- Learning business networks including outlets of the industry.
- Skill development in all crucial tasks of the industry
- Documentation of the activities and tasks performed by the students.
- Performance evaluation, appraisal, and ranking of students.

Course Perspective: The Rural Agricultural Work Experience and Agro-Industrial Attachment (RAWE & AIA) course is designed to provide students with practical exposure to rural agricultural practices and agro-industrial operations. This course combines fieldwork and industrial attachment to bridge the gap between theoretical knowledge and real-world agricultural applications, enhancing students' skills and understanding of the agricultural sector.

Modules for Skill Development and Entrepreneurship

Course Code	Course Title	L	T	P	C
	Course-I	0	0	20	10
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Code	Course Title	L	T	P	C
	Course-II	0	0	20	10
Pre-requisites/Exposure	None				
Co-requisites	--				

A student has to register 20 credits opting for two courses of (0+10) credits each (a total of 20 credits) from the package of modules.

Paper Code	Title of the module	Credits
	Production Technology for Bioagents and Biofertilizers	0+10
	Seed Production and Technology	0+10
	Mushroom Cultivation Technology	0+10
	Soil, Plant, Water and Seed Testing	0+10
	Commercial Beekeeping	0+10
	Poultry Production Technology	0+10
	Commercial Horticulture	0+10
	Floriculture and Landscaping	0+10
	Food Processing	0+10
	Agriculture Waste Management	0+10
	Organic Production Technology	0+10
	Commercial Sericulture	0+10

NOTE: In addition to the above ELP modules other important modules may be given to the students by SAUs.

Evaluation of Experiential Learning Programme (ELP):

Sr. No.	Parameters	Max. Marks
1.	Project Planning and Writing	10
2.	Presentation	10
3.	Regularity	10
4.	Monthly Assessment	10
5.	Output Delivery	10
6.	Technical Skill Development	10
7.	Entrepreneurship Skills	10
8.	Business Networking Skills	10
9.	Report Writing Skills	10
10.	Final Presentation	10
	Total	100

Course Perspective: The Modules for Skill Development and Entrepreneurship course is designed to equip students with the essential skills, knowledge, and mindset necessary for successful entrepreneurship in the agricultural sector. This course focuses on practical skill development, innovative thinking, and the application of entrepreneurial principles to create and manage agricultural ventures effectively.

COURSES

A student can select three elective courses out of the following and offered during the 4th, 5th, and 6th semesters.

Course Code	Course Title	L	T	P	C
	Agri-business Management	2	0	2	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO-1. Understanding the importance of agribusiness in the Indian economy

CO-2. Understanding the business environment and form the budget accordingly

CO-3. Analyzing the financial components of agribusiness

CO-4. Applying the marketing skills.

Course Perspective: The Agri-Business Management course provides students with a comprehensive understanding of the principles and practices involved in managing agricultural businesses. It focuses on the integration of agricultural production with business management concepts, enabling students to effectively navigate the complexities of the agri-food industry.

Course Contents

Unit-1

Transformation of agriculture into agribusiness, various stakeholders and components of agribusiness systems. Importance of agribusiness in the Indian economy and New Agricultural Policy. Distinctive features of Agribusiness Management: Importance and needs of agro-based industries, Classification of industries and types of agro based industries. Institutional arrangement, procedures to set up agro based industries. Constraints in establishing agro-based industries.

Unit-2

Agri-value chain: Understanding primary and support activities and their linkages. Business environment: PEST & SWOT analysis. Management functions: Roles & activities, Organization culture. Planning, meaning, definition, types of plans. Purpose or mission, goals or objectives, Strategies, polices procedures, rules, programs and budget.

Unit-3

Components of a business plan, Steps in planning and implementation. Organization staffing, directing and motivation. Ordering, leading, supervision, communications, control. Capital Management and Financial

management of Agribusiness. Financial statements and their importance. Marketing Management: Segmentation, targeting & positioning.

Unit-4

Marketing mix and marketing strategies. Consumer behaviour analysis, Product Life Cycle (PLC). Sales & Distribution Management. Pricing policy, various pricing methods. Project Management definition, project cycle, identification, formulation, appraisal, implementation, monitoring and evaluation. Project Appraisal and evaluation techniques.

Practical

Study of agri-input markets: Seed, fertilizers, pesticides. Study of output markets: grains, fruits, vegetables, flowers. Study of product markets, retails trade commodity trading, and value added products. Study of financing institutions- Cooperative, Commercial banks, RRBs, Agribusiness Finance Limited, NABARD. Preparations of projects and Feasibility reports for agribusiness entrepreneur. Appraisal/evaluation techniques of identifying viable project- Non-discounting techniques. Case study of agro-based industries. Trend and growth rate of prices of agricultural commodities. Net present worth technique for selection of viable project. Internal rate of return.

Suggested Readings:
Textbooks

1. Subba rao reddy, S. and P. Raghav Rao. Agriculture finance and management. Oxford and IBH Publication company Ltd. New Delhi

Reference Book

2. Dwivedi, D.N. Managerial Economics. Vikas Publishing House. New Delhi
3. Dhingra, I.C, Indian economic problems. Sultan chand and sons, New Delhi

Course Code	Course Title	L	T	P	C
	Agrochemicals	2	0	2	3
Pre-requisites/Exposure	Fundamentals of Agronomy				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understanding the role of agrochemicals in agriculture and its effect on environment

CO2 Imparting knowledge on herbicides, fungicides, insecticides and its applications

CO3 Emphasizing the use of right dose of agrochemicals for sustainable agriculture

CO4 Analyze fertilizers application related to crop growth

Course Perspective: The Agrochemicals course provides students with a comprehensive understanding of the various chemical substances used in agriculture to enhance crop production, manage pests, and improve soil fertility. The course focuses on the classification, application, safety, and environmental impacts of agrochemicals, equipping students with the knowledge necessary for responsible and effective use in agricultural practices.

Course Contents

Unit-1

An introduction to agrochemicals, their type and role in agriculture, effect on environment, soil, human and animal health, merits and demerits of their uses in agriculture, and management of agrochemicals for sustainable agriculture. Herbicides-Major classes, properties and important herbicides. Fate of herbicides.

Unit-2

Fungicides - Classification –Inorganic fungicides - characteristics, preparation and use of sulfur and copper, Mode of action- Bordeaux mixture and copper oxychloride. Organic fungicides- Mode of action- Characteristics, preparation and use of Zineb and maneb. Systemic fungicides- Benomyl, carboxin, oxy-carboxin, Metalaxyl, Carbendazim, characteristics and use.

Unit-3

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

Unit-4

Fertilizers and their importance. Nitrogenous fertilizers: Feedstocks and Manufacturing of ammonium sulphate,

ammonium nitrate, ammonium chloride, urea. Slow-release N-fertilizers. Phosphatic fertilizers: feedstock and manufacturing of single superphosphate. Preparation of bone meal and basic slag. Potassic fertilizers: Natural sources of potash, manufacturing of potassium chloride, potassium sulphate and potassium nitrate. Mixed and complex fertilizers: Sources and compatibility–preparation of major, secondary and micronutrient mixtures. Complex fertilizers: Manufacturing of ammonium phosphates, nitro-phosphates and NPK complexes. Fertilizercontrol order. Fertilizer logistics and marketing. Plant bio-pesticides for ecological agriculture, Bio-insect repellent.

Practical

Sampling of fertilizers and pesticides. Pesticides application technology to study about various pesticide appliances. Quick tests for identification of common fertilizers. Identification of anion and cation in fertilizer. Calculation of doses of insecticides to be used. To study and identify various formulations of insecticide available kin market. Estimation of nitrogen in Urea. Estimation of120 Report of the ICAR Fifth Deans' Committee water soluble P2O5 and citrate soluble P2O5 in single super phosphate. Estimation of potassium in Muraite of Potash/ Sulphate of Potash by flame photometer. Determination of copper content in copper oxychloride. Determination of sulphur content in sulphur fungicide. Determination of thiram. Determination ofziram content.

Suggested Readings:

Textbooks

1. Rao, V S. 2003. Principles of weed science, Oxford & IBH Publishing Co. Pvt. Ltd.,NewDelhi

Reference Book

2. Gupta,O P. 1998. Weed management: principles and practices, Agro botonica,Bikaner

3. Saraswat,V N. 2003. Weed management, ICAR, New Delhi

Course Code	Course Title	L	T	P	C
	Commercial Plant Breeding	1	0	2	3
Pre-requisites/Exposure	Fundamentals of Plant Breeding				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO 1. Understanding the methods and techniques of line maintenance for variety and hybrid development.

CO 2. Applying techniques in quality seed production of field and horticultural crops

CO 3. Applying methods and techniques of biotechnology for seed production and improvement.

CO 4. Analyzing the requirements for new variety release notification and certification process under PPV & FR Act.

Course Perspective: This course provides an overview of the fundamental concepts of plant breeding, including the genetic principles, selection methods, and modern technologies used in crop improvement. It explores the history and evolution of plant breeding and the role it plays in enhancing crop productivity, quality, and resilience. The course also emphasizes the applications of traditional and modern plant breeding techniques in addressing the challenges of food security and sustainable agriculture.

Course Contents

Unit- 1

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

Unit-2

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

Unit-3

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

Unit-4

Variety testing, release and notification systems in India. Principles and techniques of seed production,types of seeds, quality testing in self and cross pollinated crops.

Practical

Floral biology in self and cross pollinated species, selfing and crossing techniques. Techniques of seed production in self and cross pollinated crops using A/B/R and two line system. Learning techniques in hybrid seed production using male-sterility in field crops. Understanding the difficulties in hybrid seed production, Tools and techniques for optimizing hybrid seed production. Concept of rouging in seed production plot. Concept of line its multiplication and purification in hybrid seed production. Role of pollinators in hybrid seed production. Hybrid seed production techniques in sorghum, pearl millet, maize, rice, rapeseed-mustard, sunflower, castor, pigeon pea, cotton and vegetable crops. Sampling and analyticalprocedures for purity testing and detection of spurious seed. Seed drying and storage structure inquality seed management. Screening techniques during seed processing viz., grading and packaging. Visitto public private seed production and processing plants.

Suggested Reading:

Textbooks

1. Singhal, N.C. (Ed.), 2020, Hybrid Seed Production in Field Crops: Principles and Practices, Kalyani Publicati

Reference Book

2. Singh,H.G., 1994, Crop Breeding In India, IBDCO, New Delhi
3. Khurana, S.M.Paul, 2022, Plant Biotechnology, Scientifics Publication, New Delhi
4. Agrawal, Rattan, Lal., 2017, Fundamentals of Plant Breeding and Hybrid Seed Production, CBS, New Delhi.

Course Code	Course Title	L	T	P	C
	Landscaping	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	**--**				

Course Outcomes: On completion of course, student will be: -

CO1 Understand the importance and principles of landscaping and planning

CO2 Development of bonsai and their management

CO3 Creating designs of cultivating propagated materials

CO4 Developing methods for gardens and lawns in rural and in urban areas

Course Perspective: Landscaping is a course designed to introduce students to the fundamental concepts and practices involved in landscape design and management. The course emphasizes the importance of landscaping in enhancing both aesthetic and functional aspects of the environment. Students will explore key principles of landscape planning, including site analysis, plant selection, and sustainable design practices. The curriculum covers the development and management of bonsai, providing students with hands-on experience in this specialized form of horticulture. Additionally, students will learn how to create effective designs for cultivating propagated materials and apply these concepts in practical settings. By the end of the course, students will be equipped with the skills to develop landscaping methods suitable for both rural and urban gardens and lawns. This course will prepare them to contribute to environmental beautification, landscape restoration, and sustainable practices in various settings.

Course Contents

Unit-1

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

Unit-2

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

Unit-3

Annuals: selection, propagation, planting scheme, Other garden plants: palms, ferns, grasses and cacti succulents. Pot plants: selection, arrangement, management. Bio-aesthetic planning: definition, need, planning.

Unit-4

Landscaping of urban and rural areas, Peri-urban landscaping, Landscaping of schools, public places like bus station, railway station, townships, river banks, hospitals, play grounds, airports, industries, institutions. Bonsai:

principles and management, lawn: establishment and maintenance. CAD application.

Practical

Identification of trees, shrubs, annuals, pot plants; Propagation of trees, shrubs and annuals, care and maintenance of plants, potting and repotting, identification of tools and implements used in landscape design, training and pruning of plants for special effects, lawn establishment and maintenance, layout of formal gardens, informal gardens, special type of gardens (sunken garden, terrace garden, rock garden) and designing of conservatory and lathe house. Use of computer software, visit to important gardens/ parks/ institutes.

Suggested Readings:

Textbooks

1. Floriculture, Landscaping and Turf Management" by Alagarsamy Nithya Devi and Alagarsamy Ramesh Kumar

Reference Book

2. Floriculture and Landscaping-Vol.1" by Naya Udyog and T K Bose
3. Landscaping Irrigation and Floriculture Terminology" by Neeraj Pratap Singh
4. Nursery Crops and Landscape Designs for Agribusiness Studies" by George Scott Williams

Course Code	Course Title	L	T	P	C
	Food Safety and Standards	2	0	2	3
Pre-requisites/Exposure	-				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understand the Importance, Scope and Factors affecting Food Safety.

CO2 Applying management of hazards Food storage,

CO3 Analysis, Surface Sanitation and Personal Hygiene

CO4 Remembering the Indian and International Standards for food products.

Course Perspective: The Food Safety and Standards course provides students with a comprehensive understanding of the principles and practices essential for ensuring food safety and quality. This course covers regulatory frameworks, safety management systems, and standards that govern the production, processing, and distribution of food products, equipping students with the knowledge necessary to contribute to food safety and quality assurance in the agricultural sector.

Course Contents

Unit-1

Food Safety – Definition, Importance, Scope and Factors affecting Food Safety. Hazards andRisks, Typesof hazards - Biological, Chemical, Physical hazards. Management of hazards - Need.Control of parameters. Temperature control.

Unit-2

Food storage. Product design. Hygiene and Sanitationin Food Service Establishments- Introduction. Sources of contamination and their control. WasteDisposal. Pest and Rodent Control. Personnel Hygiene. Food Safety Measures. Food Safety Management Tools- Basic concepts. PRPs, GHPs, GMPs, SSOPs etc. HACCP. ISO series.

Unit-3

TQM- concept and need for quality, components of TQM, Kaizen. Risk Analysis. Accreditation andAuditing, Water Analysis, Surface Sanitation and Personal Hygiene. Food laws and Standards-Indian Food Regulatory Regime, FSSA. Global Scenario CAC. Other laws and standards relatedto food.

Unit-4

Recent concerns- New and Emerging Pathogens. Packaging, Product labeling andNutritional labeling. Genetically modified foods\ transgenics. Organic foods. Newer approaches to food safety. Recent Outbreaks.

Indian and International Standards for food products.

Practical

Water quality analysis physico-chemical and microbiological. Preparation of different types of media. Microbiological Examination of different food samples. Assessment of surface sanitation by swab/rinse method. Assessment of personal hygiene. Biochemical tests for identification of bacteria. Scheme for the detection of food borne pathogens. Preparation of plans for Implementation of FSMS - HACCP, ISO: 22000.

Suggested Readings:

Textbooks

1. Commercial's The Food Safety and Standards Act 2006 by Virag Gupta (Two Vols) – 16th Edition.

   Reference Book

2. Commentary on the Food Safety and Standards Act, 2006 by Seth & Capoor – 11th Edition 2023.
3. Manual of Methods of Analysis of Foods (as per FSSAI) (Set of 4 Vols.) – 8th Edition 2024

Course Code	Course Title	L	T	P	C
	Biopesticides and Biofertilizers	2	0	2	3
Pre-requisites/Exposure					
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO1 Understanding the concept of bio-pesticides and bio-fertilizers

CO2 Applying mass production technology of bio-pesticides and bio-fertilizers

CO3 Analyzing **s**tructure and characteristics features of bio-pesticides and bio-fertilizers

CO4 Understanding the Storage, shelf life, quality control and marketing of bio-pesticides and bio-fertilizers

Course Perspective: The Biopesticides and Biofertilizers course provides students with an in-depth understanding of biological alternatives to chemical pesticides and fertilizers in sustainable agriculture. This course emphasizes the importance of using biopesticides and biofertilizers to enhance crop productivity, protect the environment, and promote ecological balance in agricultural practices.

Course Contents

Unit-1

History and concept of bio-pesticides. Importance, scope and potential of bio-pesticide. Definitions, concepts andclassification of bio-pesticides viz. pathogen, botanical pesticides, and bio-rationales. Botanicals and their uses.

Unit-2

Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomo-pathogenic pathogens and nematodes. Methods of application of bio-pesticides. Methods ofquality control and Techniques of bio-pesticides. Impediments and limitation in production and use of bio-pesticide.

Unit-3

Bio-fertilizers - Introduction, status and scope. Structure and characteristic features of bacterial bio-fertilizers-*Azospirillum, Azotobacter, Bacillus, Pseudomonas, Rhizobium. Frankia*; Cyanobacterial biofertilizers-*Anabaena*, *Nostoc*, Hapalosiphon and fungal bio-fertilizers- AM mycorrhiza and ectomycorrhiza.

Unit-4

Nitrogen fixation -Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization, K-solubilization. Production Report of the ICAR Fifth Deans' Committee technology: Strain selection, sterilization, growth and fermentation, mass production of carrier based and liquid bio-fertilizers. FCO specifications and quality control of bio-fertilizers. Application technology for seeds, seedlings, tubers, sets etc. Bio-fertilizers -Storage, shelf life, quality control and marketing. Factors influencing the efficacy of bio-fertilizers.

Practical

Isolation and purification of important bio-pesticides: *Trichoderma Pseudomonas, Bacillus, Metarhyzium*etc and its production. Identification of important botanicals. Visit to biopesticide laboratory in nearby area. Field visit to explore naturally infected cadavers. Identification of entomopathogenic entities in field condition. Quality control of biopesticides. Isolation and purification of *Azospirillum, Azotobacter, Rhizobium*, P- solubilizers and cyanobacteria. Mass multiplication and inoculum production of biofertilizers. Isolation of AM fungi -Wet sieving method and sucrose gradient method. Mass production of AMinoculants.

Suggested Readings:

Textbooks

1. Bio-Fertilizers in Agriculture and Forestry by Subba Rao, N.S.

Reference Book

2. Handbook of Microbial Biofertilizers by Rai ,M.K.
3. Biopesticides in Environment and Food Security: Issues and Strategies by Koul, Opender ; Dhaliwal, G.S ; Khokhar, Sucheta ; Ram Singh

4. Botanical Pesticides for Pest Management by Dodia, D.A ; Rabari,P.H ; Zala, M.B ; Patel, G.M

Course Code	Course Title	L	T	P	C
	Protected Cultivation	2	0	2	3
Pre-requisites/Exposure	**None**				
Co-requisites	**--**				

Course Outcomes: On completion of course, student will be: -

CO1. Understanding protected cultivation of vegetables, fruits, and flowers

CO2. Understanding irrigation system used in protected cultivation

CO3. Creating layout and construction for traditional and low cost green houses

CO4. Applying off-season cultivation and economic important of vegetables, fruits, and flowers

Course Perspective: Protected Cultivation is a comprehensive course designed to provide students with essential knowledge and skills in modern agricultural practices that enhance the production of vegetables, fruits, and flowers through controlled environments. This course covers the principles and techniques of protected cultivation, including greenhouses, shade houses, and other structures that create optimal growing conditions.

Students will explore various aspects of protected cultivation, focusing on the importance of maintaining environmental factors such as temperature, humidity, and light. The course also emphasizes the different irrigation systems utilized in protected environments to ensure efficient water management. In addition, students will learn to design and construct layouts for traditional and low-cost greenhouses, fostering innovation in resource-constrained settings. The course will cover off-season cultivation techniques that enable year-round production of high-value crops and explore the economic significance of cultivating vegetables, fruits, and flowers in protected environments. By the end of the course, students will be well-equipped to implement protected cultivation practices that maximize yield, quality, and profitability while addressing the challenges of modern agriculture.

Course Contents

Unit-1

Protected cultivation- importance and scope, Status of protected cultivation in India. World types of protected structure based on site and climate. Cladding material involved in greenhouse/ poly-house. Greenhouse design, environment control, artificial lights

Unit-2

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

Unit-3

Propagation and production of quality planting material of horticultural crops. Greenhouse cultivation of important horticultural crops – rose, carnation, chrysanthemum, gerbera, orchid, anthurium, lilium, tulip, tomato, bell pepper, cucumber, strawberry, pot plants, etc.

Unit-4

Cultivation of economically important medicinal and aromatic plants. Off-season production of flowers and vegetables. Insect pest and disease management.

Practical

Raising of seedlings and saplings under protected conditions, use of protrays in quality planting material production, Bed preparation and planting of crop for production, Intercultural operations, Soil EC and pH measurement, Regulation of irrigation and fertilizers through drip, fogging ad misting.

Suggested Readings:

Textbooks

1 S. Prasad and U. Kumar. 2015. Greenhouse Management for Horticultural Crop Production, Agrobios,

Reference Book

2 Singh,DK.and K V Peter. 2014. Protected Cultivation of Horticultural Crops, NewIndia Publishing Agency, New Delhi

3 Balraj,Singh.2014.AdvancesinProtectedCultivation,NewIndiaPublishing Agency, New Delhi

Course Code	Course Title	L	T	P	C
	Micro propagation Technologies	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	**--**				

Course Outcomes: On completion of course, student will be: -

CO- 1. Understanding plant growth processes in the tissue culture environment

CO -2. Applying the techniques of micro propagation

CO- 3. Evaluating the clonal fidelity and polymorphism of the tissue cultured plants

CO -4. Designing and develop the protocols for enhanced production of bioactive compounds in cell suspension culture.

CO- 5. Formulate protocol for development of genetically engineered crops for novel traits.

Course Perspective: Micro propagation Technologies introduces students to the fundamental principles and applications of plant tissue culture, with a focus on micro propagation techniques. The course covers the history, advantages, and limitations of micro propagation, along with various types of culture systems such as seed, embryo, organ, callus, and cell cultures. Students will explore key processes like axillary bud roliferation, organogenesis, and somatic embryogenesis. Advanced topics include the production of secondary metabolites, somaclonal variation, and cryopreservation techniques. In the practical component, students will gain hands-on experience in tissue culture laboratory techniques, including equipment use, media composition, sterilization methods, and explant culturing. The practical will involve callus induction, somatic embryo regeneration, and hardening procedures to prepare plants for successful growth outside the laboratory.

Course Contents

Unit-1

Introduction, History, Advantages, and Limitations of micro-propagation techniques.

Unit-2

Types of cultures (seed, embryo, organ, callus, cell), Stages of micro-propagation, Axillary bud proliferation (Shoot tip and meristem culture, bud culture)

Unit-3

Organogenesis (callus and direct organ formation), Somatic embryogenesis, cell suspension cultures,

Unit-4

Production of secondary metabolites, Soma clonal variation, Cryopreservation.

Practical

Identification and use of equipment in tissue culture Laboratory, Nutrition media composition, sterilization techniques for media, containers, and small instruments, sterilization techniques for Report of the ICAR Fifth Deans' Committee explants, Preparation of stocks and working solution, Preparation of working medium, Culturing of explants: Seeds, shoot tip and single node, Callus induction, Induction of somatic embryos regeneration of whole plants from different explants, Hardening procedures.

Suggested Reading:

Textbooks

1. Chhatwal, G.R. 1995. Textbook of biotechnology, Anmol publications, New-Delhi

Reference Book

2. Chadha, K L. 2000. Biotechnology in Horticultural and plantation Crops, MalhotraPublishing House, New-Delhi

Course Code	Course Title	L	T	P	C
	Hi-Tech. Horticulture	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	**--**				

Course Outcomes: On completion of course, student will be: -

CO1. Understanding the nursery management.

CO2. Applying micro-propagation and protected cultivation techniques in horticultural crops.

CO3. Applying modern methods of farming

CO4. Handling precision farming tools

Course Perspective: Hi-Tech Horticulture is a specialized course designed to equip students with advanced knowledge and practical skills in modern horticultural practices that leverage technology for enhanced productivity and sustainability. The course covers a wide range of topics, including precision farming, automation in cultivation, controlled environment agriculture (CEA), and the use of innovative techniques such as hydroponics, aeroponics, and vertical farming.

Students will learn about the integration of information technology in horticulture, including the use of sensors, data analytics, and remote monitoring systems to optimize growing conditions and improve crop management. The course emphasizes sustainable practices, resource efficiency, and minimizing environmental impact while maximizing yield and quality.

In addition to theoretical concepts, the course includes hands-on training in the application of hi-tech tools and equipment, enabling students to design and implement modern horticultural systems. By the end of the course, students will be prepared to contribute to the development of sustainable horticulture practices that meet the growing global demand for food while addressing challenges such as climate change, resource scarcity, and food security.

Course Contents

Unit-1

Introduction & importance of high-tech horticulture. Nursery management and mechanization; micro-propagation of horticultural crops.

Unit-2

Modern field preparation and planting methods, Protected cultivation: advantages, controlled conditions, method, and techniques. Hydroponics, Aeroponics, and Aquaponics.

Unit-3

Micro irrigation systems and its components; EC, pH-based fertilizer scheduling, canopy management, high

density orcharding, Components of precision farming.

Unit-4

Remote sensing, Geographical Information System(GIS), Differential Geo-positioning System(DGPS), Variable Rate applicator(VRA), application of precision farming in horticultural crops (fruits, vegetables, and ornamental crops); mechanized harvesting of produce.

Practical

Types of polyhouses and shade net houses, Intercultural operations, tools and equipment's identification and application, Micro propagation, Nursery-protrays, micro-irrigation, EC, pH-based fertilizer scheduling,canopy management, visit to hi-tech orchard/nursery.

Suggested Readings:

Textbooks

1. Floriculture, Landscaping and Turf Management" by Alagarsamy Nithya Devi and Alagarsamy Ramesh Kumar

Reference Book

2. Floriculture and Landscaping-Vol.1" by Naya Udyog and T K Bose
3. Landscaping Irrigation and Floriculture Terminology" by Neeraj Pratap Singh
4. Nursery Crops and Landscape Designs for Agribusiness Studies" by George Scott Williams

Course Code	Course Title	L	T	P	C
	Weed Management	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	**--**				

Course Outcomes: On completion of course, student will be: -

CO-1. Identifying the harmful and beneficial effects of weeds.

CO-2. Understanding the methods of propagation and dissemination of weeds

CO-3. Identifying the different weeds which harmful for crops.

CO-4. Analyzing weed competition with main crops for nutrients, moisture, light, space and losses caused by weeds

Course Perspective: The Weed Management course provides students with a comprehensive understanding of the principles and practices involved in managing weeds in agricultural systems. This course emphasizes the importance of effective weed management strategies to enhance crop productivity, minimize competition, and promote sustainable agricultural practices.

Course Contents

Unit-1

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

Unit-2

Herbicide classification, the concept of adjuvant, surfactant, herbicide formulation, and their use. Introduction to Mode of action of Herbicides and selectivity

Unit-3

Allelopathy and its application for weed management. Bio-herbicides and their application in agriculture.

Unit-4

Concept of herbicide mixture and utility in agriculture. Herbicide compatibility with agrochemicals andtheir application. Integration of herbicides with non-chemical methods of weed management. HerbicideResistance and its management.

Practical

Techniques of weed preservation. Weed identification and their losses study. Biology of important weeds. Study of herbicide formulations and mixtures. Herbicide and agrochemicals study. Shift of weed flora study in long-term experiments. Methods of herbicide application, spraying equipment. Calculations of herbicide doses weed

control efficiency and weed index.

Suggested Reading:

Textbooks

1. Rao, V S. 2003. Principles of weed science, Oxford & IBH Publishing Co. Pvt. Ltd.,NewDelhi

Reference Book

2. Gupta,O P. 1998. Weed management: principles and practices, Agro botonica,Bikaner
3. Saraswat,V N. 2003. Weed management, ICAR, New Delhi

Course Code	Course Title	L	T	P	C
	System Simulation and Agro advisory	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the crop models, concept and techniques.

CO -2. Analyzing the crop responses to weather conditions

CO -3. Analyzing of crop growth models

CO -4. Applying of IT application and different IT tools in Agriculture.

Course Perspective: The System Simulation and Agro Advisory course provides students with a comprehensive understanding of simulation modeling techniques and their application in agricultural decision-making and advisory systems. This course emphasizes the use of computational tools and models to analyze agricultural systems, assess management practices, and provide informed recommendations to enhance productivity and sustainability.

Course Contents

Unit-1

System Approach for representing soil-plant-atmospheric continuum, systemboundaries, Crop models, concepts & techniques.

Unit-2

Types of crop models, data requirements, relational diagrams. Report of the ICAR Fifth Deans' Committee Evaluation of crop responses to weather elements.

Unit-3

Elementary crop growth models; calibration, validation, verification and sensitivity analysis. Potential and achievable crop production- concept and modeling techniques for their estimation. Crop production in moisture and nutrients limited conditions, components of soil water and nutrients balance.

Unit-4

Weather forecasting, types, methods, tools & techniques, forecast verification. Value added weather forecast, ITK for weather forecast and its validity; Crop- Weather Calendars. Preparation of agro-advisory bulletin based on weather forecast. Use of crop simulation model for preparation of Agro-advisory and its effective dissemination.

Practical

Preparation of crop weather calendars. Preparation of agro-advisories based on weather forecast using various

approaches and synoptic charts. Working with statistical and simulation models for crop growth. Potential & achievable production; yield forecasting, insect & disease forecasting models. Simulation with limitations of water and nutrient management options. Sensitivity analysis of varying weather and crop management practices. Use of statistical approaches in data analysis and preparation of historical, past and present meteorological data for medium range weather forecast. Feedback from farmers about the agro-advisory.

Suggested Reading:

Textbooks

1. Mahi, G.S. and P.K. Kingra. 2018. Fundamentals of agrometeorology and climate change. Kalayani Publishers,India.

Reference Book

2. Daniel. W, David. M, James W.J and Francois. B. 2014. Working with Dynamic Crop Models: Methods,Tools and Examples for Agriculture and Environment. 3rd edition, Academic press's.

Course Code	Course Title	L	T	P	C
	Agricultural Journalism	2	0	2	3
Pre-requisites/Exposure	None				
Co-requisites	--				

Course Outcomes: On completion of course, student will be: -

CO -1. Understanding the conceptual and theoretical knowledge of Journalism and Mass Communication.

CO -2. Identifying, formulate, review literature, and analyze research problems related to the subject.

CO -3. Applying research- based knowledge and research methods including research design, survey analysis and interpretation of data.

CO -4. Applying conceptual knowledge and the knowledge gained through research to assess.

Course Perspective: The Agricultural Journalism course provides students with an understanding of the principles and practices of journalism, specifically focused on agricultural topics. This course emphasizes the importance of effective communication in the agricultural sector, covering various forms of media and the skills required to inform and educate the public, farmers, and policymakers about agricultural issues, innovations, and practices.

Course Contents

Unit-1

Agricultural Journalism: The nature and scope of agricultural journalism characteristics and training of the agricultural journalist. How agricultural journalism is similar to anddifferent from other types of journalism. Newspapers and magazines as communication media.

Unit-2

Characteristics; kinds and functions of newspapers and magazines, characteristics of newspaper and magazine readers. Form and content of newspapers and magazines. Style and language of newspapers and magazines, parts of newspapers and magazines. The agricultural story.

Unit-3

Types of agricultural stories, the subject matter of the agricultural story, Structure of the agricultural story. Gathering agricultural information.

Unit-4

Sources of agricultural information, interviews, coverage of events, abstracting from research and scientific materials, wire services, and other agricultural news sources. Writing the story: Organizing the material, treatment of the story, writing the news lead and the body, and readability measures. Illustrating agricultural stories. Use of

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

Practical

Practice in interviewing. Covering agricultural events. Abstracting stories from research and scientific materials and from wire services. Writing different types of agricultural stories. Selecting pictures and artwork for the agricultural story. Practice in editing, copyreading, headline and title writing, proofreading, lay-outing. Testing copy with a readability formula. Visit to a publishing house.

Suggested Reading:

Textbook

1 Singh, A K. 2014. Agricultural Extension and Farm Journalism, Agrobios, India.

Reference Book

3. Bhaskaran C. 2008. Farm Journalism and Media Management, Agrotech Publishing Academy,India.