Aim and Learning Outcome

Of

UG, M.Sc.(Ag.) and Ph.D. Degree Programme

Bihar Agricultural University, Sabour, Bhagalpur-813210

Aim and Learning Outcome (LO) of all the courses across all the programmes offered by Bihar Agricultural University, Sabour

Undergraduate Programme

B.Sc Agriculture

S.No	Course Code	Credit Hrs	Course Title	Aim of the course	Learning Outcome
1.	AAG 111	3+1	Fundamentals of Agronomy	To provide a comprehensive understanding of the essential principles and practices in the field of Agronomy, empowering students with the knowledge and skills to enhance agricultural productivity and sustainability.	• Gain a solid foundation in crop production, soil management, enabling students to make informed decisions for optimizing agricultural yields. • Develop a deep appreciation for sustainable and environmentally responsible farming practices, preparing students to address the challenges of modern agriculture with innovative solutions.
2.	AAG 112	1+1	Introduction to Forestry	To introduce students to the multifaceted world of forestry, encompassing the study of forest ecosystems, conservation, and sustainable management practices.	• Develop a deep appreciation for the ecological and economic significance of forests and their role in global ecosystems. • Acquire fundamental knowledge and practical skills in forestry management and conservation, enabling informed decision-making for sustainable forest resource utilization.
3.	AAG 113	2+0	Agricultural Heritage	To explore and preserve the rich history, traditions, and cultural	• Gain a profound understanding of the historical and cultural

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				significance of agriculture, fostering an appreciation for the heritage that has shaped the modern agricultural landscape.	significance of agriculture. exploring its pivotal role in shaping societies and civilizations. • Develop an appreciation for the preservation and promotion of agricultural heritage, equipping students with the knowledge to contribute to the conservation of traditional agricultural practices and the safeguarding of agricultural heritage for future generations.
4.	ABP 111	1+1	Introductory Biology	To provide students with a comprehensive introduction to the fundamental principles of biology, fostering a strong foundation in life sciences and an appreciation for the diversity and complexity of the natural world.	• Develop a foundational understanding of core biological concepts, including cell biology, genetics, and evolution, enabling students to comprehend the fundamental principles governing life on Earth. • Cultivate critical thinking and scientific inquiry skills, fostering an ability to analyse and evaluate biological phenomena, conduct experiments, and make informed decisions in various life science contexts.
5.	AEE 111	2+0	Rural Sociology & Educational Psychology	To integrate the realms of rural sociology and educational psychology, with the aim of preparing students to address the social and educational needs of rural communities through a	• Develop a deep understanding of the social dynamics and challenges specific to rural communities, equipping students with the knowledge to address social issues and contribute to the sustainable

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				holistic understanding of their dynamics and by developing effective educational strategies.	development of rural areas. • Acquire a solid grasp of educational psychology principles and practices, enabling students to design effective educational strategies tailored to the unique needs and contexts of rural populations, ultimately improving the quality of education in rural settings.
6.	AEE 112	1+1	Comprehension & Communication Skill in English	The course aims to empower students with advanced comprehension and communication skills in English, enabling them to excel in academic, professional, and personal communication through the mastery of the English language.	• Enhance students' proficiency in English comprehension, enabling them to effectively interpret and analyse a wide range of written and spoken materials. • Develop strong communication skills in English, including effective verbal and written expression, to equip students with the ability to convey their ideas and thoughts clearly and persuasively in various professional and academic contexts.
7.	AEE 113	1+0	Human values & Ethics (Non Gradial)	The course aims to develop a strong foundation in human values and ethics, empowering students to make principled and morally sound choices while promoting empathy, social responsibility, and ethical conduct in all aspects of life.	• Foster a deep understanding of human values and ethics, encouraging students to critically evaluate moral dilemmas and make ethically informed decisions in their personal and professional lives. • Cultivate empathy, tolerance, and a

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					sense of responsibility towards diverse perspectives and communities, equipping students to contribute positively to society and uphold ethical principles in their interactions and decision-making.
8.	AHT 111	1+1	Fundamentals of Horticulture	The course aims to provide students with a solid understanding of the fundamental principles of horticulture, enabling them to apply sound horticultural practices and contribute to the cultivation, beautification, and sustainability of plant-based environments.	• Develop a comprehensive knowledge of horticultural principles, including plant growth, propagation, and cultivation techniques, enabling students to effectively manage and optimize horticultural practices. • Acquire practical skills in the cultivation and maintenance of horticultural crops, plants, and gardens, preparing students to contribute to sustainable agriculture, urban landscaping, and ornamental horticulture.
9.	AME 111	2+1	Fundamentals of Plant Biochemistry and Biotechnology	The course aims to provide students with a strong foundation in plant biochemistry and biotechnology, fostering expertise in understanding and manipulating plant processes to contribute to advancements in agriculture, environmental conservation, and biotechnological innovation.	• Gain a profound understanding of plant biochemical processes, including photosynthesis and metabolic pathways, enabling students to comprehend the fundamental mechanisms governing plant growth and development. • Develop proficiency in plant biotechnology techniques, such as genetic modification and tissue culture, equipping students with

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					the skills to address agricultural and environmental challenges through innovative plant-based solutions.
10.	ASC 111	2+1	Fundamentals of Soil Science	The course aims to provide students with a solid foundation in soil science, equipping them with the knowledge and skills necessary to comprehend and manage soil properties for the sustainable development of agriculture and the environment.	• Develop a comprehensive understanding of soil properties, classification, and their effects on plant growth, enabling students to make informed decisions for sustainable land use and agriculture. • Acquire practical skills in soil analysis and management, preparing students to address real-world soil-related challenges and contribute to the enhancement of soil fertility and environmental stewardship.
11.	ASM 111	2+0	Elementary Mathematics	The course aims to provide students with a solid grounding in elementary mathematics, fostering mathematical literacy and problem-solving skills to empower them in their academic pursuits and everyday applications.	• Develop a strong mathematical foundation, with proficiency in fundamental concepts and operations, enabling students to solve a wide range of practical problems and apply mathematical reasoning in various disciplines. • Cultivate critical thinking and analytical skills, fostering the ability to analyse, interpret, and communicate mathematical information effectively, both verbally and in writing.
12.	AAE-121	2+0	Fundamentals of	The course aims to provide	• Develop a comprehensive

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			Agricultural Economics	students with a foundational knowledge of agricultural economics, equipping them with the tools and insights needed to analyse, manage, and enhance economic aspects of agriculture for sustainable and efficient agricultural practices.	understanding of economic principles and their application in the agricultural sector, enabling students to analyse and make informed decisions regarding agricultural production, marketing, and policy. • Acquire the skills to assess and address economic challenges in agriculture, including resource allocation, cost-benefit analysis, and market dynamics, preparing students to contribute to the sustainable development of the agricultural industry.
13.	ABP-121	1+1	Fundamentals of Crop Physiology	The course aims to provide students with a fundamental grasp of crop physiology, empowering them to comprehend the intricacies of plant growth and development, and apply this knowledge to enhance crop productivity and resilience in agricultural contexts.	• Develop a deep understanding of plant physiological processes, including photosynthesis, respiration, and growth regulation, enabling students to make informed decisions for optimizing crop production and resource management. • Acquire the ability to assess and address crop physiological challenges, such as responses to environmental stress and resource limitations, preparing students to contribute to the advancement of sustainable and resilient agricultural practices.
14.	AEE-121	2+1	Fundamentals of	The course aims to equip students	• Develop effective communication

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			Agricultural Extension Education	with the essential knowledge and skills in agricultural extension education, empowering them to bridge the gap between research and farming communities, promote best agricultural practices, and facilitate rural development through effective education and communication strategies.	and interpersonal skills, enabling students to engage with diverse agricultural communities, understand their needs, and facilitate the dissemination of relevant agricultural knowledge and practices. • Acquire a deep understanding of extension education methods and strategies, preparing students to design and implement effective extension programs that promote sustainable agriculture, enhance farmer livelihoods, and contribute to rural development.
15.	AEE122	1+1	Communication Skills and Personality Development	The course aims to empower students with the essential communication skills and personal development strategies necessary to build confidence, enhance interpersonal relationships, and excel in both academic and professional spheres.	• Enhance students' verbal and non-verbal communication skills, enabling them to express themselves confidently and effectively in various personal and professional contexts. • Cultivate self-awareness and personal growth, fostering the development of a positive self-image, emotional intelligence, and interpersonal skills to facilitate constructive relationships and personal development.
16.	AEN-121	1+1	Soil and Water Conservation Engineering	The course aims to provide students with the knowledge and skills in soil and water conservation engineering to	• Develop expertise in soil erosion and water management techniques, equipping students to design and implement effective conservation

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				address critical issues related to soil erosion, water resource management, and sustainable land use, promoting environmental stewardship and agricultural sustainability.	strategies for mitigating soil erosion, preserving water resources, and promoting sustainable agriculture. • Acquire the ability to assess, analyze, and solve real-world problems related to soil and water conservation, preparing students to contribute to environmentally responsible land use and resource management practices.
17.	AEZ-121	3+1	Fundamentals of Entomology	The course aims to provide students with a solid foundation in entomology, fostering a deep appreciation for the world of insects and equipping them with the knowledge and skills to address the roles of insects in agriculture, ecology, and pest management.	• Develop a comprehensive understanding of insect biology, taxonomy, and behavior, enabling students to identify and comprehend the ecological roles and economic significance of insects in agriculture and ecosystems. • Acquire practical knowledge of entomological methods, including pest identification, integrated pest management, and insect collection techniques, preparing students to contribute to effective pest control and conservation efforts in agricultural and environmental contexts.
18.	APG-121	2+1	Fundamentals of Genetics	The course aims to provide students with a foundational knowledge of genetics, empowering them to comprehend	• Develop a strong understanding of the principles of Mendelian genetics, enabling students to analyse inheritance patterns.

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				the principles of inheritance and genetic diversity, and apply this knowledge towards agriculture.	• Acquire proficiency in genetic techniques in agriculture.
19.	APP-121	3+1	Fundamentals of Plant Pathology	The course aims to provide students with a fundamental understanding of plant pathology, empowering them to comprehend the nature of plant diseases, their causes, and methods for their prevention and management in agriculture.	• Develop expertise in identifying, diagnosing, and managing plant diseases, equipping students with the knowledge and skills to protect agricultural crops and promote sustainable farming practices. • Acquire a deep understanding of the biology and epidemiology of plant pathogens, enabling students to contribute to the development of effective disease control strategies and the reduction of crop losses in agricultural systems.
20.	ASC-121	1+1	Agricultural Microbiology	The course aims to provide students with a strong foundation in agricultural microbiology, empowering them to comprehend the vital roles of microorganisms in agriculture, soil health, and plant-microbe interactions, and apply this knowledge to sustainable agricultural practices.	• Develop a thorough understanding of the roles of microorganisms in soil fertility, plant health, and nutrient cycling, enabling students to apply microbiological knowledge to enhance agricultural productivity. • Acquire practical skills in microbiological techniques, such as soil and plant sample analysis and microbial inoculation, preparing students to contribute to sustainable agricultural practices and the development of biofertilizers and biopesticides.
21.	AAE-211	2+1	Agricultural	The course aims to equip students	• Develop an in-depth understanding

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			Finance and Cooperation	with the knowledge and skills necessary to support the financial and cooperative aspects of agricultural enterprises, fostering economic stability and growth in the agricultural sector.	of the financial instruments and strategies essential for managing agricultural businesses effectively, including risk assessment, investment analysis, and capital budgeting. • Gain insights into the principles and practices of agricultural cooperation, covering topics such as cooperative organization, governance, and the role of cooperatives in enhancing the economic sustainability of agricultural communities.
22.	AAG-211	1+1	Crop Production Technology-I (*Kharif Crops*)	The course aims to provide students with a fundamental understanding of crop production practices specific to Kharif season, enabling them to contribute to efficient and sustainable agricultural production in this context.	• Acquire comprehensive knowledge of the principles and practices of crop production specific to Kharif crops, including seed selection, planting techniques, irrigation management, and pest and disease control. • Develop the ability to analyze and implement sustainable and innovative agricultural technologies for Kharif crop production, leading to increased crop yields and improved agricultural productivity.
23.	AAG-212	3+1	Livestock and Poultry Management	The course aims to equip students with the knowledge and skills necessary to effectively manage and care for livestock and poultry,	• Develop a comprehensive understanding of livestock and poultry management, including breeding, nutrition, health, and

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				ensuring their health, well-being, and optimal productivity in various agricultural settings.	housing, enabling students to optimize the production and welfare of these animals. • Gain practical skills in assessing and implementing appropriate management practices for diverse livestock and poultry systems, fostering sustainable and profitable animal husbandry operations.
24.	ABP-211	2+1	Environmental Studies and Disaster Management	The course aims to educate students about environmental issues and equip them with the skills to proactively address these concerns and effectively manage disasters to promote a sustainable and resilient future.	• Develop a holistic understanding of environmental issues, including ecosystem dynamics, pollution control, and resource conservation, enabling students to make informed decisions about environmental sustainability. • Acquire the knowledge and skills to effectively assess, respond to, and mitigate natural and man-made disasters, enhancing disaster preparedness and management strategies for both local and global contexts.
25.	AEN-211	1+1	Farm Machinery and Power	The course aims to provide students with the knowledge and skills required to effectively utilize, maintain, and make sustainable choices regarding agricultural machinery and power sources in order to optimize farm operations.	• Gain a deep understanding of farm machinery and power systems, including their selection, operation, and maintenance, to enhance the efficiency and productivity of agricultural operations. • Develop the ability to assess the environmental impact of various farm machinery and power

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					technologies and apply sustainable practices for responsible resource management in modern agriculture.
26.	AHT-211	1+1	Production Technology for Vegetables and Spices	The course aims to equip students with the necessary skills and knowledge to efficiently produce, manage, and enhance the quality of vegetable and spice crops, contributing to the advancement of sustainable and profitable agriculture.	• Develop expertise in the cultivation and management of a wide range of vegetables and spices, including planting techniques, nutrient management, pest and disease control, and post-harvest handling. • Acquire knowledge of advanced and sustainable production technologies, such as greenhouse and hydroponic systems, to enhance the yield, quality, and profitability of vegetable and spice crops.
27.	APG-211	2+1	Fundamentals of Plant Breeding	The course aims to provide students with a strong foundation in the science and techniques of plant breeding, empowering them to contribute to the development of crop varieties that meet the evolving needs of agriculture and food security.	• Develop a comprehensive understanding of the principles and methods of plant breeding, including genetic variability, selection techniques, and hybridization, to improve crop traits and productivity. • Gain the ability to apply modern biotechnological tools and molecular techniques in plant breeding, enabling students to contribute to the development of improved crop varieties with enhanced agronomic and economic

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					traits.
28.	ASM-211	1+1	Statistical Methods	The course aims to equip students with the knowledge and skills necessary to apply statistical techniques for data analysis and interpretation, facilitating informed decision-making and problem-solving across various disciplines.	• Develop a solid grasp of statistical concepts and techniques, enabling students to effectively collect, analyze, and interpret data for research, decision-making, and problem-solving in various fields. • Acquire the ability to use statistical software and tools to perform advanced data analysis and hypothesis testing, making informed and evidence-based decisions in diverse professional and academic settings.
29.	ASM-212	1+1	Agri-Informatics	The course aims to educate students on the effective utilization of information technology and data analysis in agriculture, enabling them to enhance productivity, sustainability, and decision-making in the agri-food sector.	• Develop proficiency in using information technology and data analysis tools to collect, manage, and analyze agricultural data, enabling students to make data-driven decisions in farming and agribusiness. • Gain an understanding of the role of agri-informatics in optimizing agricultural processes, including precision farming, supply chain management, and market analysis, fostering efficiency and sustainability in the agricultural sector.
30.	AAE-221	2+1	Agricultural Marketing Trade & Prices	The course aims to equip students with the knowledge and skills necessary to navigate and improve	• Develop a comprehensive understanding of agricultural marketing systems, including

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				the marketing, trade, and pricing aspects of agricultural products, contributing to enhanced market competitiveness and profitability in the agriculture sector.	supply chain dynamics, pricing mechanisms, and market structures, empowering students to assess and enhance market opportunities for agricultural products. • Gain proficiency in analyzing and interpreting market data, trade policies, and pricing strategies, enabling students to make informed decisions regarding product marketing, trade negotiations, and price risk management in the agricultural industry.
31.	AAG-221	1+1	Crop Production Technology-II (*Rabi Crops*)	The course aims to provide students with the knowledge and skills necessary to effectively cultivate and manage Rabi crops, promoting sustainable and productive agricultural practices in the context of winter-season crop production.	• Develop expertise in the cultivation and management of Rabi crops, including wheat, barley, and mustard, by understanding specific planting techniques, nutrient requirements, pest and disease control, and harvesting methods. • Acquire the ability to apply sustainable agricultural practices, such as crop rotation, water management, and soil health improvement, to optimize yield and quality in Rabi crop production, while also reducing environmental impacts.
32.	AAG-222	1+0	Farming System &	The course aims to educate	• Develop a comprehensive

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			Sustainable Agriculture	students about the principles and practices of sustainable agriculture and farming systems, equipping them with the knowledge and skills necessary to promote agricultural practices that are economically viable, socially equitable, and environmentally responsible.	understanding of farming systems and sustainable agriculture practices, including crop-livestock integration, resource conservation, and ecosystem management, to enhance agricultural productivity and environmental sustainability. • Gain the ability to assess and design sustainable farming systems that consider economic, social, and environmental factors, equipping students to promote resilient and environmentally responsible agricultural practices.
33.	AAG-223	1+1	Introductory Agro-meteorology & Climate Change	The course aims to is to educate students on the essential principles of agro-meteorology and climate change, providing them with the knowledge and tools to understand and address the implications of weather and climate on agriculture, and to develop strategies for climate-resilient farming practices.	• Develop a fundamental understanding of agro-meteorology, including weather patterns, climate variability, and their impact on agricultural systems, enabling students to make informed decisions related to crop planning and risk management. • Gain insights into the science of climate change and its effects on agriculture, allowing students to assess and adapt to the challenges and opportunities posed by a changing climate in the context of food production and agricultural sustainability.
34.	AEN-221	1+1	Renewable Energy and Green	The aim of the course is to educate students about renewable energy	• Develop a comprehensive understanding of renewable energy

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			Technology	sources and green technologies relevant to agriculture, equipping them with the knowledge and skills necessary to promote and implement sustainable and eco-friendly practices in the agri-food sector.	sources, including solar, wind, and biomass, and their applications in agriculture, enabling students to assess and implement sustainable energy solutions for farm operations. • Gain proficiency in green technology practices such as energy-efficient equipment, waste management, and eco-friendly farming methods, empowering students to reduce the environmental footprint of agricultural activities and contribute to a more sustainable food production system.
35.	AHT-221	1+1	Production Technology for Ornamental Crops, MAP and Landscaping	To equip students with comprehensive knowledge and practical skills in the cultivation, management, and design of ornamental crops and landscapes, fostering an understanding of sustainable practices and innovative techniques in the field of horticulture.	• Demonstrate proficiency in the application of advanced production techniques for ornamental crops, including the use of controlled environments, specialized fertilization strategies, and integrated pest management, to optimize crop quality and yield. • Apply sustainable landscaping principles and practices, including plant selection, landscape design, and maintenance strategies, to create aesthetically pleasing and environmentally responsible outdoor spaces.
36.	AHT-222	1+1	Production	To provide students with a	• Develop expertise in the

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			Technology for Fruit and Plantation Crops	comprehensive understanding of the principles and practices related to the production, management, and sustainable cultivation of fruit and plantation crops, fostering expertise in crop optimization and post-harvest processes that contribute to the success of the horticultural industry.	cultivation and management of fruit and plantation crops, including the selection of appropriate cultivars, site preparation, irrigation methods, and pest and disease control measures, to optimize crop quality and yield. • Gain a deep understanding of post-harvest handling, storage, and marketing strategies for fruit and plantation crops, enabling students to make informed decisions and contribute to the development of efficient supply chains and agribusiness practices in the field.
37.	ASC-221	2+0	Problematic Soils and their Management	To equip students with the knowledge and skills necessary to understand, assess, and effectively manage problematic soils, ensuring sustainable land use and optimizing agricultural productivity in the face of soil-related challenges.	• Analyze and identify problematic soils, such as saline, sodic, or compacted soils, through soil testing and assessment techniques, and develop appropriate soil management strategies to mitigate their adverse effects on crop production. • Acquire proficiency in the application of soil amendment techniques, including soil reclamation, drainage, and the incorporation of organic matter, to improve soil fertility and structure, leading to enhanced agricultural productivity and sustainable land

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					management practices.
38.	AST-221	1+2	Principles of Seed Technology	To provide students with a foundational knowledge of seed technology, enabling them to contribute to the production and management of high-quality seeds, supporting agricultural sustainability and food security.	• Develop a comprehensive understanding of seed biology, genetics, and physiology, enabling the identification of high-quality seeds and the ability to assess seed health and vigour. • Acquire practical skills in seed processing, storage, and treatment techniques, ensuring the maintenance of seed quality and viability, as well as compliance with industry standards and regulations.
39.	AAE-222	2+1	Agribusiness Management	To equip students with the knowledge and skills necessary to understand, analyze, and effectively manage agribusiness enterprises, fostering their ability to drive innovation, growth, and sustainability in the agricultural sector.	• Gain the ability to analyse and evaluate agribusiness enterprises, including financial performance, marketing strategies, and risk management, to make informed decisions that enhance profitability and sustainability. • Develop effective communication and leadership skills within the context of agribusiness, enabling students to collaborate with stakeholders, manage teams, and adapt to dynamic challenges in the agricultural industry.
40.	AHT-223	2+1	Landscaping	To provide students with the knowledge and skills required to design, create, and maintain visually appealing and sustainable	• Develop proficiency in landscape design principles, plant selection, and hardscape planning, allowing students to create aesthetically

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				landscapes, fostering their ability to contribute to the enhancement of outdoor environments and the quality of life for individuals and communities.	pleasing and functional outdoor spaces that meet client needs and environmental considerations. • Gain expertise in landscape construction and maintenance techniques, including the installation of irrigation systems, lighting, and sustainable landscaping practices, to ensure the long-term health and beauty of landscaped areas.
41.	APG-221	2+1	Commercial Plant Breeding	To equip students with the knowledge and skills necessary to engage in commercial plant breeding, with a focus on developing new plant varieties that meet market demands and contribute to agricultural and horticultural advancements.	• Develop a deep understanding of the principles of plant genetics and breeding techniques, enabling students to apply advanced breeding strategies for the development of new plant varieties with improved traits. • Acquire practical skills in the evaluation, selection, and testing of plant breeding materials, and gain proficiency in data analysis to make informed decisions in the development of commercially viable plant varieties.
42.	ASC-222	2+1	Agrochemicals	To provide students with a comprehensive knowledge of agrochemicals, emphasizing their responsible and effective use in modern agriculture and horticulture, while addressing environmental and safety	• Understand the properties, modes of action, and environmental impacts of various agrochemicals, including pesticides, fertilizers, and growth regulators, enabling students to make informed decisions regarding their

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				considerations in the application of these chemical inputs.	application in agricultural and horticultural systems. • Develop proficiency in agrochemical safety protocols, including proper handling, storage, and disposal practices, as well as integrated pest management strategies, to minimize risks to human health, the environment, and non-target organisms while effectively managing pests and enhancing crop production.
43.	AAG-311	1+1	Geoinformatics and Nano-technology and Precision Farming	To equip students with the knowledge and skills necessary to leverage geoinformatics, nano-technology, and precision farming approaches to address contemporary agricultural challenges and enhance global food security.	• Understand the integration of geoinformatics, nano-technology, and precision farming techniques to optimize agricultural processes, resource management, and environmental sustainability. • Apply geospatial data analysis, nanoscale technologies, and precision farming principles to design and implement innovative solutions for improving crop yields, resource utilization, and overall agricultural productivity.
44.	AAG-312	0+2	Practical Crop Production-I (*Kharif Crops*)	The aim of the course is to equip students with the practical knowledge and skills necessary to effectively cultivate and manage Kharif crops, contributing to increased agricultural productivity and food security.	• Demonstrate proficiency in the cultivation and management of key Kharif crops, including rice, maize, and cotton, by applying appropriate agronomic practices and pest management strategies. • Analyse and make informed

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					decisions related to crop selection, planting techniques, and irrigation methods to optimize yield and sustainability in Kharif crop production, taking into account regional variations and environmental considerations.
45.	AEE-311	1+1	Entrepreneurship Development and Business Communication	The aim of the course is to empower students with the knowledge and skills required to become successful entrepreneurs and effective communicators in the business world, fostering innovation and economic growth.	• Demonstrate effective communication skills in various business contexts, including written, oral, and interpersonal communication, to facilitate successful entrepreneurship and business operations. • Apply fundamental entrepreneurial concepts, strategies, and analytical tools to identify business opportunities, develop feasible business plans, and effectively manage and grow a business venture.
46.	AEZ-311	2+1	Pests of Crops and Stored Grain and their Management	The aim of the course is to equip students with the knowledge and skills required to effectively identify, prevent, and manage pest infestations in agricultural crops and stored grain, thereby enhancing food security and reducing economic losses in the agriculture sector.	• Identify common pests that affect both crops and stored grain, and understand their life cycles, feeding habits, and the damage they cause to agricultural products. • Demonstrate the ability to implement integrated pest management (IPM) strategies, including biological, chemical, and cultural control methods, to effectively manage and mitigate

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					pest infestations in both agricultural fields and grain storage facilities.
47.	APG-311	1+1	Crop Improvement-I (*Kharif Crops*)	The aim of the course is to provide students with the knowledge and skills necessary to contribute to the development of improved Kharif crop varieties that enhance agricultural productivity, sustainability, and resilience to environmental factors, ultimately supporting global food security and economic growth in agriculture.	• Develop a comprehensive understanding of the principles and techniques involved in crop improvement for Kharif crops, including the selection and breeding of superior varieties with desirable traits such as yield, disease resistance, and stress tolerance. • Gain practical experience in the application of genetic and biotechnological tools for crop improvement, enabling students to contribute to the development of sustainable and high-yielding Kharif crop varieties to meet the challenges of changing agricultural needs and climate conditions.
48.	APG-312	1+0	Intellectual Property Rights		• Develop a comprehensive understanding of intellectual property rights (IPR) systems, including patents, trademarks, copyrights, and trade secrets, and their relevance to various industries and creative endeavours. • Demonstrate the ability to analyze, apply, and manage intellectual property rights, including the process of patent filing, copyright

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					registration, and trademark protection, to effectively protect and leverage intellectual assets in agriculture fields.
49.	APP-311	2+1	Principles of Integrated Pest and Disease Management	The aim of the course is to equip students with the knowledge and skills necessary to effectively address and mitigate pest and disease challenges in agricultural and horticultural systems through the application of holistic and sustainable IPDM approaches, promoting increased crop yields and reduced environmental impact.	• Acquire a thorough understanding of the principles and practices of integrated pest and disease management (IPDM), including the identification, monitoring, and assessment of pest and disease problems in agricultural systems. • Develop the capability to design and implement comprehensive IPDM strategies that incorporate biological, cultural, chemical, and physical control measures, fostering sustainable and environmentally responsible pest and disease management practices in agriculture.
50.	APP-312	2+1	Diseases of Field and Horticultural Crops and their Management	The aim of the course is to equip students with the knowledge and skills required to identify, diagnose, and proactively manage diseases in field and horticultural crops, thereby contributing to increased agricultural productivity and sustainable food production.	• Develop a comprehensive understanding of common diseases that affect field and horticultural crops, including their etiology, symptomatology, and the environmental conditions conducive to their development. • Demonstrate the ability to implement effective disease management strategies, including the use of resistant crop varieties, cultural practices, biological

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					control methods, and appropriate chemical treatments, to mitigate the impact of diseases on crop yield and quality in both field and horticultural settings.
51.	ASC-311	2+1	Manures, Fertilizers and Soil Fertility Management	The aim of the course is to educate students in the principles and practices of optimizing soil fertility through the appropriate use of manures and fertilizers, with a focus on sustainable and environmentally responsible agricultural practices that enhance crop productivity and long-term soil health.	• Gain a comprehensive understanding of the various types of manures and fertilizers, their nutrient content, and their effects on soil fertility and plant nutrition. • Develop the ability to formulate and implement soil fertility management plans, including nutrient assessment, fertilizer application, and soil amendment strategies, to optimize crop yields while minimizing environmental impacts and resource wastage.
52.	AEN-311	2+1	Protected Cultivation	The aim of the course is to provide students with the knowledge and skills necessary to design, implement, and manage controlled-environment agricultural systems, such as greenhouses and polyhouses, to maximize crop production, quality, and resource efficiency, thereby contributing to sustainable and resilient agriculture.	• Acquire a comprehensive understanding of the principles and techniques of protected cultivation, including greenhouse and polyhouse management, microclimate control, and the use of advanced technologies for optimizing plant growth in controlled environments. • Develop the ability to design and manage protected cultivation systems for various crops, taking into consideration factors such as temperature, humidity, light, and

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					ventilation, to achieve year-round production, improved crop quality, and resource-efficient agriculture.
53.	AFS-311	2+1	Food Safety and Standards		• Develop a comprehensive understanding of food safety regulations, standards, and best practices, including the identification of potential hazards in the food production and supply chain. • Acquire the knowledge and skills necessary to implement and maintain effective food safety management systems to ensure the production and distribution of safe and high-quality food products that meet regulatory requirements.
54.	AHT-311	2+1	Micro propagation Technologies	The aim of the course is to equip students with the knowledge and skills required to harness advanced tissue culture methods for the efficient and large-scale production of disease-free, genetically uniform plant material, thereby contributing to the rapid and cost-effective propagation of valuable plant species in agriculture, horticulture, and conservation efforts.	• Gain a deep understanding of micropropagation techniques, including tissue culture and in vitro plant propagation, and their application in mass-producing disease-free and genetically identical plantlets. • Develop proficiency in the practical aspects of micropropagation, such as sterile culture techniques, media preparation, and the management of growth conditions, to produce a wide range of plants for commercial and research purposes

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					with precision and efficiency.
55.	ASC-312	2+1	Biopesticides & Biofertilizers	The aim of the course is to provide students with the knowledge and skills necessary to effectively utilize bio-based products for pest management and soil fertility improvement, contributing to sustainable and eco-friendly agricultural practices that enhance crop productivity while minimizing the environmental impact of conventional chemical inputs.	• Acquire a deep understanding of the principles and mechanisms of biopesticides and biofertilizers, including the identification of key microorganisms and compounds involved in pest control and nutrient enhancement in agriculture. • Develop the expertise to design, implement, and assess the practical application of biopesticides and biofertilizers in integrated pest management and sustainable crop production, fostering environmentally responsible and economically viable agricultural practices.
56.	AAE-321	1+1	Farm Management, Production & Resource Economics	The aim of the course is to equip students with the knowledge and skills required to make informed and economically sound decisions in agricultural production, resource allocation, and farm management, ultimately contributing to increased farm profitability, sustainability, and resilience in the face of economic and environmental challenges.	• Develop a comprehensive understanding of farm management principles, production systems, and resource economics, including factors affecting farm profitability, resource allocation, and decision-making in agriculture. • Gain the ability to analyze and optimize farm production, resource utilization, and financial performance through the application of economic models, cost-benefit analysis, and risk assessment, leading to more

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					efficient and sustainable agricultural enterprises.
57.	AAG-321	1+1	Rainfed Agriculture & Watershed Management	The aim of the course is to educate students on the principles and practices of sustainable rainfed agriculture and integrated watershed management, enabling them to contribute to improved agricultural productivity, natural resource conservation, and livelihood development in rain-dependent regions while mitigating the impacts of water scarcity and climate variability.	• Develop a comprehensive understanding of rainfed agriculture and watershed management, including the principles of conserving rainwater, optimizing land use, and managing natural resources in semi-arid and rain-dependent regions. • Acquire the ability to design and implement effective watershed management strategies, including soil conservation, water harvesting, and agroforestry practices, to enhance agricultural productivity, improve water resource utilization, and promote sustainable livelihoods in rainfed areas.
58.	AAG-322	0+2	Practical Crop Production-II (*Rabi Crops*)	The aim of the course is to provide students with the knowledge and hands-on experience required to effectively plan, execute, and manage the cultivation of Rabi crops, fostering sustainable and high-yielding agricultural practices that contribute to food security and economic development in Rabi crop-growing regions.	• Gain practical expertise in the cultivation and management of Rabi crops, including wheat, barley, and oilseeds, by applying best practices for crop selection, soil preparation, sowing, irrigation, and pest and disease control. • Develop the ability to assess and implement sustainable agricultural techniques and innovations, such as precision farming and crop rotation, to optimize Rabi crop yields and quality while

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					minimizing environmental impact and resource use.
59.	AAG-323	1+1	Principles of Organic Farming	The aim of the course is to educate students on the fundamental concepts and practices of organic agriculture, with a focus on sustainable and environmentally friendly farming methods that prioritize soil health, biodiversity, and the production of organic food products while minimizing the use of synthetic inputs.	• Develop a deep understanding of the principles and philosophies of organic farming, including soil health, biodiversity conservation, and the avoidance of synthetic chemicals and genetically modified organisms in agricultural practices. • Acquire the skills to implement organic farming techniques, such as composting, crop rotation, and integrated pest management, to promote soil fertility, reduce environmental impact, and produce high-quality, chemical-free organic crops.
60.	AEN-321	1+1	Protected Cultivation and Secondary Agriculture	The aim of the course is to provide students with the knowledge and practical skills necessary to excel in the management of controlled environment agriculture, and to leverage secondary agriculture processes, such as value addition and post-harvest handling, to increase the market value and economic sustainability of horticultural and agricultural products grown under protected cultivation.	• Develop a comprehensive understanding of protected cultivation techniques, including greenhouse and polyhouse management, microclimate control, and advanced technologies for optimizing plant growth and yield in controlled environments. • Gain practical skills in the management of secondary agriculture processes, such as post-harvest handling, value addition, and agribusiness, to enhance the market value and economic viability of agricultural produce

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					grown in protected environments.
61.	AEZ-321	1+1	Management of Beneficial Insects	The aim of the course is to equip students with the knowledge and skills required to understand, conserve, and effectively utilize beneficial insects in agriculture, contributing to sustainable pest management practices, reduced pesticide use, and enhanced ecological balance in agroecosystems.	• Develop a comprehensive understanding of beneficial insects, their roles in pest control, and their identification, biology, and behavior in various agricultural ecosystems. • Gain the ability to implement integrated pest management (IPM) strategies that utilize beneficial insects, such as parasitoids and predators, to effectively control pest populations, reducing the reliance on chemical pesticides and promoting sustainable and environmentally friendly pest management practices in agriculture.
62.	AFS-321	2+0	Principles of Food Science and Nutrition	The aim of the course is to provide students with a solid foundation in the principles of food science and nutrition, enabling them to make informed choices about food consumption, understand the science behind food production, and contribute to promoting healthier diets and food safety practices.	• Develop a comprehensive understanding of the fundamental principles of food science, including the chemical and physical properties of food components, food preservation techniques, and food safety and quality control. • Acquire knowledge of the principles of nutrition, including macronutrients, micronutrients, and their roles in human health, as well as the ability to assess and make informed decisions about

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					dietary choices and their impact on well-being.
63.	AFS-322	1+1	Post-harvest Management and Value Addition of Fruits and Vegetables	The aim of the course is to educate students on effective post-harvest handling practices and value addition techniques for fruits and vegetables, enabling them to contribute to reduced food losses, increased economic value, and improved food security in the agriculture and food processing sectors.	• Develop expertise in post-harvest management techniques for fruits and vegetables, including harvesting, storage, packaging, and transportation, to minimize post-harvest losses and maintain product quality. • Gain practical skills in value addition processes, such as food processing, preservation, and product development, to enhance the market value and diversify the utilization of fruits and vegetables, contributing to economic growth and reduced food waste.
64.	APG-321	1+1	Crop Improvement-II (*Rabi Crops*)	The aim of the course is to equip students with the knowledge and skills required to contribute to the development of improved Rabi crop varieties through modern breeding and biotechnological techniques, thereby promoting increased crop yields, enhanced food security, and the adaptation of crops to changing environmental conditions in Rabi season agriculture.	• Develop a deep understanding of crop improvement techniques for Rabi crops, including traditional breeding, genetic modification, and marker-assisted selection, to enhance crop traits such as yield, resistance to pests and diseases, and abiotic stress tolerance. • Gain proficiency in the practical application of advanced crop improvement methods, including the development and evaluation of improved Rabi crop varieties, contributing to increased agricultural productivity and the

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					sustainability of crop production in diverse agroecological regions.
65.	APP-321	2+1	Diseases of Field and Horticultural Crops and their Management –II	The aim of the course is to educate students on advanced principles and practices of disease management in field and horticultural crops, equipping them with the knowledge and skills needed to effectively identify, diagnose, and proactively control diseases, ultimately contributing to enhanced crop productivity and quality in agricultural and horticultural production.	• Develop an in-depth understanding of the diseases that affect field and horticultural crops, including their etiology, epidemiology, and the latest diagnostic and management strategies, enabling effective disease identification and control. • Acquire the ability to implement advanced disease management approaches, including the use of resistant crop varieties, precision disease forecasting, and the integration of biological, chemical, and cultural control methods, to mitigate the impact of diseases on crop production and quality in diverse agricultural and horticultural systems.
66.	AAG-324	2+1	Weed Management	The aim of the course is to provide students with the knowledge and skills necessary to effectively manage weed populations in agricultural systems, with a focus on sustainable and integrated approaches that enhance crop productivity, reduce weed-related economic losses, and minimize the environmental impact of weed control measures.	• Develop a comprehensive understanding of weed biology, ecology, and the principles of integrated weed management, including cultural, mechanical, chemical, and biological control methods. • Acquire the ability to design and implement effective weed management strategies tailored to specific cropping systems, optimizing weed control while

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					minimizing the reliance on herbicides and promoting sustainable and environmentally responsible agriculture.
67.	AEE-321	2+1	Agricultural Journalism	The aim of the course is to prepare students for careers in the field of agricultural communication, equipping them with the knowledge and skills needed to effectively inform, educate, and engage the public and stakeholders on matters related to agriculture, rural development, and agribusiness through responsible and effective journalistic practices.	• Develop proficient writing and communication skills specific to the field of agricultural journalism, including the ability to craft engaging and informative articles, reports, and multimedia content related to agricultural and rural topics. • Gain an understanding of ethical and professional standards in agricultural journalism, including the responsible reporting of agricultural issues, the importance of accuracy, and the ability to effectively convey complex agricultural information to diverse audiences.
68.	AHT-321	2+1	Hi-Tech Horticulture	The aim of the course is to educate students on the principles and applications of advanced horticultural technologies, enabling them to effectively implement and manage high-tech horticultural practices that enhance crop production, quality, and resource efficiency, contributing to the sustainability and innovation of the horticultural industry.	• Develop a comprehensive understanding of high-tech horticultural practices, including greenhouse and controlled environment technologies, precision irrigation and nutrient management, and automation and sensor-based monitoring systems. • Acquire the ability to plan, implement, and manage high-tech horticultural production systems,

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					optimizing resource use, crop quality, and yield, and staying at the forefront of sustainable and innovative horticultural practices in the agricultural industry.
69.	ASM-321	2+1	System Simulation and Agro-Advisory	The aim of the course is to equip students with the knowledge and skills necessary to model and simulate complex agricultural systems, and to provide data-driven agro-advisory services, facilitating evidence-based decision-making in agriculture, enhancing resource utilization, and improving overall farm productivity and sustainability.	• Develop the capability to model and simulate agricultural systems, including crop growth, pest and disease dynamics, and resource management, using computer-based tools and software. • Acquire the skills to provide agro-advisory services based on simulation results and real-time data, enabling informed decision-making for farmers and agricultural stakeholders to optimize agricultural practices and resource allocation.
70.	RAWE 411	0+20	Rural Agricultural Work Experience and Agro-industrial Attachment (RAWE & AIA)	The aim of the course is to provide students with practical exposure to rural agriculture and agro-industrial operations, fostering a comprehensive understanding of both agricultural practices and the agribusiness sector, thereby preparing students for effective and informed engagement in the agricultural and agro-industrial fields.	• Gain practical experience through hands-on work in rural agricultural settings, applying theoretical knowledge to real-world agricultural operations and engaging with local communities to understand their agricultural practices and challenges. • Acquire valuable insights into agro-industrial processes and practices by participating in industrial attachments, enhancing skills in areas such as agribusiness

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					management, value addition, and quality control, and developing a holistic understanding of the agricultural supply chain.
71.	AAG 421	0+10	Poultry Production Technology	The aim of the course is to equip students with the knowledge and skills required to effectively manage poultry production systems, with a focus on best practices in nutrition, health, and management, to ensure the sustainable and efficient production of poultry products for both local and global markets.	• Develop a comprehensive understanding of poultry production systems, including poultry nutrition, breed selection, housing and equipment management, disease control, and biosecurity measures. • Gain the ability to plan, implement, and manage poultry production operations, optimizing bird health, welfare, and productivity, and contributing to the efficient and sustainable production of poultry products for food security and economic development.
72.	AEZ 421	0+10	Commercial Beekeeping	The aim of the course is to provide students with the education and hands-on experience necessary to become proficient in the management of commercial beekeeping enterprises, with an emphasis on sustainable practices, honey production, and the vital role of bees in pollination, ultimately contributing to the growth and sustainability of the apiculture industry.	• Develop a comprehensive understanding of bee biology, hive management, and the various aspects of commercial beekeeping, including honey production, pollination services, and value-added bee products. • Acquire the practical skills and knowledge needed to establish and manage successful commercial beekeeping operations, including hive placement, disease management, and sustainable

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					beekeeping practices, contributing to the growth of the apiculture industry and the preservation of pollinators.
73.	AFS 421		Food Processing	The aim of the course is to provide students with the knowledge and practical skills necessary to excel in the field of food processing, with a focus on ensuring the safety, quality, and shelf-stability of food products, contributing to food security, value addition, and the growth of the food processing industry.	• Develop a thorough understanding of food processing techniques, including principles of food preservation, unit operations, and quality control measures applied to various food products. • Acquire the skills to design and execute food processing operations, ensuring the safety, quality, and shelf-stability of processed food products, while adhering to industry regulations and standards.
74.	AHT 421	0+10	Commercial Horticulture	The aim of the course is to prepare students for successful careers in the field of commercial horticulture by providing them with the knowledge and skills required to establish and manage horticultural enterprises, optimize crop production, and contribute to the economic growth and sustainability of the horticultural industry.	• Develop a comprehensive understanding of commercial horticultural practices, including crop selection, cultivation techniques, pest and disease management, and post-harvest handling, to optimize crop yield and quality. • Acquire the ability to plan, establish, and manage commercial horticultural enterprises, with a focus on sustainable production methods, market analysis, and business management, contributing to increased agricultural

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					productivity and economic growth in the horticulture sector.
75.	AHT 422	0+10	Floriculture and Landscaping	The aim of the course is to equip students with the knowledge and skills needed to excel in the fields of floriculture and landscaping, with a focus on the cultivation of ornamental plants, landscape design, and the creation of visually appealing and environmentally sustainable outdoor and indoor spaces, contributing to the enhancement of aesthetics and quality of life in various environments.	• Develop a comprehensive understanding of floriculture, including the cultivation and management of ornamental flowers and plants, as well as landscaping principles, design aesthetics, and horticultural practices for creating visually appealing outdoor and indoor environments. • Acquire the ability to design and execute landscaping projects, combining knowledge of plant selection, landscape design, and maintenance techniques to create aesthetically pleasing and environmentally sustainable landscapes and indoor green spaces.
76.	APG 421	0+10	Seed Production and Technology	The aim of the course is to provide students with the knowledge and practical skills necessary to excel in the field of seed production, with a focus on producing high-quality, genetically pure seeds for various agricultural and horticultural crops, contributing to the availability of improved plant varieties and the overall success of agriculture and plant breeding.	• Develop a comprehensive understanding of seed biology, genetics, and the principles of seed production, including varietal improvement, hybrid seed production, and seed processing techniques. • Acquire the ability to plan, manage, and execute seed production operations, ensuring the production of high-quality, genetically pure seeds, and

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					contributing to the availability of improved plant varieties for agriculture, horticulture, and conservation purposes.
77.	APP 421	0+10	Mushroom Cultivation Technology	The aim of the course is to equip students with the knowledge and skills required to excel in the field of mushroom cultivation, with a focus on sustainable and commercially viable practices that lead to the production of high-quality edible fungi for both economic and culinary purposes, while also contributing to food security and environmentally responsible agricultural practices.	• Develop a comprehensive understanding of mushroom biology, growth requirements, and cultivation techniques, including substrate preparation: spawn inoculation, environmental control, and disease management. • Acquire the practical skills to establish and manage mushroom cultivation operations, with an emphasis on selecting suitable mushroom species, optimizing production parameters, and ensuring the quality and safety of harvested mushrooms, contributing to the sustainable production of edible fungi for commercial and culinary purposes.
78.	ASC 421	0+10	Production Technology for Bioagents and Biofertilizers	The aim of the course is to educate students on the principles and practices of producing and utilizing bioagents and biofertilizers in agriculture, equipping them with the knowledge and skills necessary to enhance the sustainability and productivity of agricultural systems while reducing reliance on chemical inputs and promoting	• Develop a comprehensive understanding of the production techniques for bioagents, such as beneficial microorganisms and natural enemies, and biofertilizers, including microbial inoculants and organic soil amendments. • Acquire the practical skills to produce and quality-control bioagents and biofertilizers.

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				environmentally responsible farming.	emphasizing the mass production and formulation of these products, and understand their application in integrated pest management and sustainable agriculture, contributing to environmentally friendly and cost-effective farming practices.
79.	ASC 422	0+10	Soil, Plant, Water and Seed Testing	The aim of the course is to prepare students to effectively assess and manage the key components of agricultural systems, including soil, plants, water, and seeds, through accurate and informed testing and analysis, ultimately contributing to improved agricultural productivity, resource conservation, and sustainable land management.	• Develop a comprehensive understanding of soil, plant, water, and seed testing techniques, including sample collection, laboratory analysis, and data interpretation to assess nutrient levels, soil health, and potential limitations in agricultural systems. • Acquire the ability to conduct soil, plant, water, and seed testing, interpret test results, and make informed recommendations for soil fertility management, irrigation planning, seed quality, and nutrient application, thereby optimizing agricultural practices and resource utilization.
80.	AFS-422	0+10	Agriculture Waste Management		• Develop an understanding of agricultural waste sources, their environmental impact, and the principles of sustainable waste management in agriculture. • Acquire the knowledge and skills to implement effective waste

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					reduction, recycling, and disposal practices in agricultural operations, minimizing environmental pollution and promoting resource efficiency.
81.	AAG-422	0+10	Organic Production Technology	The aim of the course is to prepare students for careers in organic agriculture by providing them with the knowledge and practical skills necessary to excel in the field of organic farming, with a focus on sustainable and environmentally friendly practices that prioritize soil health, biodiversity, and the production of organic food products while minimizing the use of synthetic inputs.	• Develop a deep understanding of organic farming principles, including soil health, biodiversity conservation, and the avoidance of synthetic chemicals and genetically modified organisms in agricultural practices. • Acquire the practical skills to implement organic farming techniques, such as composting, crop rotation, and integrated pest management, to promote soil fertility, reduce environmental impact, and produce high-quality, chemical-free organic crops.
82.	AEZ-422	0+10	Commercial Sericulture	The aim of the course is to educate students on the principles and practices of sericulture, equipping them with the knowledge and skills necessary to effectively manage sericulture operations and contribute to the sustainable and high-quality production of silk, thereby supporting the silk industry and promoting economic growth in the sector.	• Develop a comprehensive understanding of sericulture practices, including the life cycle of silkworms, rearing, cocoon production, and silk extraction techniques. • Acquire the practical skills to establish and manage sericulture operations, optimizing silkworm health, silk production, and quality, contributing to the sericulture industry and the production of

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					high-quality silk products.
83.	-		National Service Scheme (NSS)	The aim of the course is to foster in students a sense of social responsibility, community engagement, and personal development, by involving them in various community service activities, instilling values of active citizenship, and contributing to the betterment of society.	• Develop a deep understanding of the principles and goals of National Service Scheme (NSS), including community engagement, social responsibility, and personal development. • Acquire practical skills in organizing and participating in community service activities, such as awareness campaigns, cleanliness drives, and health camps, to address local needs and contribute to the welfare of society.
84.	-		National Cadet Corps (NCC)	The aim of the course is to develop leadership qualities, discipline, and a sense of patriotism in students through military training and other NCC activities, preparing them for roles in the defence forces and promoting a strong sense of national service and duty.	• Develop leadership and teamwork skills through participation in National Cadet Corps (NCC) activities, including drills, physical training, and military training. • Acquire a sense of discipline, responsibility, and patriotism while learning about defence and security matters, preparing students for potential roles in the armed forces or other aspects of national service.
85.	-		Physical Education & Yoga Practices	The aim of the course is to promote physical fitness, holistic health, and well-being among students by providing education and practical training in physical activities and yoga, enabling them to maintain a healthy and balanced	• Develop physical fitness, endurance, and overall well-being through structured physical education and yoga practices, gaining proficiency in various exercises, sports, and relaxation techniques.

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				lifestyle while managing stress and fostering overall personal development.	• Acquire knowledge of the principles of physical fitness and holistic health, and the ability to integrate physical activity and yoga into daily life for improved health, stress management, and a balanced lifestyle.

B.Sc Horticulture

Sl. No	Course No.	Credit Hrs.	Course Title	Aim of the course	Learning Outcome
1.	HSM 111	2+1	Elementary Statistics and Computer Application	Awareness towards statistical data analysis and computer friendly	Friendly with Computer are statistical data analysis
2.	HSC 111	1+1	Fundamental of Soil Science	To help and protect natural resources and improve water quality and make soil healthier.	Safe crop production and healthy environment.
3.	HAE 111	2+1	Economics and Marketing	To understanding marketing has acquired and important place for the economic development.	Better standard living to the society and increase in income.
4.	HBP 111	1+1	Elementary Plant Biochemistry	To let student understand the physical and chemical properties of molecules and their status of occurrence in biological system.	Students list have enhancement in knowledge on the principles of plant Biochemistry.
5.	HBP 112	1+1	Introductory crop physiology	It studies the structure and function of crops in relation to productivity and quality product for different uses.	It helps in the improvement of crop production and the quality of food.
6.	HHT 111	2+1	Fundamentals of Horticulture	To identity and prescribe sustainable option in horticulture	It demonstrates the working knowledge and appreciation of the

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				which benefit the environment while marinating productivity and economic viability	diversity of plant, their culture and utilization and successful growth of production of horticultural Plants.
7.	HHT 112	0+1	Principles of Landscape Architecture	To make Place with good functional ecological and visual qualities.	It achieves aesthetic and environmental outcomes while ensuring sustainability by removing pollutants the surroundings.
8.	HPG 111	2+1	Principles of Genetics and Cytogenetic	To help and diagnose and disease or condition, plant treatment or find our how well treatment is working.	It identifies structure abnormalities and cytogenetic involves the examination of Chromosomes.
9.	HSC 112	1+1	Introductory Microbiology	To better understand the total picture of infectious diseases in terms of hosts-infections agent interaction.	Student gain knowledge about the different cell, organ cells of micro organism and their detail function.
10.	HEE 111	1+1	Communication Skills and Personality Development	To boost, trust, understanding and compassion listening to and exposing the opinion and concern for others.	Students communicate fluently and helps in building relationship with people and to learn many more things.
11.	HHT 121	2+1	Tropical and Subtropical Fruits	To acquaint with various tropical and subtropical fruit crops and cultivation, production techniques and their post harvest management.	Students get acquainted with the specific package of practices of various tropical and subtropical fruit crops.
12.	HHT 122	2+1	Tropical and Subtropical Vegetables	To knows about cultural practices of tropical and subtropical vegetables.	Student gets acquainted with scientific cultivation for high production and more benefit from tropical and subtropical vegetables.
13.	HPG 121	2+1	Principles of Plant Breeding	To learn about various breeding methods for improvement of crops.	Students get acquainted with various breeding techniques.
14.	HSC 121	0+1	Soil Fertility and Nutrient Management	It aims maximizing the efficiency of agronomic use of nutrients and improving crop productivity.	It guides students for high yield and better quality of plants.

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15.	HAG 121	1+1	Water Management in Horticultural Crops	To know about different sources of water, its availability and importance for plant growth, method of soil moisture measurement and method of irrigation.	Students got acquainted about water resource, quality of irrigation water and different methods of irrigation of horticultural crops.
16.	HHT 123	1+1	Plant Propagation and Nursery Management	To get familiar with the various methods of plant propagation.	Student gets well vested with the various methods of plant propagation.
17.	HBP 121	2+1	Environmental Studies and Disaster Management #	To understand the instruction of human with the environment, reduce disaster and their rapid and effective recovery.	It in enhances knowledge about the environment, relationship with the human activities and awareness about disaster management.
18.	HHT 124	1+1	Growth and Development of Horticulture Crops	To know about the physiology of plant influencing growth and development.	It provides knowledge about various physiological activities under going within the plant system.
19.	HEE 121	1+1	Information and Communication Technology	To get acquainted with computer and improve their knowledge through ICT.	It helps in upgrading knowledge through ICT tools.
20.	HPP 211	2+1	Fundamentals of Plant Pathology	To learn principles of pathogens, symptoms and their management.	Students acquired knowledge about plant pathogen, diseases and their management.
21.	HEZ 211	2+1	Fundamentals of Entomology	To learn about principles of insects, beneficial insects, their activities, damage on plants and their integrated management.	Students are get well vested about different insects, bio agents and their management.
22.	HHT 211	1+1	Temperate Vegetable Crops	To get familiar with temperate vegetable cultivation	Students get knowledge regarding cultural practices of temperate vegetable crops.
23.	HEZ 212	1+1	Nematode Pests of horticultural crops	To know about principals of plant parasitic nematodes, classification,	It helps in acquiring the knowledge about different types of plant

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			and their Management	life cycle, nature of damage on plants and their integrated management.	parasite nematode and their management.
24.	HPP 212	2+1	Diseases of Fruits, Plantation, Medicinal and Aromatic Crops	To study about the cause systems and its management of fruits, plantation, medicinal and aromatic crops.	It helps in gaining the knowledge to identify identification and management of diseases of fruits, plantation, medicinal and aromatic crops.
25.	HFS 211	2+1	Fundamentals of Food Technology	To preserve nutrients through all phases of food harvesting, processing, storage and preparation.	Students get ability to use techniques skill and modern tools in the food industry and academic profession.
26.	HHT 212	2+0	Temperate Fruits Crops	To provide the scientific knowledge of cultivation multiplication and orchid management of temperate fruit crops.	Students get acquainted with various temperate foods its cultivation practices for production of quality fruits.
27.	HAG 211	1+1	Weed Management in Horticultural Crops	To aware the students about weeds, crop weed competition basic information about herbicides and methods of weed management.	Students understand the relevance caused by weeds, identify weeds and management in integrated manner.
28.	HHT 213	2+1	Commercial Floriculture	To know about different cultural practices of various flowers grown in India.	Students get benefited after knowing the cultural practices of different flowers grown in India.
29.	HME 211	2+1	Elementary Plant Biotechnology	To get knowledge about biological tolls and technology for the welfare of human beings.	It provides education that leads to comprehensive understanding of the principles and practices of biotechnology.
30.	HSC 221	1+1	Soil, Water and Plant Analysis	To develop basic understanding regarding soil water plant testing in the students	Students get understand the role of micronutrients and macronutrients in plant growth development in also soil plant water test methods is well

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					understood.
31.	HHT 221	2+1	Spices and Condiments	To know about production, value addition and processing of different spices and condiments.	Students get benefited for production value addition and processing aspects of spices and condiments.
32.	HHT 222	2+1	Ornamental Horticulture	To study the different type of ornamental plants and their marketing.	Students get in imparting knowledge with different type of ornamental plants its beneficiations value and marketing.
33.	HHT 223	2+1	Plantation Crops	To grow cash crop for sale in the market.	It helps in conserving the soil and ecosystem.
34.	HPG 221	2+1	Breeding of Fruits and Plantation Crops	To know the process of improving the genetics of fruit crops by different breeding process.	Students get acquainted with different breeding technique for improvement of fruit and plantation crops.
35.	HEN 221	1+1	Farm Power and Machinery	To enhance different agricultural tools and techniques through various farm implements.	Students get knowledge about farm power and machinery used in agriculture production.
36.	HEZ 221	2+1	Insect Pest of Fruits, Plantation, Medicinal & Aromatic Crops	To study about different insect's damage symptoms life cycle and its management of fruits plantation, medicinal and aromatic crops.	Students learn about identification about different insect and their management of fruit plantation, medicinal and aromatic crops.
37.	HHT 224	2+1	Precision Farming and Protected Cultivation	It's main aim is to produce horticultural crops where climate inhibits the production.	Students get benefited for off season cultivation of crops for their entrepreneurship development.
38.	HHT 225	1+1	Dry land Horticulture	To know about the cultivation technique and management practices of horticultural crops grown under limited natural resources viz. water stress, problematic soil condition etc.	It helps the management of horticulture crops grown under heat stress, water stress and poor soil condition.

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39.	HAG 311	2+1	Organic Farming	It is responsible use of energy and natural resources. Maintain biodiversity and protect animal welfare and conserve the regional ecological balance.	The student able to develop critical understanding on various aspects of agronomy.
40.	HAG 312	1+1	Introduction to major Field Corps	To impart knowledge about major field crops and their package of practices. To understand about basic concept of crop rotation, cropping system and crop planning.	Student get acquainted about major field crops and its cultivation crop rotation and cropping system.
41.	HHT 311	2+1	Medicinal and Aromatic Crops	To impart the knowledge about the production technology of medicinal and aromatic plants.	Students will get secured knowledge regarding cultural practices of medicinal and aromatic plants, medicinal value and their marketing.
42.	HAG 313	1+1	Introductory Agroforestry	To learn about different agro forestry trees their silviculture and its potential in agriculture.	Students get recognize about different agro forestry trees, its importance in agricultural industries.
43.	HPG 311	2+1	Breeding of Vegetable, Tuber and Spice Crops	To study about the genetics of vegetable, tuber and spice crops for the development of new varieties for using different breeding techniques.	Students get well versed with the different breeding technique for development of new varieties.
44.	HPP 311	2+1	Diseases of vegetables, Ornamentals and Spice Crops	To learn about symptoms damage collection, identification of different diseases of vegetables, ornamental and spice crops.	Students get knowledge about different diseases, symptoms and their management.
45.	HHT 312	1+1	Orchard and Estate Management	To provide knowledge about the establishment, overall management of orchids through judicious and	Students get acquainted with effective utilization of available area resources and increase in net

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				sustainable use of natural resources of quality fruit production and its marketing.	income of farm per unit area through orchid management.
46.	HAG 314	1+1	Agro- Meteorology and Climate Change	To learn about metrological, climatical issues and application of information in agriculture.	Students get knowledge about metrological instrumental and its observation weather forecasting and crop management strategies.
47.	HHT 313	1+1	Potato and Tuber Crops	To learn about different root and tuber crops and their package and practices.	Students get acquainted about different root and tuber crops.
48.	HEZ 321	1+1	Agriculture, Sericulture and Lac Culture	To know awareness about sericulture, lac culture for business aspects.	Students get acquainted with sericulture, lac culture.
49.	HEZ 322	2+1	Insects Pests of Vegetable, Ornamental and Spice Crops	To study about symptoms, damage, collection, identification, preservation, assessment of insect pest of vegetable ornamental and spice crops.	Students are well versed with different insect its damage, identification, life cycle and their integrated pest management.
50.	HHT 321	2+1	Postharvest Management of Horticultural Crops	To understand the various techniques for management of horticulture procedure during the various stage between the harvesting and consumption to reduce the qualitative and quantitative losses.	Students get acquainted with the various techniques of harvesting, storage, maturity indices, grading and marketing strategy for horticulture crops.
51.	HHT 322	2+1	Seed Production of Vegetable, Tuber and Spice Crops	Its main aim is to increase horticulture production through the spread if good quality seed of high yielding varieties.	Students get benefitted for horticulture production through good quality seed of high yielding varieties.
52.	HHT 323	2+1	Breeding and Seed Production of Flower and	To improve flower and ornamentals seed production by adopting approaches of quality	It will teach how to enhance the yield of flower and ornamental plants with quality seed production.

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			Ornamental Plants	seed production of high yielding varieties.	
53.	HFS 324	1+2	Processing of Horticultural Cops	To provide the basic knowledge about the production, utilization, consumption and losses of horticultural crops, its preservation methods for the best utilization of horticultural produces.	Students acquainted the knowledge of basic principles and method of preservation for increasing the self lifeyear round availability and value addition of horticultural produce.
54.	HAE 321	2+1	Horti- Business Management	To acquaint students about Horti-business skills and techniques of farm management for self sustainability.	Students get knowledge about principles of farm management for enhancing production techniques.
55.	HEE 321	1+1	Entrepreneurship Development and Business Management	Awareness about to create employment for self sustainability	Improvement in organizational skill as well as changing the culture of a competitive work environment into a collaborative one.
56.	HEE 322	1+1	Fundamental of Extension Education	To learn about rural society and improve their general standard of living.	It enhances knowledge about rural programme and techniques to reach rural people for their rural development.
57.	RHWE 411	0+20	Rural Horticultural work Experience Programme Student Ready-Placement in Industries	To gain practical knowledge of different crop production techniques and their marketing in rural society.	Majority of the students fully agreed the RHWE programme had helped them to get familiar with rural people and understand village situation. Students acquainted with knowledge increases in industrial activities.
58.	HHT 421	0+10	Commercial Horticulture	To improve integrated development of horticulture industrial area to help in coordinating sustaining the production and processing of fruits	Students get acquainted with all the techniques of commercial horticulture such as nursery development protected cultivation of high value crops, flowers and

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				and vegetables.	fruit production.
59.	HHT 422	0+10	Protective Cultivation of High Valve Horticulture Crops	Its main aim is to promoting professional skills and knowledge through hands of experience building confidence and ability to work in project mode and acquire enterprises management capabilities.	It provides professional skill and knowledge through project mode by providing off season cultivation for high value crops.
60.	HFS 421	0+10	Processing of Fruits and Vegetables for Value Addition	To develop skill in entrepreneurship, establishment, project formulation, financial management and marketing strategies on value addition of fruits and vegetables.	It helps in development of professional skills to establish processing unit and its management.
61.	HHT 423	0+10	Floriculture and Landscape Architecture	To know about landscape principles and layout of different gardens and parks.	Students get acquainted with proper landscape designing.
62.	HSC 421	0+10	Bio-input; Bio Fertilizers and Bio-pesticide	To know awareness about bio-inputs, bio-fertilizers and bio-pesticides for soil and health conciseness.	Students get knowledge about bio-inputs, bio-fertilizers and bio-pesticides.
63.	HME 421	0+10	Mass Multiplication of plant and molecules through Tissue Culture	To obtain large number of virus free plants in short span of time.	Students get well acquainted with tissue culture techniques.
64.	HPP 421	0+10	Mushroom Culture	To provide basic knowledge in cultivation of mushrooms able to grown mushroom in a scientific way and sustainable use of resources to promote self employment.	It helps in understanding various aspects of cultivation of mushroom.

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65.	HEZ 421	0+10	Bee Keeping	Apiculture is a practice for production of honey, wax, royal jelly, venom, pollen and propels and is also useful for crop pollination.	It helps in understanding the basic about beekeeping tools equipment and managing bee hives.
66.	HHT 421	0+10	Commercial Horticulture	To improve integrated development of horticulture industrial area to help in coordinating sustaining the production and processing of fruits and vegetables.	Students get acquainted with all the techniques of commercial horticulture such as nursery development protected cultivation of high value crops, flowers and fruit production.

M.Sc Programme

Genetics and Plant Breeding (GPB)

S.No	Course Code	Credit Hrs	Course Title	Aim of the course	Learning Outcome
1.	GPB 501	2+1	Principles of Genetics	This course is aimed at understanding the basic concepts of inheritance of genetictraits, helping students to develop their analytical, quantitative and problem-solvingskills from classical to molecular genetics.	After passing out this course the student will be able to know the differencebetween the genotype and phenotype, can carry study on inheritance and alsoknow the role of DNA and RNA in genotypic manifestation of characters.
2.	GPB 502	2+1	Principles of Plant Breeding	To impart theoretical knowledge and practical skills about plant breeding objectives,genetic consequences, breeding methods for crop improvement.	The knowledge of this course will enable the student to know breeding methods,different hybridization techniques for genomic reshuffling. The course will alsoacquaint the student with importance of floral biology, mutation breeding andparticipatory plant breeding, etc.
3.	GPB 503	2+1	Fundamentals of	To impart theoretical knowledge and	After studying this course, the student will

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			Quantitative Genetics	computation skills regarding components ofvariation and variances, scales, mating designs and gene effects.	be equipped with the knowledge ofadditive dominance and epistatic gene action. They will also be introduced with thevarious designs for analysis of genotypic and phenotypic variance and QTL mapping.
4.	GPB 504	1+1	Varietal Development and Maintenance Breeding	The purpose of this course is to make students well acquainted with the techniquesand procedures of varietal development. He will be associated with development of variety so the course aims is to provide knowledge on DUS testing, protocols ofvarious breeding techniques, procedures of release of variety, maintenance of thevariety and production of nucleus and breeder seed of variety/ hybrids.	Pass out student will have complete knowledge on the various procedures linkedwith the development and release of variety. This course will also enable studenthow to maintain and multiply variety for large scale distribution. It will also makestudent acquainted with the seed laws and acts related to plant variety protection.
5.	GPB 505	2+1	Principles of Cytogenetics	To provide insight into structure and functions of chromosomes, chromosomemapping, polyploidy and cytogenetic aspects of crop evolution.	The course will provide full knowledge to the student on the various procedures linkedwith cell development and chromosome structure and function. This course will alsoenable student how to tailor and utilize the variation in chromosome number andstructures in the development and synthesis of new species and varieties.
6.	GPB 506*	2+1	Molecular Breeding and Bioinformatics	To impart knowledge and practical skills to use innovative approaches andBioinformatics in Plant Breeding.	The knowledge of this course will enable the student to know about various moleculartools and approaches for genotyping and marker assisted breeding, intellectualproperty rights, bioinformatics

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					tools and their uses in crop improvement.
7.	GPB 507	2+1	Breeding for Quality and Special Traits	To provide insight into recent advances in improvement of quality traits in cereals,millets, legumes, oilseeds, forage and industrial crops using conventional and modernbiotechnological approaches.	The knowledge of this course will expose the student to know about variousconventional and genetic engineering techniques for the improvement of qualitycharacters in agricultural and horticultural field crops.
8.	GPB 508	2+1	Mutagenesis and Mutation Breeding	To impart the knowledge about general principles of mutagenesis for cropimprovement and various tests/ methods for detection of mutations.	This course will make the student well versed with the process of mutation and itsuse in crop improvement. This course will also give in depth knowledge of mutationsin genomics, allele mining and tilling.
9.	GPB 509	2+1	Hybrid Breeding	To provide knowledge of understanding about mechanisms of heterosis and itsexploitation for yield improvement through conventional and biotechnologicalapproaches.	After completing this course, the student will be able to know about importance of heterosis, the various conventional and biotechnological approaches for thedevelopment of hybrids. This will also enable student to know about the use of male sterility in hybrid seed production of important field crops.
10.	GPB 510	1+1	Seed Production and Certification	To impart knowledge on principles of seed production and certification. This willhelp the students to understand seed production practices and seed certificationprocedures in different crops.	After completing this course, the student will be able to know about seed productionof different crop varieties and hybrids, their processing, marketing and seed laws.
11.	GPB 511	2+1	Crop Breeding-I *(Kharif* Crops)	To provide insight into recent advances in improvement of kharif cereals, legumes,oilseeds, fibre, sugarcane and vegetative propagated crops using conventional andmodern	After completing this course, the student will be able to know about importantbotanical status and reproductive structures of crops and genetics of importantkharif field crops.

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				biotechnological approaches.	
12.	GPB 512	2+1	Crop Breeding-II *(Rabi* Crops)	To provide insight into recent advances in improvement of Rabi cereals, legumes,oilseeds, fibre and vegetative propagated crops using conventional and modernbiotechnological approaches	After completion of this course the student will be able to know about the differentbreeding methods and genetics of major Rabi field crops.
13.	GPB 513	2+1	Breeding Vegetable Crops	To educate about principles and practices adopted for breeding of vegetable crops.	After completion of this course the students will be able to know about the differentbreeding methods and genetics of major vegetable crops.
14.	GPB 514	2+1	Breeding Fruit Crops	To educate students about principles and practices adopted for breeding of fruitcrops.	After completion of this course the students will be able do the breeding of fruitcrops through various conventional and biotechnological methods besides mutationbreeding.
15.	GPB 515	2+1	Breeding Ornamental Crops	To educate about principles and practices adopted for breeding of ornamental crops.	After completion of this course the students will be able to do the breeding of ornamental crops by conventional breeding and biotechnological methods and toknow the genetics of major ornamental crops.
16.	GPB 516	2+1	Breeding for Stress Resistance and Climate Change	To apprise about various abiotic and biotic stresses influencing crop yield,mechanisms and genetics of resistance and methods to breed stress tolerant varieties.	After completion of this course the student will be able to well verse with the stressand its causes. This will enable the students for the development of RIL, NIL, etc.for pest resistance and Use of standard MAS procedures
17.	GPB 517	1+1	Germplasm Characterization and Evaluation	Students will gain knowledge on germplasm characterisation, evaluation anddocumentation of information. Recording of	To educate students about science of managing genetic resources including principlesinvolved in maintaining genetic integrity during regeneration, germplasm

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				morphological and agronomic traits,including quality, as well as those for resilience to biotic and abiotic stresses that will promote utilisation. Exposure to development of web-based tools for systematicdescription for efficient use of germplasm.	characterization and evaluation.
18.	GPB 518	1+1	Genetic enhancement for PGR Utilization	To teach theoretical and practical know how on CWRs reproductive behavior,acclimatization and adaptation for utilization in pre-breeding programmes usingadvanced tools.	Students would be conversant with handling of unadapted germplasm. screeningmethods for special traits-biotic and abiotic resistance, nutritional traits, characterization of CWR, breeding, etc.

Seed Science and Technology (SST)

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	SST 501	1+1	Seed Developmental Biology	To acquire knowledge on development and maturation of essential structures ofseed and their influence on seed quality.	Successful completion of this course enable student to take up advanced researchon seed developmental biology and understanding on fundamental aspects ofgametogenesis, seed development and maturity.
2.	SST 502	1+1	Seed Dormancy and Germination	To impart knowledge on significance, mechanism of dormancy, induction and releaseof seed dormancy and germination, types and factors influencing germination andtheir management.	By learning this course, students will understand the fundamental theories andmechanism underlying in seed dormancy and germination which will be useful for both basic research and development.

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3.	SST 503	2+1	Seed Production Principles and Techniques in Field Crops	To impart knowledge on principles and practices involved in quality seed productionof field crops.	Successful completion of this course enable student to take up seed production venture in scientific manner to ensure seed quality and profitability.
4.	SST 504	2+1	Seed Production Principles and Techniques in Vegetable Crops	To impart knowledge on principles and practices involved in quality seed productionof vegetable crops.	Successful completion of this course enable student to gain confidence and to become seed entrepreneur in high value low volume vegetable crops.
5.	SST 505	2+1	Seed Production Techniques in Fruits, Flowers, Spices, Plantation and Medicinal Crops	To impart comprehensive knowledge on seed production techniques in fruits, flowers,spices, plantation and medicinal crops.	Successful completion of this course enables the students to take up elite seed andseedling production on commercial scale.
6.	SST 506	1+1	Seed Production Techniques in Forage, Pasture and Green Manure Crops	To impart knowledge on basic principles and methods of quality seed productionin forage and green manure crops.	After completion of course the students gain confidence to start a seed venture onforage and green manure crops.
7.	SST 507	2+1	Seed Legislation and Certification	To impart knowledge on seed legislation in relation to seed certification and qualitycontrol systems.	This course will be useful to develop human resource on seed certification and legislation. Successful completion of this course enables students to become a Seed Certification Officer and Seed Inspector.
8.	SST 508	2+1	Post Harvest Handling and Storage of Seeds	To impart knowledge on principles, techniques and methods of seed processing,treatment and storage.	The students will understand the principles and mechanism involved in seedprocessing, storage techniques and management practices to arrest the seeddeterioration. Students will also acquire skill on seed handling and storage methodson commercial basis.
9.	SST 509	1+1	Seed Quality Testing and Enhancement	To impart knowledge on principles, techniques and methods of seed	Successful completion of this course by the students will be useful to

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				testing andseed quality enhancement.	acquiretechnical skill on seed quality analysis which leads to the development of human resource on seed quality analysis.
10.	SST 510	1+1	Seed Technology of Tree Species	To make the students gain knowledge on seed production and handling techniquesof various tree species.	Knowledge of the seed biology of a tree species enable to produce good qualityseeds, handling and prevent loss of seeds. The knowledge on sexual life cycleenables them to plan for genetic improvement, production, collection, conditioning,storage, and planting of the seeds.
11.	SST 511	1+1	Seed Industry and Marketing Management	To empower the students to become seed entrepreneurs by imparting knowledgeon seed industry management and marketing strategies.	On completion of this course students will gain knowledge and confidence to manage seed industry and able to address the problems in seed industry and seed marketing.
12.	SST 512	1+1	Seed Health Testing and Management	To acquaint the students with principle and practices of seed health testing andmanagement of seed borne pathogens and storage insects.	Successful completion of this course will provide knowledge on production of healthyseeds by timely detection and management of seed borne pathogens and storagepests to meet phyto-sanitary requirements.

Entomology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	ENT 501	2+1	Insect Morphology	To acquaint the students with the external morphology of the insect's body and thefunctioning of various body parts.	•Students are expected to have a complete understanding of the comparative morphology of the external features of insects that can be utilized in

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					taxonomy,ecology and applied entomology.
2.	ENT 502	2+1	Insect Anatomy and Physiology	To impart knowledge about the anatomy and physiology of insect body systems;nutritional physiology; and their applications in entomology.	• Students are expected to have a thorough understanding of insect growth anddevelopment, physiology of exoskeleton, endoskeleton and different organ systems;action and role of hormones, pheromones, physiology of nutrition and its application.
3.	ENT 503	1+2	Insect Taxonomy	To sensitize the students on the theory and practice of classifying organisms (with specialreference to animals) and the rules governing the same. To introduce the students tothe classification of insects up to the level of families with hands-on experience inidentifying the families of insects with an emphasis on the practical aspects.	• Students are expected to know the evolution of arthropods, especially insects andother hexapods, and their hierarchical classification • Acquire working skills for collecting, mounting, and preserving insects • Understand the basic concepts of taxonomic hierarchy, identification, taxonomiccharacters, variations, taxonomic keys and preparation of taxonomic papers • Identify insects of economic importance up to family levels, taking up the insectorders of agriculture and veterinary importance
4.	ENT 504	2+1	Insect Ecology	To teach the concepts of ecology, basic principles of distribution and abundance oforganisms and their causes. Study life tables, constructing life tables, organizationof communities, diversity indices. Train students in sampling methodology,calculation of diversity	• The students are expected to be well versed with the basic concepts of ecology,ecological succession, population ecology, community ecology, nutritional ecologyand different insect-ecosystem interactions • Quantification of insect diversity and abundance, life table analyses, predator

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				indices, relating insect population fluctuations to biotic and/or abiotic causes.	prey and host-parasitoid relations, functional and numerical responses, nichebreadth and overlap
5.	ENT 505	2+1	Biological Control of Insect Pests and Weeds	To train the students with theory and practice of biological control, mass productiontechniques and field evaluation of various biological control agents like parasitoids,predators and various entomopathogenic microorganisms.	• Students are expected to have a good understanding of the role of natural enemiesin managing pest populations below those causing economic damage • Learn the techniques for mass production of quality bio-agents and their optimaluse in IPM
6.	ENT 506	2+1	Toxicology of Insecticides	To orient the students with structure and mode of action of important insecticidesbelonging to different groups, development of resistance to insecticides by insects,environmental pollution caused by toxic insecticides and their toxicological aspects.	• Students are expected understand the concept of toxicity, bio-efficacy, insecticide formulations, modes of action of insecticides, estimation of insecticide residues and have significant know-how about the functioning of various types of sprayequipment.
7.	ENT 507	1+1	Host Plant Resistance	To orient the students with host plant resistance	• Students are expected to acquire a thorough knowledge of the types and basis ofmechanisms involved in host plant resistance, screening techniques to measureresistance and insect resistance breeding.
8.	ENT 508	2+0	Concepts of Integrated Pest Management	To familiarize the students with principles of insect pest management, includingconcept and philosophy of IPM. Train students in computation of ETL andimplementing IPM programmes.	• Students are expected to have significant knowledge of IPM concepts, estimationof losses due to insect pests, computation of ETL, EIL and should be able takemanagement decisions.
9.	ENT 509	2+1	Pests of Field Crops	To familiarize the students about nature of damage and seasonal incidence ofpestiferous insects that	• Students are expected to acquire knowledge of insect pests of field crops, their nature of damage, life history traits

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				cause loss to major field crops and their effectivemanagement by different methods.	and effective management.
10.	ENT 510	2+1	Pests of Horticultural and Plantation Crops	To impart knowledge on major pests of horticultural and plantation crops regardingthe extent and nature of loss, seasonal history, their integrated management.	• Students are expected to acquire knowledge of insect pests of horticultural, medicinal and plantation crops, their nature of damage, life history traits andeffective management.
11.	ENT 511	1+1	Post Harvest Entomology	To focus on requirement and importance of grain and grain storage, to understandthe role of stored grain pests and to acquaint with various stored grain pestmanagement techniques for avoiding losses in storage.	• Students are expected to acquire knowledge of pestiferous insects, mites, rats and birds affecting stored produce, their nature of damage, life history traits andeffective management. • Detection of insect infestation and familiarization with different storage structures. • Learning preventive and curative measures to manage infestation in storagehouses.
12.	ENT 512	1+1	Insect Vectors of Plant Pathogens	To teach the students about the different groups of insects that act as vectors ofplant pathogens, vector-plant pathogen interaction, and management of vectors forcontrolling diseases.	• Students are expected to be well versed with insect vectors of plant pathogens,acquire knowledge on disease transmission and vector management techniques.
13.	ENT 513	1+1	Principles of Acarology	To acquaint the students with external morphology of different groups of mites,train in identification of commonly occurring families of plant associated mites,provide information about important mite pests of crops and their management.	• Students are expected to identify mites up to family level. • Acquire knowledge of mite pests of cultivated crops, their nature of damage, lifehistory traits and effective management.

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14.	ENT 514	1+1	Vertebrate Pest Management	To impart knowledge on vertebrate pests like birds, rodents, mammals and othersof different crops, their biology, damage they cause and management strategies.	• Students are expected to be well versed with vertebrate pest diversity, their natureof damage, life history traits, behaviour and effective management.
15.	ENT 515	0+1	Techniques in Plant Protection	To acquaint the students with appropriate use of plant protection equipments andtechniques related to microscopy, computation, pest forecasting, etc.	• Students are expected to have a good knowledge of different plant protection equipments and techniques related to pest forecasting.
16.	ENT 516	2+1	Apiculture	To impart knowledge about the honey bees, and their behaviour and activities; beehusbandry, bee multiplication, bee enemies and diseases and their management;hive products, apitherapy; and managed bee pollination of crops	• Students are expected to have a comprehensive knowledge of bee biology, physiologyand bee keeping/ apiculture. • With practical training it is expected that students develop entrepreneurial skillsfor apiculture
17.	ENT 517	2+1	Sericulture	To familiarize the students with entrepreneurial opportunities in entomology,sericulture in particular, and providing information on silk worm rearing, productionand management.	• Students taking up sericulture are expected to have a thorough knowledge ofsilkworm morphology, races, biology, and all the practices of rearing for silkproduction. • They should be well versed with the pests and diseases of silkworm and theirmanagement. • With practical training it is expected that students develop entrepreneurial skillsfor sericulture or link up with industries to sell cocoons for silk production orguide farmers engaged in silk worm rearing/ sericulture.
18.	ENT 518	2+1	Lac Culture	To familiarize the students with	• The students are expected to have good

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				entrepreneurial opportunities in entomology withan emphasis on lac culture in particular. To provide information on lac insectrearing, production and management.	knowledge of lac host trees and theirmaintenance for lac production. • It is expected that they should perfect the most suitable techniques for lac productionwith a good knowledge about diseases and natural enemies of the lac insect. • With practical training it is expected that students are able to guide landlesslabourers, who bring stick lac as forest produce.
19.	ENT 519	2+1	Molecular Approaches in Entomology	To acquaint students the latest techniques used in molecular biology.	• The students are expected to be well versed with the basic techniques used inmolecular biology.
20.	ENT 520	2+0	Plant Quarantine, Biosafety and Biosecurity	To acquaint the learners about the principles and the role of Plant Quarantine incontainment of pests and diseases, plant quarantine regulations and set-up. Also, tofacilitate students to have agood understanding of the aspects of biosafety andbiosecurity.	Students offering this course are expected to have a good knowledge of the rulesand regulations of Plant Quarantine, WTO regulations, GAP, Sanitary andPhytosanitary measures.
21.	ENT 521	1+1	Edible and Therapeutic Insects	To create awareness and acquaint students about the contribution that insects maketo ecosystems, diets, food security and livelihoods in developed and developing countries.	• Students are expected to be aware of insects for edible and therapeutic use; theirnutritional composition. • Should know the techniques of farming and processing insects for human andanimal consumption.
22.	ENT 522	1+1	Medical and Veterinary Entomology	To study the major insect, mite, and tick vectors of disease to man and animals.Students will learn to identify and understand the life	• Students are expected to identify the arthropods of medical and veterinaryimportance; identify the diseases transmitted by these arthropod

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				cycles, morphology, andbehavior of mosquitoes, ticks, mites, lice, fleas, and other disease vectors.	vectors andsuggest management options.
23.	ENT 523	1+1	Forest Entomology	To promote a more global theoretical understanding of pest population dynamicsand the causes of forest insect outbreaks: covering pests of both natural forests andplantations, the diversity of tropical forest insects, their ecological functions, theconcept of pests and the incidence of pests in natural forests, plantations andstored timber.	• Students are expected to acquire knowledge of insect pests of forest nurseries,forests and plantations, their nature of damage, life history traits and effectivemanagement. • Likewise, students are expected to have a thorough knowledge of pestiferous insectsof stored timber, hide and other forest produce.

Plant Pathology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	PL PATH 501	2+1	Mycology	To study the nomenclature, classification and characters of fungi.	To gain understanding about classification and characters of t fungi
2.	PL PATH 502	2+1	Plant Virology	To acquaint with the structure, virus-vector relationship, biology and managementof plant viruses.	Knowledge about biology, virus-vector relationship and management of plant viruses
3.	PL PATH 503	2+1	Plant Pathogenic Prokaryotes	To acquaint with plant pathogenic prokaryote (procarya) and their structure,nutritional requirements, survival and dissemination.	To develop insight about pathogenic prokaryotes and their structure,nutritional requirements, survival and dissemination
4.	PL PATH 504	2+1	Plant Nematology	To project the importance of nematodes in agriculture and impart basic knowledgeon all aspects of plant nematology.	To develop knowledge about nematodes and their importance in agriculture
5.	PL PATH	2+1	Principles of Plant	To introduce the subject of Plant	Knowledge about basic concepts and

	505		Pathology	Pathology, its concepts and principles.	principles of plant pathology
6.	PL PATH 506	0+2	Techniques in Detection and Diagnosis of Plant Diseases	To impart training on various methods/ techniques/ instruments used in the studyof plant diseases/ pathogens.	Gain understanding on various methods/ techniques/ instruments used in the studyof plant diseases/ pathogens.
7.	PL PATH 507	2+1	Principles of Plant Disease Management	To acquaint with different strategies for management of plant diseases.	Accrue knowledge about different strategies for management of plant diseases
8.	PL PATH 508	1+0	Epidemiology and Forecasting of Plant Diseases	To acquaint with the principles of epidemiology and its application in diseaseforecasting.	Develop understanding on various principles of epidemiology and its application in diseaseforecasting.
9.	PL PATH 509	2+0	Disease Resistance in Plants	To acquaint with the disease resistance mechanisms	Get aware about mechanisms of disease resistance in plants
10.	PL PATH 510	1+1	Ecology of Soil-borne Plant Pathogens	To provide knowledge on soil-plant disease relationship.	Understanding about soil-plant disease relationship
11.	PL PATH 511	2+1	Chemicals and Botanicals in Plant Disease Management	To provide knowledge on the concepts, principles and judicious use of chemicalsand botanicals in plant disease management.	Gain understanding on concepts, principles and judicious use of chemicalsand botanicals in plant disease management.
12.	PL PATH 512	2+1	Detection and Management of Seed Borne Pathogens	To acquaint with seed-borne diseases, their nature, detection, transmission,epidemiology, impacts/ losses and management.	Knowledge about seed-borne diseases, their nature, detection, transmission,epidemiology, impacts/ losses and management.
13.	PL PATH 513	1+1	Biological Control of Plant Diseases	To study principles and application of ecofriendly and sustainable managementstrategies of plant diseases.	Know about principles and application of ecofriendly and sustainable managementstrategies of plant diseases.
14.	PL PATH 514	2+1	Integrated Disease Management	To emphasize the importance and the need of IDM in the management of diseasesof important crops.	Develop an understanding on the importance and the need of IDM in the management of diseasesof important

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					crops
15.	PL PATH 515	2+1	Diseases of Field and Medicinal Crops	To acquaint with diseasesof Field and Medicinal Crops and their management	To gain knowledge about various diseasesof Field and Medicinal Crops and its management
16.	PL PATH 516	2+1	Diseases of Fruits, Plantation and Ornamental Crops	To acquaint with diseases of fruits, plantation, ornamental plants and theirmanagement.	To gain knowledge about various diseasesof fruits, plantation, ornamental plants and theirmanagement.
17.	PL PATH 517	2+1	Diseases of Vegetable and Spices Crops	To impart knowledge about symptoms, epidemiology of different diseases ofvegetables and spices and their management.	Understand about symptoms, epidemiology of different diseases ofvegetables and spices and their management
18.	PL PATH 518	2+1	Post Harvest Diseases	To acquaint with the post-harvest diseases of agricultural produce and their ecofriendlymanagement.	Develop insight about post-harvest diseases of agricultural produce and their ecofriendlymanagement
19.	PL PATH 519	1+0	Plant Quarantine and Regulatory Measures	To acquaint the learners about the principles and the role of plant quarantine incontainment of pests and diseases, plant quarantine regulations and set-up.	Understand the principles and the role of plant quarantine incontainment of pests and diseases, plant quarantine regulations and set-up

Horticulture-Fruit Science

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	FSC 501	2+1	Tropical Fruit Production	To impart comprehensive knowledge to the students on cultural and managementpractices for growing tropical fruits.	The students are expected to equip themselves with know-how on agro-techniquesfor establishment and management of an orchard leading to optimum and qualityfruit production of tropical fruits.
2.	FSC 502	2+1	Sub-Tropical and	To impart comprehensive knowledge	• After successful completion of the

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			Temperate Fruit Production	to the students on cultural and management practices for growing subtropical and temperate fruits.	course, the student are expected to equipthemselves with principles and practices of producing subtropical (citrus, grapes,litchi, pomegranate, etc.) and temperate fruits (apple, pear, peach, plum, apricot,cherries, berries, kiwifruit, etc.) and nuts (almond, walnut, pecan, etc.)
3.	FSC 503	2+1	Propagation and Nursery Management of Fruit Crops	To understand the principles and methods of propagation and nursery managementin fruit crops.	The student would be expected to equip to acquire skills and knowledge on principlesand practices of macro and micropropagation and the handling of propagatedmaterial in nursery.
4.	FSC 504	2+1	Breeding of Fruit Crops	To impart comprehensive knowledge on principles and practices of fruit breeding.	• Have an understanding on importance and peculiarities of fruit breeding • Have an updated knowledge on reproductive biology, genetics and inherent breedingsystems. • Have detailed knowledge of various methods/ approaches of breeding fruit crops
5.	FSC 505	2+1	Systematics of Fruit Crops	To acquaint with the classification, nomenclature and description of various fruitcrops.	After successful completion of the course, the students would be able to— • Categorise different fruit species into broad groups. • Identify various fruit cultivars on basis of distinguishing features • Characterize fruit cultivars for description, registration and protection
6.	FSC 506	1+1	Canopy Management in Fruit Crops	To impart knowledge on principles and practices in management of canopyarchitecture for quality fruit	After successful completion of the course, the students are expected to learn • The basic principles of canopy

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				production.	management to modify plant architecture • The skills on training and pruning of fruit crops, and growth regulation
7.	FSC 507	2+1	Growth and Development of Fruit Crops	To develop comprehensive understanding on growth and development of fruitcrops.	Consequent upon successful completion of the course, the students are expected to have • Equipped with understanding of various growth and development processes • Learned about the role of environment and growth substances • Acquired the skills to realise optimum growth and development under stress conditions
8.	FSC 508	2+1	Nutrition of Fruit Crops	To acquaint with principles and practices involved in nutrition of fruit crops	After successful completion of the course, the students would be expected to • Know the importance and various types of nutrients and their uptake mechanisms • Analyse soil and plant status with respect to various nutrients • Make use of corrective measures to overcome deficiency or toxicity
9.	FSC 509	2+1	Biotechnology of Fruit Crops	To impart knowledge on the principles and tools of biotechnology.	After the successful completion of the course, the students are expected to know • Basic principles and methods of plant tissue culture and other biotechnological tools. • The use and progress of biotechnology in fruit crops.
10.	FSC 510	2+1	Organic Fruit Culture	To develop understanding on organic production of fruit crops.	On successful completion of the course, the students are expected to be able to • Familiarize with the concepts and

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					practices of organic and other natural farmingsystems • Generate know-how on procedures, policies and regulation for inspection andcertification of organic produce
11.	FSC 511	2+1	Export Oriented Fruit Production	To acquaints with the national and international standards and export potentialof fruit crops	Consequent upon successful completion of the course, the students are expected to have learnt about • National and international trade scenario of fruit crops • Set norms and standards for export of fruit crops • Requisite infrastructure and growing practices meeting export standards
12.	FSC 512	1+0	Climate Change and Fruit Crops	To understand the impact of climate change and its management in fruit production	After the successful completion of the course, the students are expected to have learnt • Nature and extent of altered behaviour or damage due to climate change • Methods to assess the adverse effects • Approaches to mitigate the effect due to climatic variability
13.	FSC 513	2+1	Minor Fruit Production	To import basic knowledge underexploited minor fruit crops.	On successful completion of the course, the students are expected to know about • Various minor fruits hitherto neglected and their commercial value • Efforts made to domesticate minor fruits and standardization of agro-techniques. • Their utilization in processing industry.

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Horticulture- Vegetable Science

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	VSC 501	2+1	Production of Cool Season Vegetable Crops	To impart knowledge and skills on advancement in production technology of coolseason vegetable crops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of cool season vegetable crops in India • Acquire knowledge about the production technology and post-harvest handling of cool season vegetable crops • Calculate the economics of vegetable production in India
2.	VSC 502	2+1	Production of Warm Season Vegetable Crops	To impart knowledge and skills on advancement in production technology of warmseason vegetable crops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of warm season vegetable crops in India • Acquire knowledge about the production technology and post-harvest handling of warm season vegetable crops • Calculate the economics of vegetable production in India
3.	VSC 503	2+1	Growth and Development of Vegetable Crops	To teach the physiology of growth and development of vegetable crops	After successful completion of this course, the students are expected to: • Acquire knowledge about the growth and development of plants in vegetable crops • Distinguish between primary and secondary growth in plant stems • Understand how hormones affect the growth and development of vegetable

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					crops
4.	VSC 504	3+0	Principles of Vegetable Breeding	To teach basic principles and practices of vegetable breeding	After successful completion of this course, the students are expected to: • Acquire knowledge about the principles of vegetable breeding • Improve yield, quality, abiotic and biotic resistance, other important traits ofvegetable crops • Understand how the basic principles are important to start breeding of vegetable crops
5.	VSC 505	2+1	Breeding of Self-Pollinated Vegetable Crops	To impart comprehensive knowledge about principles and practices of breeding ofself-pollinated vegetable crops	After successful completion of this course, the students are expected to: • Acquire knowledge about the breeding of self-pollinated vegetable crops • Improve yield, quality, abiotic and biotic resistance and other important traits ofvegetable crops • Understand how to start the breeding of self-pollinated vegetable crops
6.	VSC 506	2+1	Breeding of Cross-Pollinated Vegetable Crops	To impart comprehensive knowledge about principles and practices of cross-pollinated vegetable crops breeding.	After successful completion of this course, the students are expected to: • Acquire knowledge about the breeding of cross-pollinated vegetable crops • Improve yield, quality, abiotic and biotic resistance, and important traits of cross-pollinated vegetable crops • Understand how to start the breeding of cross-pollinated vegetable crops
7.	VSC 507	1+1	Protected Cultivation of Vegetable Crops	To impart latest knowledge about growing of vegetable crops under	After successful completion of this course, the students are expected to:

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				protectedenvironmental conditions	• Appreciate the scope and scenario of protected cultivation of vegetable crops inIndia • Acquire knowledge about the effect of abiotic factors on growth, flowering and production of vegetable crops • Gaining knowledge about the designing of various low cost protected structures • Adopting the raising of vegetable seedlings in low cost protected structures asentrepreneur
8.	VSC 508	2+1	Seed Production of Vegetable Crops	To impart a comprehensive knowledge and skills on quality seed production ofvegetable crops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of seed production of vegetable crops in India • Acquire knowledge about the complete seed production technology, extraction andpost-extraction processing of vegetable seeds • Adoption of seed production of vegetable crops as entrepreneur
9.	VSC 509	2+1	Production of Underutilized Vegetable Crops	To impart knowledge about production technology of lesser utilized vegetable crops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of production of underutilized vegetable cropsin India • Acquire knowledge about the production technology of underutilized vegetablecrops • Adopting production of lesser utilised crops as entrepreneur

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10.	VSC 510	1+1	Systematics of Vegetable Crops	To impart knowledge on morphological, cytological and molecular taxonomy ofvegetable crops	After successful completion of this course, the students are expected to: • Acquire knowledge on identification, description, classification and maintenance of vegetable species and varieties • Collecting locally available allied species of vegetable crops • Preparing herbarium and specimens
11.	VSC 511	1+1	Organic Vegetable Production	To elucidate principles, concepts and their applications in organic farming ofvegetable crops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of organic vegetable production in India • Acquire knowledge about the organic vegetable production technology • Adopting production of organic vegetable crops a s entrepreneur
12.	VSC 512	2+1	Production of Spice Crops	To impart basic knowledge about the importance and production technology ofspices grown in India	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of production of spice crops in India • Acquire knowledge about the production technology and processing of spice crops • Adopting production of spice crops as entrepreneur
13.	VSC 513	1+1	Processing of Vegetable	To educate the students about the principles and practices of processing in vegetablecrops	After successful completion of this course, the students are expected to: • Appreciate the scope and scenario of vegetable processing in India • Acquire knowledge about the processing technology of vegetable crops

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					• Adopting processing products of vegetable crops at small or medium scale • Adopt processing of vegetable crops as entrepreneur
14.	VSC 514	2+1	Postharvest Management of Vegetable Crops	To facilitate deeper understanding of principles and to acquaint the student withproper handling and management technologies of vegetable crops for minimizingthe post-harvest losses	After successful completion of this course, the students are expected to be able tounderstand: • Regulation of postharvest losses by using chemicals and growth regulators • Pre and postharvest treatments for extending shelf life of vegetable crops • Packinghouse operations for extending the shelf life of vegetable crops • Successful storage of vegetable crops

Horticulture- Floriculture and Landscaping

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	FLS 501	2+1	Systematics of Ornamental Plants	To familiarize students about the taxonomy, classification, nomenclature anddescriptors of different ornamental crops	After successful completion of this course, • The students will have an in depth knowledge of nomenclature, description ofimportant genera and use of molecular techniques in systematics of flower crop
2.	FLS 502	2+1	Breeding of Ornamental Plants	To impart comprehensive knowledge about the principles and practices of breedingof ornamental plants	After successful completion of course, the students are expected to have •Thorough understanding of principles of plant breeding and genetic mechanisms in different ornamental plants and flowers. •Application of different breeding methods for improvement of ornamental

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					crops •Develop the required skills in conventional and advanced breeding
3.	FLS 503	2+1	Commercial Production of Cut Flowers	To impart basic knowledge about the importance and production dynamics of cutflowers grown in India	After successful completion of this course, the students are expected to– •Understand the scope and scenario of floriculture •A thorough understanding of production and post-harvest management of flower crops. •Acquire the required skills to prepare project reports on different crops for financing
4.	FLS 504	2+1	Commercial Production of Loose Flowers	To impart basic knowledge about the importance and management of loose flowersgrown in India	After successful completion of this course, the students would have •A thorough understanding of production and post-harvest management of loose flowers. •Develop the required skills on commercial production management
5.	FLS 505	2+1	Ornamental Gardening and Landscaping	Familiarization with principles and practices of landscaping	After successful completion of this course, the students are expected to be •The students will be apprised of different types of gardens and have a thoroughunderstanding of principles of landscape gardening •Develop skills for landscaping under different situations and layout of garden
6.	FLS 506	1+1	Indoor Plants and Interiorscaping	To facilitate deeper understanding of the benefits of indoor plants, selection,designing and their management	After successful completion of this course, the students are expected to develop •Deep understanding and knowledge of

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					principles affecting indoor cultivation including vertical gardens •Develop required skills in interiorscaping •Develop required entrepreneurial acumen
7.	FLS 507	2+1	Nursery Management in Ornamental Plants	Familiarization with principles and practices of propagation and nursery management for Ornamental plants	After successful completion of this course, •The students will develop thorough understanding of nursery management in flowercrops. •Empower the students with the knowledge to start an enterprise •Hone adequate skill in propagation and management
8.	FLS 508	2+1	Turf Grass Management	To understand the science, principles and management of turf grasses	After successful completion of this course, the students are expected to •Deep understanding and knowledge of different types of grasses and theirmanagement •Developing skills for turfing of different arenas •Develop required entrepreneurial acumen
9.	FLS 509	2+1	Value Addition in Floriculture	To understand the avenues for value addition in floriculture	After successful completion of this course, the students are expected to •Understand and prepare different value-added products from flowers •Develop entrepreneurial acumen •Imbibe the skills for making various value-added products
10.	FLS 510	2+1	Protected Cultivation of Flower Crops	Understanding the principles, theoretical aspects and developing skills in protectedcultivation of flower crops	After successful completion of this course, the students are expected to be • Acquire knowledge on types, design and principles of protected structures

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					• Thorough understanding of principles of microclimate management and crop management. •Develop the required skills for designing a greenhouse •Acquire skills on microclimate management, production management
11.	FLS 511	1+2	CAD for Landscaping	To impart basic knowledge about the Computer Aided Designing (CAD) of landscape	After successful completion of this course, the students are expected to develop •The students will be able to use CAD and ARCHICAD for landscape planning and designing. •Develop the adequate skills to create 3 D model to showcase interaction of different factors in landscape gardening. •Develop the entrepreneurial acumen
12.	FLS 512	1+1	Seed Production in Flower Crops	To impart basic knowledge about the importance of seed production in importantflower crops	After successful completion of this course, •The students will get a thorough knowledge on seed industry, principles andmethods of seed production in flower crops. •Students will get awareness on seed standards, certification and law in flower crops.

Horticulture- Post-Harvest Management

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	PHM 501	2+1	Postharvest	To impart comprehensive	After successful completion of this course,

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			Management of Horticultural Produce	knowledge on management of horticultural produce thusextending the post-harvest life of the produce by various treatments	the students are expected to be able tounderstand: •Regulation of ripening by use of chemicals and growth regulators •Pre and Postharvest treatments for extending storage life/ vase life •Standards and specifications for fresh produce
2.	PHM 502	2+1	Postharvest Physiology and Biochemistry of Perishables	To impart comprehensive knowledge on physiology of horticultural produce afterharvest and to understand different physiological processes like respiration ripening	After successful completion of this course, the students are expected to be able to: •Understand about different factors affecting shelf life • Processes of respiration and ripening •Biosynthesis of ethylene and its action on ripening
3.	PHM 503	1+1	Packaging and Storage of Fresh Horticultural Produce	To acquaint with the different storage systems and packaging systems for perishablehorticultural produce	After successful completion of this course, the students are expected to be able tounderstand: •Importance of storage of horticultural produce •Different methods of storage •Importance of packaging for fresh horticultural produce •Different methods of packaging
4.	PHM 504	1+1	Packaging and Storage of Processed Horticultural Produce	To acquaint with the different and packaging systems for processed horticulturalproduce.	After successful completion of this course, the students are expected to be able tounderstand: •Importance of packaging for processed horticultural produce •Different methods of packaging, methods and their applications in food industry
5.	PHM 505	2+1	Principles and	Understanding spoilage,	After successful completion of this course,

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			Methods of Fruit and Vegetable Preservation	underlying principles and methods of processing of fruitsand vegetables	the students are expected to be able to: •Understand Principles and different methods of preservation •Principal spoilage organisms, food poisoning and their control measures • Canning of fruits and vegetables •Processing equipments and layout of processing industry
6.	PHM 506	1+2	Laboratory Techniques in Postharvest Management	To familiarise with advances in instrumentation and Postharvest management	After successful completion of this course, the students are expected to be able tounderstand: •Techniques and instrumentation used in food industry • Analysis of pesticide residues • Quality analysis of processed fruits and vegetables
7.	PHM 507	2+2	Processing of Horticultural Produce	This course gives an overview of status of fruit and vegetable processing in thecountry, objectives and importance of preservation, important constraints anddifferent unit operations processing industry which helps in expansion of industryand scope for further growth in this sector	After successful completion of this course, the students are expected to be able tounderstand: • Unit operations of processing •Planning for domestic as well as commercial storage and processing facilities • Kinetics of growth and enzyme reaction
8.	PHM 508	2+1	Quality Assurance, Safety and Sensory Evaluation of Fresh and Processed Horticultural Produce	To understand the quality and safety management system and the process ofsensory analysis for horticultural products	After successful completion of this course, the students are expected to be able toUnderstand: •Concepts of quality management •Food laws and regulation in India •Export specification and guidelines by APEDA

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					•Consumer perception of safety and Ethics in food safety
9.	PHM 509	2+0	Functional Foods from Horticultural Produce	To familiarise with functional foods from horticultural produce	After successful completion of this course, the students are expected to be able tounderstand: • Importance of functional foods •Functional ingredients and their properties •Classes of bioactive compounds present in fruits and vegetables •Mechanism of neuroprotection by bioactive compounds •Importance of Nutraceuticals
	PHM 510	1+1	Marketing and Entrepreneurship in Postharvest Horticulture	To understand the market channel and appraise entrepreneurship opportunity inpostharvest operations	After successful completion of this course, the students are expected to be able tounderstand: • Concept of entrepreneurship • Writing Business Plan •Steps in establishment of MSME Enterprise • Marketing management • Institutional support to Entrepreneurship

Agronomy

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	Agron 501	3+0	Modern Concepts in	To teach the basic concepts of soil	Basic knowledge on soil management and

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			CropProduction	management and crop production	crop production
2.	Agron 502	2+1	Principles and Practices of Soil Fertility and Nutrient Management	To impart knowledge of fertilizers and manures as sources of plant nutrients andapprise about the integrated approach of plant nutrition and sustainability of soilfertility.	Basic knowledge on soil fertility and management
3.	Agron 503	2+1	Principles and Practices of Weed Management	To familiarize the students about the weeds, herbicides and methods of weedcontrol	Basic knowledge on weed identification and control for crop production
4.	Agron 504	2+1	Principles and Practices of Water Management	To teach the principles of water management and practices to enhance the waterproductivity	Basic knowledge on water management for optimization of crop yield
5.	Agron 505	1+1	Conservation Agriculture	To impart knowledge of conservation of agriculture for economic development.	Experience on the knowledge of various types of conservation of agriculture practices.
6.	Agron 506	2+0	Agronomy of major Cereals and Pulses	To impart knowledge of crop husbandry of cereals and pulse crops.	Basic knowledge on cereals and pulse growing in the country
7.	Agron507	2+1	Agronomy of oilseed, fibre and sugar crops	To teach the crop husbandry of oilseed, fiber and sugar crops	Basic knowledge on production of oil seed, sugar and fibre crops.
8.	Agron 508	2+1	Agronomy of Medicinal, Aromatic &Underutilized Crops	To acquaint students about different medicinal, aromatic and underutilized fieldcrops, their package of practices and processing.	Acquainted with various MAP and their commercial base for developingentrepreneurship.
9.	Agron 509	2+1	Agronomy of Fodder and Forage Crops	To teach the crop husbandry of different forage and fodder crops along with theirprocessing.	Acquainted with various fodder and forage crops and their commercial base fordeveloping entrepreneurship
10.	Agron 510	2+1	Agrostology and Agro- Forestry	To teach crop husbandry of different forage, fodder and agroforestry crops/treesalong with their processing	Basic knowledge on agro forestry, forage crops and their utility
11.	Agron 511	2+0	Cropping System	To acquaint the students about	Basic knowledge on cropping system for

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			and Sustainable Agriculture	prevailing cropping systems in the country andpractices to improve their productivity.	sustainable agriculture.
12.	Agron 512	2+1	Dryland Farming and Watershed Management	To teach the basic concepts and practices of dry land farming and soil moistureconservation	Basic knowledge on dry land farming and soil moisture conservation
13.	Agron 513	2+1	Principles and Practices of Organic Farming	To study the principles and practices of organic farming for sustainable cropproduction.	Basic knowledge on organic farming for sustainable agriculture and developmentof entrepreneurship on organic inputs

Soil Science

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	Soil 501	2+1	Soil Physics	To impart basic knowledge about soil physical properties and processes in relationto plant growth	• The students will be introduced to the concept of soil as a physical entity, visualize the soil physical properties and the related processes along with the factors affecting these properties and processes. • Familiarity with the soil in terms of the state as well as movement of both matter and energy in the soil and its environment. • Understanding how soil physical conditions affect the ability of the soils to supply nutrients, water and air for optimum plant growth and vice versa. • Overall, an understanding of how soils can and should be used, not abused.
2.	Soil 502	2+1	Soil Fertility and Fertilizer Use	To impart knowledge about soil fertility and its control, and to	• Basic knowledge about criteria of essentiality classification of essential

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				understand the roleof fertilizers and manures in supplying nutrients to plants so as to achieve highfertilizer use efficiency	element plant nutrient and their function and deficiency symptoms in plant. • Knowledge about soil fertilizer i.e. major and micronutrients. Soil test methods fertilizers recommendation based on soil test value. • Soil fertility evaluation and method based on recommendation for increase the fertilizer use efficiency.
3.	Soil 503	2+1	Soil Chemistry	To introduce the classical concepts of soil chemistry and to familiarize studentswith modern developments in chemistry of soils in relation to using soils as amedium for plant growth	• Experience on the knowledge of chemical behaviour of soil • Understanding about various modes of nutrient transportations and its chemistry in soil • Knowledge about Classical and modern concepts of soil chemistry
4.	Soil 504	2+1	Soil Mineralogy, Genesis and Classification	To acquaint students with basic structure of alumino-silicate minerals and genesisof clay minerals; soil genesis interms of factors and processes of soil formation, andto enable students conduct soil survey and interpret soil survey reports in termsof land use planning	• Knowledge about soil genesis and mineralogy, Taxonomic classification of different soil orders, Factors and processes of soil formation
5.	Soil 505	2+1	Soil Erosion and Conservation	To enable students to understand various types of soil erosion and measures tobetaken for controlling soil erosion to conserve soil and water	• Understanding of the effects and impacts of soil erosion as a major contributor to soil degradation • Understanding of the mechanisms and factors for wind and water erosion • Understanding of the concept of watershed as a basis of soil and water management and conservation planning

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6.	Soil 506	2+1	Soil Biology and Biochemistry	To teach students the basics of soil biology and biochemistry, including biogeochemical cycles, plant growth promoting rhizobacteria, microbial interactionsin soil and other soil activities	• Understanding about basics of soil biology and biochemistry, includingbiogeochemical cycles, plant growth promoting rhizobacteria, microbial interactions in soil and other soil activities
7.	Soil 507	1+	Radioisotopes In Soil and Plant Studies	To train students in the use of radio isotopes in soil and plant research	• Knowledge about practical use of radioisotopes in soil research
8.	Soil 508	2+1	Soil, Water and Air Pollution	To make the students aware of the problems of soil, water and air pollutionassociated with use of soils for crop production	• Understanding about sources, causes and effects of soil, water and air pollution • Detailed knowledge about hazardous nutrients in soil. • Remediation of different types of pollution.
9.	Soil 509	2+1	Remote Sensing and GIS Technique for Soil and Crop Studies	To impart knowledge about the basic concepts of remote sensing, aerial photographsand imageries, and their interpretation; application of remote sensing in generaland with special reference to soil, plants and yield forecasting; to impart knowledgeabout geo-statistical techniques with special reference to krigging, and GIS andapplications in agriculture	•Students shall learn how to acquire remote sensing data from various sources such as satellites, drones, and aerial imagery. They should also be able to access and work with geospatial data in a GIS environment. •Students will be able to preprocess and clean remote sensing data, including image rectification, calibration, and georeferencing. They should also learn to process and manage GIS data, including data conversion and integration similarly familiar with a range of remote sensing and GIS software tools, such as ArcGIS, QGIS, ENVI, and Google Earth Engine. •Students would be able to apply remote sensing and GIS technology to real-world

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					problems, such as environmental management, urban planning, disaster response, and Land Resource Management.
10.	Soil 510	0+2	Analytical Technique and Instrumental Methods in Soil and Plant Analysis	To familiarize the students with commonly used instruments – their working,preparations of common analytical reagents for qualitative and quantitative analysisof both soil as well as plant samples	•Development of confidence for setting soil testing laboratory. •The students will familiarize with commonly used instruments in soil and plant analysis. •The students become trend in preparation of common analytical reagents for qualitative and quantitative analysis of both soil as well as plant samples. •Understanding about the quantification of different soil and plant parameters will be developed. •They become able to interpret the result and formulation of recommendation
11.	Soil 511	2+1	Management of Problematic Soils and Water	To educate students about basic concepts of problem soils and brackish water, andtheir management. Attention will be on management of problem soils and safe useof brackish water in relation to crop production.	• To accrue knowledge about problem soils and their management • Classification of soil on the basis of their capability and suitability • Knowledge about quality of irrigation water
12.	Soil 512	1+0	Land Degradation and Restoration	To impart knowledge related to various factors and processes of land degradationand their restoration techniques	•These course outcomes aim to equip students with the knowledge and skills needed to understand the complexities of land degradation, identify practical restoration solutions, and contribute to the sustainable management of landscapes. Students should be prepared to address

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					real-world challenges related to land degradation and actively participate in restoration efforts. •Understand the principles and techniques of land restoration, such as reforestation, agroforestry, soil conservation, and wetland restoration along with how land restoration can contribute to climate change mitigation through carbon sequestration and sustainable land management practices.
13.	Soil 513	2+0	Soil Survey and Land Use Planning	To teach the better utilization of land for agricultural purposes, and better management of run-off or surplus/ excessive rain-water in the catchment area foragricultural purposes in a watershed	Planning for land use in proper way for higher crop productivity
14.	Soil 514	2+1	Introduction To Nanotechnology	To impart basic knowledge about nanoscience, properties of nanoparticles andtheir applications in biology	Develop basic understanding about nanoscience, properties of nanoparticles andtheir applications in biology

Agricultural Economics

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	AEC501	3+0	Micro Economic Theory and Applications	The course envisages the concepts and principles embodying micro-economics. Theeconomic problems, functioning of price mechanism,	After completion of the course the student will be able to: •Get acquainted with the basic concepts of market functions.

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				theory of household behaviourand consumer's demand function. Theory of firm, supply determinants,determination of price under different market structures and factor pricing (microeconomic components)	•Build up vision towards how consumers makes choices and market reaches the equilibrium. •Develop decision making skill for firms about product selections and scale of production to ensure maximum profit. •Understand about different types of markets existing in the real world, their principles and whereabouts.
2.	AEC-502	1+1	Agricultural Production Economics	To expose the students to develop the concept, significance and uses of productioneconomics. To understand the relationships between factors and output. To learnhow to decide the combination of inputs to be used as per the resources available. Ensure that the production process works efficiently.	• After the successful completion of the course the student will be able to— Understand how the factors and output interact with each other. • Work out whether the production system is working efficiently and point out the loop holes. • Apply the knowledge of costs and profits to work out the demand and supply functions. This will result into more efficient decision making.
3.	AEC-503	2+1	Agricultural Marketing and Price Analysis	The course is designed to acquaint the students about the basics of dynamics ofagricultural marketing. The content includes supply, demand and marketing offarm production, marketing functions and channels, marketing costs, margins andefficiency, agricultural prices, New marketing formats like e-marketing, e-NAMfuture trading, supply chain management, market intelligence etc.	After the completion of this course the student will be able to– •Understand the whereabouts of agricultural marketing. •The different forms of marketing existing in this sector. •Gain expertise in market intelligence and price forecasting.

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4.	AEC-504	2+0	Macro Economics and Policy	The course envisages the concepts and principles of macroeconomics from classicalto Keynesian theories. The other component deals with the monetary systemmoney,credit and banking system, value of money and economic activities, nationalincome accounting and approaches to estimate national income theory of incomeand employment determination and inflation	After the completion of the course the student will be able to- Understand theconcepts of national income, theories build up to understand macroeconomics. Understand better about the policies and government steps taken to control theeconomic transaction of the nation. Workout how the investment acts as a catalystin national development.
5.	AEC-505	2+1	Econometrics	The course provides knowledge of the econometric methods like time series analysis,linear regression models and their application in economic analysis. The course providesan insight into the econometric problems in analyzing time series and cross section data	After the completion of the course, the student will be able to- Understand thevariables and the properties of regression models. Identify the problems in variablesand remove them before conducting the analysis and avoid biased results
6.	AEC-506	2+0	Agricultural Development and Policy Analysis	Concept of economic development and policy, theories of development, performanceof Indian agriculture. The process and implementation of policies over a period oftime.	After the completion of the course the student will be able to- Understand theconcept of development and its preference over growth. Visualize how the agriculturesector is performing in this aspect. Understand the motive behind the policies andtheir implementation.
7.	AEC-507	2+1	Agricultural Finance and Project Management	This course is designed with an objective to deliver knowledge of the principles,procedures, problems and policies relating to financing agricultural firms. In additionto this	After the completion of the course the student will be able to- Understand the keyissues of finance in Agriculture. Learn the techniques of assessing the worth of aproject

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				the students are also given knowledge about the research developments inthe subject. The approach is analytic.	
8.	AEC-508	1+1	Linear Programming	The course deals with decision tools, game theory, linear programming and simplex methods	After the successful completion of this course, student will be able to-Understand different linear programming models and decision making tools
9.	AEC-509	1+1	Research Methodology for Social Sciences	The course deals with scientific methods of research, the initiation of an inquiry,formulation of research problems and hypotheses, the role of induction and deductionin research, collection and analysis of date and interpretation of results	After the successful completion of this course, student will be able to-Understand fundamentals of research. How to carefully plan out the research work and conductit.
10.	AEC-510	2+0	Indian Economy: History and Contemporary Issues	To introduce the students to the economic history over a period of time. It alsohighlights the contemporary issues of Indian economy	After the completion of the course the student will be able to-Visualize how the Indian economy has evolved. Get acquainted with the basic steps involved in theworking of the national economy.
11.	AEC-511	1+1	International Economics	The major objective of this course is to give an insight of the interactions betweennational economies. What are the theories governing the trade across nationalboundaries. The methods involved to regulate the international trade and institutions involved.	After successful completion of the course the student will be able to – Understandhow trade take place between nations. Be able to work out strategies to maintaina favourable trade balance. Understand how the institutions play role in regulatingthe cross country trade and deal with the issues.
12.	AEC-512	1+0	Institutional Economics	To develop critical and informed understanding about institutions, their role in theworking of economy. Exposure of issues, policies &	After successful completion of this course the student will be able to- Understandinstitutions and their roles in economic development. Know about the

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				regulations and its applicationin agricultural system	policies andtheir issues in an institution
13.	AEC-513	1+1	Natural Resource and Environmental Economics	To understand about economics of environment and social costs incurred due toeconomic development. Work out methods to maintain environment quality and reducesocial costs	After successful completion of this course, the student will be able to-Work out theplan for extraction / use of natural resource in most economical way. Understandthe environment and its pollution. Learn how markets are affected if environmentis not taken into consideration. Gain proficiency in rules and regulation governingeconomic aspect of environment.
14.	AEC-514	2+0	Commodity Future Trading	To disseminate the knowledge about risk mitigating measures especially futuretrading. The future trading in agricultural commodities is increasing day by daytherefore the role of SEBI, functioning of commodity exchanges are discussed	After successful completion of this course, the student will be able to-The basicconcepts of commodity markets. The national and international commodity markets.
15.	AEC-515	2+0	Development Economics	To develop concept of growth and development. Methods and theories of measuringdevelopment. Study of different developed economies will give exposure towardsmeasures to create economic upliftment.	After successful completion of this course, the student will be able to-Measure thedevelopment using different methods. Understand the theories of development andrelate it to real world.
16.	AEC-516	2+0	Rural Marketing	To understand functioning and working of rural markets in India	After successful completion of this course, the student will accrue knowledge about rural markets of country and its functioning and regulations .
17.	AEC-517	1+0	Evolution of Economic Thought	Aims about knowledge on development of various economics school of thoughts.	After successful completion of this course, the student will have insight about various economic thoughts prevailing.

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Agricultural Extension Education

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	EXT-501	2+0	Extension Landscape	The aim of this course is to introduce the new challenges before extension and howextension is evolving globally. It presents the new capacities that are needed byEAS providers to provide a much wider support to farmers and it orient studentsto the new insights from communication and innovation studies that are influencing the practice of extension globally. The course also help students to appreciate theprocess and the impact of extension reforms implemented in many countries, thenew approaches that are evolving globally in different regions and the policychallenges in managing a pluralistic extension system.	After successful completion of this course, the students are expected to be able to: • Appreciate the changing global extension landscape • Broaden their understanding on the role of EAS in agricultural innovation system • Critically evaluate the reforms in extension and the evolving approaches in • extension • Analyse the policy level challenges in extension funding and delivery
2.	EXT-502	2+1	Applied Behaviour Change	This course aims to build capacities of students to understand the fundamentalpsychological processes which guide human behaviour at individual, group andcommunity levels in specific contexts, to develop sound extension strategies	The students should: •Understand the biological and cognitive processes determining human behaviour •Understand the process of learning under different context •Develop competencies in influencing the human decision process in various contexts •Design effective strategies to influence

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					attitude and behaviour
3.	EXT-503	2+1	Organisational Behaviour and Development	To understand the theory and practice relating to the processes of organizationalbehavior, development and change. • To develop insight and competence in diagnostic and intervention processes andskills for initiating and facilitating change in organizations.	This course will equip the students to become potential change agents and OD practitioners. They should be able to learn how to improve individual, group/teamand organizational performance through the use of OD techniques or interventions
4.	EXT-504	2+1	Research Methodology in Extension	This course aimed to create a workforce which has sound fundamental knowledgeand critical competencies in planning, conducting and applying behavioural research for developing quality extension models, methods and tools.	• Understand the concepts, paradigms, approaches and strategies of behavioural • research • Enable to choose research design, methods and tools suitable for the research • problem • Design research instruments skilfully and conduct research in an objective and • unbiased way
5.	EXT-505	2+1	Capacity Development	To understand the concepts of training, capacity building, capacity developmentand human resource development in the context of roles and responsibilities ofextension professionals •To discuss capacity development-approaches, strategies, needs assessment andmethods / tolls •To help you devise, organize, implement and evaluate capacity developmentprogrammes	After successful completion of this course, the students are expected to be able to: • Differentiate between training, capacity building, capacity development and human resource development • Explain different levels of capacities, needs assessment approaches & methods, • capacity development methods and tools • Formulate, implement and evaluate need based capacity development programmes
6.	EXT-506	2+1	ICTs for Agricultural	To discuss different ICT initiatives, knowledge management process and	After successful completion of this course, the students are expected to be

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			Extension and Advisory Services	applicationAspects To orient students on advances in smart/ disruptive technologies and data analytics • Hands on experience in navigating ICTs	able to: • Appreciate the importance of the ICTs in EAS • Understand the ICT application aspects • Critically evaluate ICT initiatives and smart/disruptive technologies • To execute extension functions by applying ICTs and • Engage stakeholders in knowledge management process
7.	EXT-507	2+1	Evaluation and Impact Assessment	To orient students on the importance of evaluation and impact assessment • To develop capacities for evaluation and impact assessment •Discuss ways of conducting evaluations and impact assessment	After successful completion of this course, the students are expected to be able to: Develop competencies in the areas of evaluation planning, indicator development,conducting evaluation and impact assessment and writing reports.
8.	EXT-508	2+1	Managing Extension Organisations	To orient students on the importance of knowledge and skills on various management functions, as applicable to extension organizations • Discuss ways of running extension services as managers of agri-ventures • To develop capacities for becoming effective managers of agri-ventures	After successful completion of this course, the students are expected to be able to: • Turn good managers of extension and advisory services including agri-ventures, • FPOs, cooperatives etc. • understand the key business skills needed for managing agribusinesses andmanaging the value chains • critically evaluate the Management functions to make extension systems efficient by applying management principles and good practices of effective management • engage in management of extension

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					organizations
9.	EXT-509	1+1	Enabling Innovation	The aim of this course is to introduce the new perspectives related to "innovation"and help learners to apply the AIS framework especially in dealing with scaling upknowledge. It discusses the different ways to explore AIS including the roles ofdifferent actors and the enabling environment (including institutions and policies)in enabling innovation. The course also aims to broaden the understanding ofstudents in scaling up knowledge and orient students to varied tools and approachesto scaling up	After successful completion of this course, the students are expected to be able to: • Appreciate and apply AIS framework in different contexts • Enhance their knowledge and skills related to enabling innovation • Diagnose AIS and design interventions for improvement and • Design scaling up strategies to achieve innovation and impact
10.	EXT-510	2+1	Gender Mainstreaming	To orient students on the importance of "Gender mainstreaming" as well as theother concepts related to gender. The students will be able to understand the genderroles and responsibilities and how in the present times, the roles may be shifting •To discuss ways and various techniques for conducting gender analysis theoreticallyand practically as well as the prerequisites for gender analysis •To develop capacities for identifying and addressing gender implications in alldevelopment programmes related	After successful completion of this course, the students are expected to be able to: • Appreciate the importance of addressing agrarian gender concerns in the context • of sustainable livelihoods and national development • Understand the various concepts related to gender and the application of theseconcepts for women empowerment and gender mainstreaming • Critically evaluate the various agricultural development, rural development programmes, schemes, policies and strategies for women empowerment within the context of

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				to agriculture and allied sectors, climate changeadaptation and livelihood security, as well as addressing gender issues throughapplication of extension methods including PRA and PLA	achieving gender equity • How to engage in gender analysis and collect and analyse sex-disaggregated datafor developing strategies for women empowerment and gender mainstreaming

Plant Physiology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	PP 501	2+1	Principles of Plant Physiology-I: Plant Water Relations	The aim of this course is to impart knowledge in the field of water relations andmineral nutrition and how plants acquire water and transport it under differentsoil water regimes and also make use of the water in an effective way to maximizeuse efficiency. In addition, the other aim is to impart knowledge of how plantsminimize water loss under stress conditions besides educating the students of howplants make use of nutrients in a best possible way	By the end of this course, the student will be able to: •comprehend the fundamental concepts of plant physiological processes associated with water relation and mineral nutrition. •describe the physiological mechanisms of water relation and mineral nutrition. •recognize and describe how plants respond to mineral deficiency and toxicity.
2.	PP 502	2+1	Principles of Plant Physiology-II: Metabolic Processes	This course will impart knowledge on cellular structure and function that determineof carbon and nitrogen metabolism, lipids, enzymes and secondary metabolites inplants. Relevance of metabolic processes on growth	By the end of this course, the student will be able to: • figure out the fundamental metabolic processes in plant • describe the physiological mechanisms and metabolic events associated with regulation of plant growth

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				and development leading toproductivity will be dealt	
3.	PP 503	2+1	Plant Developmental Biology: Physiological and Molecular Basis	To explain about basic physiological and molecular processes concerning various facets of growth and development of plants. It provides knowledge on basicphysiological processes governing developmental events in plants includingsenescence and fruit development and ripening. Development of vegetative tissue like shoot, leaf and root and morphogenetic phenomena like flower induction anddevelopment, factors associated with photoperiod and thermoperiod response. Regulation of morphogenesis would be studied at the molecular level providinginformation on genes involved. In addition, students will study how to apply theknowledge on plant development and morphogenesis using tissue culture.	After completion of this course students are expected to have knowledge on and insight into the physiological and molecular basis of plant growth and development. The student will develop critical insight in physiological aspects of vegetative growth and reproductive development at molecular level
4.	PP 504	2+1	Physiological and Molecular Responses of Plants to Abiotic Stresses	This course aims to describe students the abiotic-stress physiology and their effectson plant growth and productivity. This will also help students gain insights intolatest developments in	After completion of this course students are expected to have knowledge on and insight into the physiological and molecular responses of plants to abiotic stresses. The student will develop critical insight in

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				stress physiology and stress tolerance mechanisms,approaches for crop improvement under stressful environment	adaptive mechanisms of plants against various abiotic stresses.
5.	PP 505	2+1	Hormonal Regulation of Plant Growth and Development	It provides knowledge on the fundamentals of hormone biosynthesis, homeostasis,transport and signaling and the role in regulating basic physiological processesgoverning developmental events in plants.The role of classical hormones ondevelopmental processes from germination, shoot and root apical meristemdifferentiation, flowering, seed maturation and senescence. The aim of this course is to appraise the students about structure and function of plant growth regulators.	After successful completion of this course, the students are expected to be able to: • acquire basic knowledge about plant hormones and plant growth regulators. • understand the physiological roles and mechanisms of actions of plant hormone. • obtain practical knowledge about application of plant growth regulators in agricultural and horticulture
6.	PP 506	2+1	Physiological and Molecular Mechanisms of Mineral Nutrient Acquisition and their Functions	It provides knowledge on basic physiological processes governing nutrient uptake,physiological role of elements, factors influencing uptake, internal remobilizationof nutrient element during starvation and adaptation strategies. Regulation ofnutrient uptake and translocation would be studied at the molecular level	By the end of this course, the student will be able to: • comprehend the fundamental concepts of mineral nutrition of plant. • describe the physiological and molecular mechanisms of acquisition andtranslocation of nutrient. • describe the basis of differential nutrient efficiency.

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				providinginformation on genes and other signaling factors involved. The aim of this courseis to make the students understand the physiological and molecular basis of nutrientuptake, translocation and utilization and to apply this knowledge in geneticimprovement of crop plants.	
7.	PP 507	2+1	Photosynthetic Processes, Crop Growth and Productivity and Concepts of Crop Modelling	The course provides a comprehensive theoretical and hands on experience andexpertise to students on various aspects of photosynthesis including biophysical,biochemical and molecular regulations. While canopy photosynthesis drives crop growth rates, factors associated with sink activity and partitioning determineproductivity	After completion of this course students are expected to have in depth knowledge on Photosynthetic processes associated with product synthesis and yielddevelopment. Students will also obtain current knowledge on various crop models
8.	PP 508	2+0	Physiology of Field Crops	The objective is to impart comprehensive information on physiological processesand physiological basis of growth, development and productivity of field crop plants.	After completion of this course, students will accrue comprehensive knowledge on various physiological processes of variety of field crops.
9.	PP 509	2+0	Physiology of Horticulture Crops	The objective is to impart comprehensive information onphysiological processes and physiological basis of growth, development andproductivity of	After completion of this course, students will accrue comprehensive knowledge on various physiological processes of variety of horticultural crops.

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				horticultural crop plants. To describe basic and applied physiologybehind the production and productivity of horticultural crops and their pre andpostharvest management, ideal storage conditions, quality retention, processingand value addition.	
10.	PP 510	2+1	Seed Physiology	It aims to describe students the physiologicalprocesses involved in regulation and mechanism of seed development, dormancyand germination. Further, to provide an insight into physiological processesgoverning seed quality and its survival.	At the end of the course the students are expected to be able to understand thephysiology of seed development and seed germination. The students will be able to identify the physiological processes involved in regulation of seed development,dormancy and germination
11.	PP 511	2+0	Phenotyping Physiological Processes	The major emphasis in this course is to phenotype well characterized physiologicalprocesses/plant traits associated with plant growth, development and productivity,besides, comprehensive approach to precise imposition of various abiotic stressesand capture genetic variability in adaptive traits. The aim is to employ these techniques for crop improvement programs.	After completion of this course students are expected to develop clear concept and insight into phenotyping technologies associated with plant growth, developmentand productivity.
12.	PP 512	2+0	Crop Growth Regulation and Management	A comprehensive information needs to be provided in this course like light regulationin polyhouse	After completion of this course students are expected to develop clear concept and insight into soil less culture techniques.

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				cultivation, photoperiod responses by red/far red light for synchronizingflowering, techniques for soil less culture like aeroponics, pollen biology and hybridproduction, chemical regulation of plant growth processes like flower initiation,flower sex, flower drop, fruit maturity, ripening and shelf-life, etc.	regulation of light in polyhouse and photoperiodism, role of chemical in plant growth process.

Agricultural Biotechnology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	MBB 501	3+0	Principles of Biotechnology	To understand the basics of Molecular biology, plant and microbial Biotechnology • Importance and applications in agriculture, case studies and success stories • Public education, perception, IPR and related issues	• The student will get an overview about the fundamentals of molecular biology and the biotechnological tools in tissue cultures, application of biotechnology in agriculture, recombinant DNA technology and biodiversity and conservation. • The student will understand methods used for development of transgenic organisms. At the end of the course, the students will have sufficient scientific understanding of the basic concepts in biotechnological process
2.	MBB 502	3+0	Fundamentals of Molecular	To understand the basics of DNA, RNA, structure, types and chromatin	• Understand the basics of DNA and RNA,

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			Biology	assembly. • To get insights into the Central Dogma, basic cellular processes, role of mutation and recombination. • To understand different levels of gene regulation and the pathways involved.	including their structure, types, and chromatin assembly. • Comprehend the Central Dogma of molecular biology and the processes involved in DNA replication, repair, and recombination. • Gain insights into the levels of gene regulation, including transcription and translation. • Familiarize themselves with the genetic code, translational machinery, and protein modifications. • Explore gene regulation in both prokaryotes and eukaryotes, including the operon concept, regulatory RNA, and epigenetic mechanisms. This course equips students with a solid understanding of the foundational principles of molecular biology, providing them with the knowledge and skills necessary for further studies and research in the field.
3.	MBB 503	3+0	Molecular Cell Biology	To understand the basics structure and function of plant and animal cell • To get insights into the basic cellular processes, transport, signalling, cellmovement, cell division and general regulation mechanisms.	• Understand the fundamental structure and function of plant and animal cells. • Comprehend the structure and function of major organelles in cells, including the nucleus, endoplasmic reticulum, mitochondria, and more. • Gain knowledge of membrane transport processes, cell communication, and signalling mechanisms. • Understand the concept of cell differentiation, tissue maintenance, and

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					organ development, including the role of stem cells. This course provides students with a solid foundation in molecular cell biology, enabling them to understand and work with the basic principles governing cellular structure and function in both plant and animal cells.
4.	MBB 504	0+3	Techniques in Molecular Biology I	To get a basic overview of molecular biology techniques, good lab practices andrecombinant DNA technology • To get a hands on training in chromatography, protein analysis, nucleic acidanalysis, bacterial and phage genetics	This course teaches RDNA technology techniques and their application in the field of genetic engineering. Students learn about plasmids, vectors and gain knowledge on the construction of cDNA libraries. Students of this course have knowledge on gene manipulation, gene expression, etc. which prepares them for further studies in the area of genetic engineering.
5.	MBB 505	2+1	Omics and Systems Biology	To get a basic overview of genomics, proteomics, ionomics and metabolomics • To get a primary information on the application of omics science across the industry	• Understand the fundamentals of genomics, proteomics, ionomics, and metabolomics. • Gain knowledge of protein structure, mass spectrometry, and proteomics techniques for studying protein interactions. • Comprehend the principles of metabolomics and the use of NMR and mass spectrometry in metabolome analysis. • Learn to study the ionome using techniques like ICP-MS, XRF, and NAA. • Explore the basics of systems biology, including biochemical and genetic models, network analysis, and regulatory circuits. Gain practical experience in DNA isolation, protein quantification, 2-D gel electrophoresis, protein-protein interaction

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					assays, and the use of various analytical instruments.
6.	MBB 506	3+0	Plant Genetic Engineering	To get a basic overview of molecular cloning, vectors and genomic libraryconstruction. • To get anoverview of PCR and its applications, sequencing, gene knockouts,transgenics etc.	• Understand the fundamental principles of molecular cloning. including the use of restriction enzymes, DNA modifying enzymes, and DNA labeling techniques. • Familiarize themselves with various vectors used in genetic engineering, such as plasmids, bacteriophages, and expression vectors, and learn about transformation methods. • Understand advanced topics such as cisgenesis, intragenesis, and genome modification using ZFN, TALENS, and CRISPR technology. This course equips students with the knowledge and skills necessary to work with genetic engineering techniques, including cloning, PCR, and the transformation of plants, and prepares them for applications in biotechnology and genetic modification.
7.	MBB 507	0+3	Techniques in Molecular Biology II	To get a basic overview of molecular biology techniques, good lab practices andmolecular markers. • To get a hands on training in RNAi, microarrays, yeast2 hybrid and immunological techniques	• Understand the fundamental molecular biology techniques, lab practices, and molecular markers. • Gain practical experience in constructing gene libraries (cDNA and genomics) and synthesizing and cloning cDNA. • Perform real-time PCR and interpret the resulting data. • Master the use of various molecular markers like RAPD, SSR, and AFLP/ISSR and analyze the data.

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					• Understand RNAi techniques, including construct design and plant phenotyping. • Gain practical experience in yeast 1 and 2-hybrid interaction assays, mutant generation, and transposon-mediated mutagenesis. • Learn immunological techniques and molecular diagnostics, including ELISA and immunohistochemistry. This course provides hands-on training in a wide range of advanced molecular biology techniques, equipping students with practical skills for research and diagnostics in the field.
8.	MBB 508	2+1	Introduction to Bioinformatics	To get a basic overview of computational techniques related to DNA, RNA andprotein analysis. • To get a hands on training in software's and programs used to analyse, assembleor annotate genomes, phylogenetics, proteomics etc.	• Gain practical experience in using bioinformatics tools for genome-wide identification of protein-coding genes, sequence analysis, alignment, and phylogenetic analysis. • Learn techniques for protein sequence analysis, secondary structure prediction, 3D structure prediction, and protein function prediction. • Explore the fundamentals of drug discovery and structure-based drug design, including molecular docking and QSAR. This course equips students with the knowledge and skills required to use bioinformatics software and programs for various applications in DNA, RNA, and protein analysis, genome assembly, and phylogenetics.
9.	MBB 509	2+1	Plant Tissue	To provide insight into principles of	• Understand the principles of plant tissue

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			culture	plant cell culture and genetic transformation. • To get a hands on training in basic plant tissue culture techniques, callusing,micropropagation and analysis.	culture, genetic transformation, and the history of plant cell culture. • Familiarize themselves with tissue culture media, plant hormones, and morphogenesis. • Gain practical experience in basic plant tissue culture techniques, including callusing, micropropagation, and analysis. • Understand large-scale cell suspension culture and techniques for the production of secondary metabolites. • Learn about somaclonal and gametoclonal variations, in vitro germplasm storage, and cryopreservation. • Gain insight into commercial tissue culture, including case studies, market assessment, project planning, economics, and government policies. • This course equips students with the knowledge and practical skills necessary for working with plant tissue culture techniques and understanding their applications in agriculture and biotechnology.
10.	MBB 510	2+1	Microbial and Industrial Biotechnology	To familiarize about the various microbialprocesses/systems/activities, which havebeen used for the development of industrially important products/processes	• Understand the scope and historical developments of microbial and industrial biotechnology. • Learn about the isolation, screening, and genetic improvement of industrially important microorganisms using classical approaches. • Understand the role of microbial enzymes in various industrial processes and the production of fine chemicals for

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					pharmaceutical industries. • Gain insight into biotreatments for pollution control, waste treatment, and the production of eco-friendly agricultural chemicals. • Learn about immobilization of cells and enzymes, including studies on kinetic behavior, growth analysis, and biomass estimation, as well as the determination of mass transfer coefficients. This course equips students with the knowledge and practical skills necessary for working with microbial processes and industrial biotechnology, preparing them for careers in the biotechnology and industrial sectors.
11.	MBB 511	2+1	Molecular Plant Breeding	To familiarize the students about the use of molecular biology tools in plantbreeding. • To provide a hands-on training in data analysis, diversity analysis and mapping ofgenes and QTLs.	• Understand the principles of molecular biology tools in plant breeding. • Analyze data related to genetic diversity and mapping of genes and QTLs. • Apply molecular markers, such as RFLP, AFLP, SCARs, CAPS, SSRs, and SNPs, for genetic analysis and mapping. • Implement Genome Wide Association Studies (GWAS) and Genomic Selection methods for breeding. • Utilize marker-assisted selection (MAS) for gene introgression and pyramiding. • Apply molecular markers in plant variety protection, intellectual property rights (IPR) issues, and hybrid purity testing. • The course equips students with the knowledge and practical skills necessary for

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					modern plant breeding using molecular techniques and tools.
12.	MBB 512	2+0	IPR, Bio-safety and Bioethics	To familiarize the students about ethical and biosafety issues in plant biotechnology. • To provide a hands-on training in data analysis, diversity analysis and mapping of genes and QTLs.	• Understand the concepts and historical background of Intellectual Property Rights (IPR) in biotechnology, including patents, trademarks, and licensing. • Comprehend the implications of IPR on the commercialization of biotechnology products and its ecological effects. • Familiarize themselves with trade agreements and their impact on cross-border movement of germplasms. • Understand the ethical aspects of biotechnology, including bioethics, social, spiritual, and environmental ethics, as well as biopiracy issues. This course equips students with the knowledge and ethical considerations related to plant biotechnology, intellectual property, biosafety, and bioethics.
13.	MBB 513	3+0	Immunologyand Molecular Diagnostics	To provide students with a comprehensive understanding of immunology and molecular diagnostics, covering topics such as immunity, immunoglobulins, cell signaling, antigen processing, immunological techniques, and applications in immunization, disease immunity, and diagnostics.	• Understand the fundamentals of immunity, its classification, and the components of innate and acquired immunity. • Gain knowledge about the lymphatic system, hematopoiesis, immune organs and cells, and the description of antigens. • Learn about immunoglobulins, their structure, classes, subclasses, and the organization of immunoglobulin genes. • Learn about phagocytosis, complement, inflammatory responses, the major histocompatibility complex (MHC), and

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					antigen processing and presentation. • Gain practical experience in advanced immunological techniques, such as RIA, ELISA, Western blotting, and flow cytometry. • This course provides students with a comprehensive understanding of immunology and molecular diagnostics, equipping them with the knowledge and skills needed for research, diagnostics, and therapeutic applications in the field of immunology.
14.	MBB 514	2+1	Nano Biotechnology	Understanding the molecular techniques involved in structure and functions ofnano-biomolecules in cells such as DNA, RNA and proteins.	• Understand the fundamentals of nanotechnology, including nanomaterials and their preparation and characterization. • Analyze the chemical, physical, and biological properties of biomaterials, with a focus on biomineralization and structural relationships. Apply nanotechnology in various fields, such as drug and gene delivery, biosensors, and metabolic engineering, and gain practical experience in synthesizing nanoparticles and other nanomaterials.
15.	MBB 515	3+0	Environmental Biotechnology	To apprise the students about the role of biotechnology in environment managementfor sustainable eco-system and human welfare.	• Understand the fundamental concepts of environmental issues and the different types of pollution. • Comprehend the role of microorganisms in waste treatment and biodegradation, including the degradation of pollutants and toxic chemicals in soil and water. • Gain knowledge of treatment schemes for

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					domestic waste and industrial effluents, and understand global environmental challenges and biodiversity conservation.
16.	MBB 516	1+0	Bio-entrepreneurship#	The objective of this course is to teach students about fundamentals ofentrepreneurship, launching a venture or a start up in biotechnology-based theme	• Understand the scope and various types of bio-industries in biotechnology. • Acquire fundamental entrepreneurial skills, including creativity, leadership, managerial abilities, and team-building. • Learn how to prepare a business plan, analyze feasibility, and identify sources of funding and support for biotechnology-based ventures. • Develop strategies for market entry and exit, customer needs identification, branding, and pricing. • Gain knowledge of knowledge centers, research and development in biotechnology, and technology transfer for successful entrepreneurship in the biotechnology sector.
17.	MBB 517	2+0	Stress Biology and Genomics#	To provide advanced knowledge on genomics with reference to abiotic stress toleranceand biotic stress resistance in plants tolerance.	• Understand the various types of abiotic and biotic stresses that affect plants and their adaptation strategies. • Comprehend the role of plant cells in sensing environmental changes and how signal transduction mechanisms work in response to external factors. • Gain knowledge of the physiological, biochemical, and molecular mechanisms involved in plant stress tolerance, including drought, salinity, water logging, temperature, light, and nutrient stresses.

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					• Learn about genomics, transcriptomes, small RNAs, and epigenomes, and how these are used for functional genomics, gene transfer, and validation in plants under stress conditions. • Acquire skills in bioinformatics for understanding gene function and networks in model plants subjected to stress.
18.	MBB 518	2+0	Gene Regulation#	To understand the basics of gene regulation including a wide range of mechanismsthat are used by organisms to increase or decrease the production of specific geneproducts in terms of time, space, conditions or their combinations.	• Understand the fundamental mechanisms of gene regulation, including transcriptional control involving activators, repressors, and regulatory proteins. • Explore the regulatory sequences in genes, such as promoters, enhancers, silencers, and insulators, and the role of nucleosomes in gene regulation. • Comprehend signal integration, signal transduction, and transcriptional regulation at both prokaryotic and eukaryotic levels. • Learn about gene silencing, epigenetic gene regulation, and the role of various non-coding RNAs in gene expression. • Understand auto-regulation, bistable and bimodal switches, and oscillating patterns of gene expression.

Agricultural Statistics

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	STAT 501	2+0	Mathematics for Applied	The students would be exposed to elementary mathematics thatwould	The students shall gain knowledge about applied mathematics including Linear

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			Sciences	prepare them to study their main courses that involve knowledge ofMathematics. The students would get an exposure to Linear Algebra, differentiation,integration and differential equations etc.	Algebra, differentiation,integration and differential equations etc
2.	STAT 502	3+1	Statistical Methods for Applied Sciences	The students would be exposed to concepts of statistical methods and statistical inference that would help them in understanding the importance ofstatistics. It would also help them in understanding the concepts involved in datapresentation, analysis and interpretation. The students would get an exposure topresentation of data, probability distributions, parameter estimation, tests ofsignificance, regression and multivariate analytical techniques.	The students shall be develop knowledge about statistical methods andstatistical inference, concepts involved in datapresentation, analysis and interpretation. They would also have understanding on presentation of data, probability distributions, parameter estimation, tests ofsignificance, regression and multivariate analytical techniques.
3.	STAT 511	2+1	Experimental Designs	The students would be exposed to concepts ofDesign of Experiments so as to enable them to understand the concepts involvedin planning, designing their experiments and analysis of experimental data.	Understanding on various designs of experiments used in agricultural research and analysis of data in such experimental set up.
4.	STAT 512	2+1	Basic Sampling Techniques	The students would be exposed to elementary sampling techniques. Itwould help them in understanding the concepts involved in planning and designingtheir surveys, presentation of survey data analysis of survey data and presentationof	Develop an understanding on the concepts involved in planning and designingtheir surveys, presentation of survey data analysis of survey data and presentationof results.

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				results. This course would be especially important to the students of socialsciences.	
5.	STAT 521	2+1	Applied Regression Analysis	The students would be exposed to the concepts of correlation andregression. Emphasis will be laid on diagnostic measures such as autocorrelation,multi collinearity and heteroscedasticity. This course would prepare students tohandle their data for analysis and interpretation.	Gain knowledge about concepts of correlation andregression, diagnostic measures such as autocorrelation,multi collinearity and heteroscedasticity
6.	STAT 522	2+1	Data Analysis Using Statistical Packages	This course is meant for exposing the students in the usage of various statisticalpackages for analysis of data. It would provide the students a hands on experiencein the analysis of their research data.	Students shall learn about usage of various statisticalpackages for analysis of data.
7.	STAT 551	3+0	Mathematics-I	To understand the importance of mathematical methodsin research. The students would be exposed to the basic mathematical tools of realanalysis, calculus, differential equations and numerical analysis.	Gain understanding on the importance of mathematical methodsin research and knowledge about basic mathematical tools of realanalysis, calculus, differential equations and numerical analysis
8.	STAT 552	2+0	Probability Theory	This course lays the foundation ofprobability theory, random variable, probability distribution, mathematicalexpectation, etc. which forms the basis of basic statistics. The students are alsoexposed to law of large numbers and central limit theorem. The students also getintroduced to stochastic processes.	Develop an insight on probability theory, random variable, probability distribution, central limit theorem, mathematicalexpectation and stochastic processes

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9.	STAT 553	2+1	Statistical Methods	This course lays the foundation of probability distributions and samplingdistributions and their application which forms the basis of Statistical Inference. The students are also exposed to correlation and regression, and orderstatistics and their distributions.	Shall develop and understanding on probability distributions and samplingdistributions and their application and correlation and regression, and orderstatistics and their distributions.
10.	STAT 554	2+0	Actuarial Statistics	This course is meant to expose to the students to the statistical techniques suchas probability models, life tables, insurance and annuities. The students would alsobe exposed top practical applications of these techniques in computation of premiumsthat include expenses, general expenses, types of expenses and per policy expenses.	Develop understanding about probability models, life tables, insurance and annuities, techniques in computation of premiumsthat include expenses, general expenses, types of expenses and per policy expenses.
11.	STAT 555	2+0	Bioinformatics	This course is meant to train the students on concepts ofbasic biology, statistical techniques and computational techniques for understandingbioinformatics principles.	Students shall have an insight on concepts of basic biology, statistical techniques and computational techniques for understanding bioinformatics principles.
12.	STAT 556	2+0	Econometrics	This course is meant for training the students in econometric methods and theirapplications in agriculture. This course would enable the students in understandingthe economic phenomena through statistical tools and economics principles.	Accrue knowledge about various econometric methods and theirapplications in agriculture.
13.	STAT 561	2+0	Mathematics-II	The students would be exposed to the advances in Linear Algebra and	Knowledge about advances in Linear Algebra and Matrix theory.

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				Matrixtheory. This would prepare them to study their main courses that involve knowledgeof Linear Algebra and Matrix Algebra.	
14.	STAT 562	2+1	Statistical Inference	The students would betaught the problems related to point and confidence interval estimation and testingof hypothesis. They would also be given the concepts of nonparametric and sequentialtest procedures and elements of decision theory.	Develop understanding about the problems related to point and confidence interval estimation and testingof hypothesis and the concepts of nonparametric and sequentialtest procedures and elements of decision theory
15.	STAT 563	2+1	Design of Experiments	This course is meant to expose the students to thebasic principles of design of experiments. The students would also be provided withmathematical background of various basic designs involving one-way and two-wayelimination of heterogeneity and their characterization properties. This coursewould also prepare the students in deriving the expressions for analysis ofexperimental data.	Gain knowledge on basic principles of design of experiments, mathematical background of various basic designs involving one-way and two-wayelimination of heterogeneity and their characterization properties.
16.	STAT 564	2+1	Sampling Techniques	To expose the students to the techniques of drawingrepresentative samples from various populations and then preparing them on themathematical formulations of estimating the population parameters based on thesample data. The students would also be exposed to the	Knowledge about techniques of drawingrepresentative samples from various populations and then preparing them on themathematical formulations of estimating the population parameters based on thesample data.

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				real life applications ofsampling techniques and estimation of parameters.	
17.	STAT 565	2+1	Statistical Genetics	This course is meant to prepare the students in applications of statistics inquantitative genetics and breeding. The students would be exposed to the physicalbasis of inheritance, detection and estimation of linkage, estimation of geneticparameters and development of selection indices.	Students shall have understanding on applications of statistics inquantitative genetics and breeding, physicalbasis of inheritance, detection and estimation of linkage, estimation of geneticparameters and development of selection indices.
18.	STAT 566	2+0	Statistical Quality Control	This course is meant for exposing the students to the concepts of Statistical QualityControl and their applications in agribusiness and agro- processing industries.This course would enable the students to have an idea about the statisticaltechniques used in quality control.	Develop knowledge about concepts of Statistical QualityControl and their applications in agribusiness and agro-processing industries.
19.	STAT 567	1+1	Optimization Techniques	This course is meant for exposing the students to the mathematical details of the optimization techniques. They will be taught numerical methods ofoptimization, linear programming techniques, nonlinear programming and multipleobjective programming.	Gain knowledge on mathematical details of theoptimization techniques, numerical methods ofoptimization, linear programming techniques, nonlinear programming and multipleobjective programming.
20.	STAT 571	2+1	Multivariate Analysis	This course lays the foundation of Multivariate data analysis. The exposure provided tomultivariate data structure, multinomial and multivariate normal distribution,estimation and testing of	Understanding about Multivariate data analysis, multivariate data structure, multinomial and multivariate normal distribution,estimation and testing of parameters.

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				parameters, various data reduction methods would helpthe students in having a better understanding of agricultural research data, itspresentation and analysis.	
21.	STAT 572	1+1	Regression Analysis	This course is meant to prepare the students in linear and non-linear regressionmethods useful for statistical data analysis. They would also be provided amathematical foundation behind these techniques and their applications inagricultural data.	Knowledge about linear and non-linear regressionmethods useful for statistical data analysis
22.	STAT 573	1+1	Statistical Computing	This course is meant for exposing the students in the concepts of computationaltechniques. Various statistical packages would be used for teaching the conceptsof computational techniques.	Knowledge about concepts of computationaltechniques.
23.	STAT 574	1+1	Time Series Analysis	This course is meant to teach the students the concepts involved in time seriesdata. They would also be exposed to components of time series, stationary modelsand forecasting/ projecting the future scenarios based on time series data. It wouldalso help them in understanding the concepts involved in time series datapresentation, analysis and interpretation.	Gain understanding abouts concepts involved in time seriesdata, stationary modelsand forecasting/ projecting the future scenarios based on time series data analysis and interpretation.
24.	STAT 575	2+0	Demography	This course is meant for training the students in measures of demographic	Knowledge about measures of demographic indices,estimation procedures of

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				indices,estimation procedures of demographic parameters. Students would also be exposedto population projection techniques and principle involved inbioassays.	demographic parameters, population projection techniques and principle involved inbioassays.
25.	STAT 576	2+0	Statistical Methods for Life Sciences	This course focuses on statistical methods for discrete data collected in publichealth, clinical and biological studies including survival analysis. This would enablethe students to understand the principles of different statistical techniques usefulin public health and clinical studies conducted.	Knowledge publichealth, clinical and biological studies including survival analysis.
26.	STAT 577	2+0	Statistical Ecology	This course is meant for exposing the students to the importance and use ofstatistical methods in collections of ecological data, species-abundance relations,community classification and community interpretation.	Understanding about the importance and use ofstatistical methods in collections of ecological data, species-abundance relations,community classification and community interpretation.

Doctoral Degree Programme

Genetics and Plant Breeding (GPB)

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	GPB 601	3+0	Advances in Plant Breeding Systems	To impart theoretical knowledge about advances in plant breeding.	After completion of this course the student will be able to know variousplant breeding methodologies, principles and procedures for the formation of a complex population; MAS for selection of

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					qualitative and quantitative traits, Gene pyramiding,marker-based utilization of exotic Germplasm and Breeding for climate change
2.	GPB 602	2+1	Advances in Biometrical Genetics	To impart theoretical knowledge and computation methods for non-allelicinteractions, mating designs and component analysis and their significance in plantbreeding.	After the completion of this course student will be able to understand various Qualitative and quantitative techniques, G x E Interaction, Construction of saturated linkage maps and Marker Assisted Selection, Use of advanced software packagesfor biometrical analysis, interpretation of analysed data.
3.	GPB 603	2+0	Molecular Cytogenetics for Crop Improvement	This course focuses on applications of cytogenetic techniques for crop improvement.	After the completion of this course the student will be able to understand Organization and structure of genome, karyotyping, Pre-breeding, polyploidy and applications of cytogenetically methods for crop improvement.
4.	GPB 604	2+0	Plant Genetics Resources, Conservation and Utilization	To impart knowledge on the methods of germplasm conservation and its utilization	After the completion of this course the student will be able to know about the various techniques of conservation of Plant Genetic Resources and its Utilizationin crop improvement.
5.	GPB 605	3+0	Genomics in Plant Breeding	To impart practical skills in advanced molecular techniques in genome mappingstructural/ functional genomics.	After the completion ofthis course, the student will have expertise on about differenttechniques for genome sequencing, molecular maps, and concepts of high-throughputproteomics, metabolomics and phenomics in crop improvement
6.	GPB 606	2+0	Population Genetics	To impart knowledge on structure, properties and their breeding values	After the completion of this course the student will be well versed with

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				of differentpopulation.	populationgenetics, its components and applications in crop improvement.
7.	GPB 607	3+0	Crop Evolution	To impart knowledge on crop evolutionary aspects and role of mutations,hybridizations and polyploidy in crop evolution and improvement.	After the completion of this course the student will have knowledge of Origin andevolution of species, Centres of diversity, Speciation, domestication and significanceof micro-mutations and polyploidy in genetic improvement of crop plants.
8.	GPB 608	1+1	Breeding Designer Crops	Breeding crops for higher physiological efficiency and nutritional enhancement.	Pass outs will have clear understanding of ideotypes of crops under varied agroclimaticsituations and breed for physiological efficient genotype. Can developvarieties for special traits having high therapeutic and nutraceutical value.
9.	GPB 609	1+0	IPR and Regulatory Mechanism (e-course)	The main objective of this course is to equip students and stakeholders withknowledge of intellectual property rights (IPR), related protection systems, theirsignificance and use of IPR as a tool for wealth and value creation in a knowledgebasedeconomy.	The students will have acquaintance of intellectual property rights, national and international laws on biodiversity and sustainable use of plant genetic resources through transfer and sharing. Can assist in follow up of various treatises and laws for research collaborations at international levels.

Entomology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	ENT 601	1+2	Insect Phylogeny and Systematics	To familiarize the students with different schools of classification, phylogenetics,classical and molecular methods, evolution of different	• Scholars are expected to understand the concepts of taxonomic hierarchy, studytaxonomic characters, variations, intra-specific phenotypic plasticity;

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				groups of insects. Detailedstudy about the International Code of Zoological Nomenclature; ethics and procedurefor taxonomic publications.	preparetaxonomic keys for specific groups and write taxonomic papers and reviews. • Scholars should be able to identify insects of economic importance up to family/generic levels and specialize in any one group of insects up to species levelidentification.
2.	ENT 602	2+1	Insect Physiology and Nutrition	To impart knowledge to the students on detailed physiology of various secretoryand excretory systems, moulting process, chitin synthesis, physiology of digestion,transmission of nerve impulses, nutrition of insects, pheromones, etc.	• The scholars are expected to have thorough theoretical and practical knowledge ofinsect physiology that can be made use of in practical/ applied entomological aspects. • Understand how physiological systems in insects are integrated to maintainhomeostasis.
3.	ENT 603	2+1	Insect Ecology and Diversity	To impart advanced practical knowledge of causal factors governing the distributionand abundance of insects and the evolution of ecological characteristics. Studyinsect-plant interactions; get acquainted with biodiversity and conservation.	• The scholar is expected to develop expertise in methods of data collection for insectpopulation studies, data transformation for analyses, diversity estimates, assessing distribution parameters, study the impact of abiotic and biotic factors on thedistribution and abundance of insects. • Should gain significant knowledge on construction of life tables and their analyses,assessment of resource size by female insects, reproductive effort and fitness.
4.	ENT 604	1+1	Insect Behaviour	To acquaint the students with a thorough understanding of how natural selectionhas led to various	• Scholars are expected to be well versed with the behavior and orientation of insectstowards exploitation as a tool in

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				survival strategies manifested as behavior in insects.	IPM.
5.	ENT 605	2+1	Bio-inputs for Pest Management	To appraise the students with advanced techniques in handling of different bioagents,modern methods of biological control and scope in cropping system-basedpest management in agro-ecosystems.	• Scholars are expected to learn the mass multiplication techniques of the morecommon and economically feasible natural enemies to be exploited under IPMprogrammes. • They should be able to guide entrepreneurs for establishing a viable massproductionunit/ insectary.
6.	ENT 606	2+1	Insect Toxicology and Residues	To acquaint the students with the latest advancements in the field of insecticidetoxicology, biochemical and physiological target sites of insecticides, and pesticideresistance mechanisms in insects.	• Scholars are expected to be well versed with the latest technologies of bioassays, insecticide/ pesticide residue analysis and solving problems associated with insect resistance to insecticides.
7.	ENT 607	1+1	Plant Resistance to Insects	To familiarize the students with recent advances in resistance of plants to insectsand acquaint with the techniques for assessment and evaluation of resistance incrop plants.	• Scholars are expected to identify sources of resistance in different crops and varieties; their utilization in resistance breeding programmes involving screeningtechniques for specific pests.
8.	ENT 608	1+1	Acarology	To acquire a good working knowledge of identification of economically importantgroups of mites up to the species level, a detailed understanding of the neweracaricide molecules and utilization of predators.	• Scholars should be able to identify major mite pests, their management andpredatory mites that can be used in biological control. • They are also expected to learn the rearing techniques of predatory Phytoseiid mites.
9.	ENT 609	1+1	Molecular Entomology	To familiarize the students with DNA recombinant technology, marker genes,transgenic plants, and biotechnological advances in	• The scholars are expected to have mastered the molecular techniques applicable inentomological research like isolation of insect DNA, purification,

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				sericulture and apiculture.	DNA barcodingand utilizing these techniques in molecular systematics and biological control aspects.
10.	ENT 610	2+0	Integrated Pest Management	To acquaint the students with recent concepts of integrated pest management;surveillance and data base management; successful national and internationalcase histories of integrated pest management, non-conventional tools in pestmanagement.	• Having gained sufficient experience in advanced studies of IPM the scholars shouldbe able to independently frame IPM schedules for major crops/ cropping ecosystems(cereal/ pulse crop/ oilseed crop based/ vegetable crop based agro-ecosystems).

Plant Pathology

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	PL PATH 601	2+1	Advances in Mycology	To acquaint with the advances in mycology	Gain understanding on recent advances in mycology
2.	PL PATH 602	2+1	Advances in Virology	To educate about the advanced techniques and new developments in plant virology	Get aware about the advanced techniques and new developments in plant virology
3.	PL PATH 603	2+1	Advances in Plant Pathogenic Prokaryotes	To learn about the latest developments in all the plant pathogenic prokaryotes asa whole.	Gain insights on the latest developments in all the plant pathogenic prokaryotes asa whole
4.	PL PATH 604	2+1	Molecular Basis of Host-pathogen Interaction	To understand the concepts of molecular biology and biotechnology in relation tohost plant- pathogen interactions.	Have clear and better understanding of concepts of molecular biology and biotechnology in relation tohost plant-pathogen interactions.
5.	PL PATH 605	1+0	Principles and Procedures of Certification	To acquaint with the certification procedures of seed and planting material.	Develop knowledge about the certification procedures of seed and planting material.
6.	PL PATH	2+0	Plant Biosecurity and	To facilitate deeper understanding on	To accrue knowledge on role and

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	606		Biosafety	plant biosecurity and biosafety issues inagriculture.	importance of plant biosecurity and biosafety issues inagriculture

Horticulture-Fruit Science

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	FSC 601	3+0	Innovative Approaches in Fruit Breeding	To update knowledge on current trends and innovative approaches in fruit breeding	On successful completion of the course, the students are expected to • Develop updated knowledge on current breeding objectives and trends • Equip with information on innovative approaches enhancing breeding efficiency
2.	FSC 602	3+0	Modern Trends in Fruit Production	To keep abreast with latest developments and trends in production technologies oftropical, subtropical and temperate fruits.	After the successful completion of the course, the students would have • Updated knowledge on current trends in fruit production.
3.	FSC 603	3+0	Recent Developments in Growth Regulation	To develop updates on recent advances in growth regulation of fruit crops.	After the successful completion of the course, the students would have • Complete understanding of growth dynamics in various fruit crops • Know-how on manipulation of growth and development processes.
4.	FSC 604	1+2	Advanced Laboratory Techniques	To familiarize with the laboratory techniques for analysis of fruit crops.	The students would be expected to develop skills and expertise on:

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					• Upkeep of laboratories and handling of research instruments • Principles and methods of various analysis
5.	FSC 605	2+0	Arid and Dry Land Fruit Production	To keep abreast with latest developments and trends in production technology of arid and dryland fruit crops.	Consequent upon successful completion of the course, the students are expected to learnt about • Fruit crops adopting to arid and drylands and their features • Specific cultivation and management practices
6.	FSC 606	2+1	Abiotic Stress Management in Fruit Crops	To updates knowledge on recent trends in management of abiotic stresses in fruitcrops.	On successful completion of the course, the students are expected to generate know-how on • Various types of abiotic stresses and their effects • Physiological processes underlying abiotic stresses • Management and conservation practices to overcome stress
7.	FSC 607	2+1	Biodiversity and Conservation of Fruit Crops	To understand the status and magnitude of biodiversity and strategies in germplasmconservation of fruit crops.	The student would be expected to learn about the significance of germplasm and various strategies to conserve it in the present context.
8.	FSC 608	2+0	Smart Fruit Production	To acquire knowledge on hi-tech innovations useful in fruit crops.	After successful completion of the course, the students are expected to learn aboutlatest innovations in automation, nanotechnology and robotics for realising smartfruit production.

Horticulture-Vegetable Science

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S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	VSC 601	3+0	Recent Trends in VegetableProduction	To keep abreast with latest developments and trends in production technology of vegetable crops.	After successful completion of this course, the students are exposed to: • Acquire the knowledge about recent trends in production technology of vegetable crops
2.	VSC 602	3+0	Advances in Breeding of Vegetable Crops	To impart knowledge on the recent research trends and advances in breeding ofvegetable crops	After successful completion of this course, the students are exposed to: • Breeding objectives and trends • Recent Advances in vegetable breeding
3.	VSC 603	2+1	Abiotic Stress Management in Vegetable Crops	To update knowledge on the recent research trends in the field of abiotic stressmanagement in vegetables. To teach management practices to mitigate abiotic stress in vegetable crops	After successful completion of this course, the students are expected to: • Acquire the knowledge about effect of different abiotic stresses on vegetables • Methods to mitigate abiotic stress in vegetables
4.	VSC 604	2+1	Seed Certification, Processing and Storage of Vegetable Crops	To impart the knowledge on seed certification, processing and storage of vegetableseeds	After successful completion of this course, the students are expected to: • Acquire the knowledge on seed certification • Acquire the knowledge on seed processing and storage
5.	VSC 605	2+0	Breeding for Special Traits in Vegetable Crops	To impart knowledge on recent developments in breeding for improved nutritionalquality in important vegetable crops	After successful completion of this course, the students are expected to: • Know about various special characters of vegetables • The recent breeding methods to achieve special characters in vegetables
6.	VSC 606	2+1	Biodiversity and Conservation of	To understand the status and magnitude of biodiversity and	• The student would be expected to learn about the significance of germplasm

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			Vegetable Crops	strategies in germplasmconservation of vegetable crops.	• Various strategies to conserve it in the present context.
7.	VSC 607	2+1	Biotechnological Approaches in Vegetable Crops	To impart latest knowledge in biotechnical advancement in vegetable crops	The student would be expected to learn • Different biotechnological tools • NGS, genetic engineering
8.	VSC 608	1+2	Advanced Laboratory Techniques for Vegetable Crops	To familiarize with the laboratory techniques for analysis of vegetable crops.	The students would be expected to develop skills and expertise on • Upkeep of laboratories and handling of research instruments • Principles and methods of various analysis

Agronomy

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	Agron 601	3+0	Current trends in Agronomy	To acquaint the students about recent advances in agricultural production.	Recent advances in agricultural production
2.	Agron 602	2+1	Recent trends in crop growth and productivity	To study the physiology of vegetative and reproductive growth in relation toproductivity of different crops in various environments.	Experience on the knowledge of crop growth for agricultural production
3.	Agron 603	2+1	Irrigation management	Experience on the knowledge of crop growth for agricultural production	Experience on the knowledge of crop growth for agricultural production
4.	Agron 604	2+0	Recent trends in weed management	To teach about the changing weed flora, new herbicides, their resistance, toxicity,antidotes and residue management under different cropping systems	Experience on the knowledge of new herbicides, their resistance, toxicity, antidotesand residue management under different cropping systems.
5.	Agron 605	2+0	Integrated farming systems for sustainable	To apprise about different enterprises suitable for different agroclimatic conditionsfor sustainable agriculture.	Experience on the knowledge of enterprises suitable for different agroclimaticconditions for sustainable

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			Agriculture		agriculture and their proper utilization
6.	Agron 606	2+1	Soil Conservation and Watershed Management	To teach about different soil moisture conservation technologies for enhancing theagricultural productivity through holistic approach watershed management	Experience on the knowledge of soil moisture conservation technologies for enhancingthe agricultural productivity through holistic approach watershed management
7.	Agron 607	2+1	Stress Crop Production	To study various types of stresses in crop production and strategies to overcomethem.	Experience on the knowledge of various types of stresses in cropproduction and strategies to overcome these.
8.	Agron 608	2+0	Research and Publication ethics	To get acquaint with ethics in research, data management and publication	Developed skill for research management, quality publication

Soil Science

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	Soil 601	2+0	Recent Trends in Soil Physics	To provide knowledge of modern concepts in soil physics	• Understand the global developments in the understanding of the status and movement of matter and energy in soil system and the scales of operation of soil physical phenomenon. • Understand the linkages of recent developments in soil physics with basic sciences • Understand the recent developments in characterisation / measurement / determination of various soil physical properties / parameters. • Sensitization about global climate change vis-a-vis soil physical conditions and the concept of newer materials as soil

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					conditioners.
2.	Soil 602	2+0	Modern Concept in Soil Fertility	To provide knowledge of modern concepts of soil fertility and nutrient use in cropproduction.	• To provide knowledge of modern concept of soil fertility and nutrient use in crop production. • Nutrient availability concept and nutrient movement in soil absorption by plant. • Chemistry of submerge soil and kinetic studies of nutrient in soil. Modern concept of soil fertility evaluation and method to increase nutrient efficiency and nutrient budgeting. Modern concept of fertilizer application. • Monitoring physical. chemical and biological changing in soil. • Knowledge about carbon and carbon cycle, green house effect and climate change, carbon sequestration vis-à-vis sustain of soil quality. • Experience of knowledge soil fertility and fertilizer and evaluation to plant growth and development.
3.	Soil 603	2+0	Physical Chemistry of Soil	To impart knowledge about modern concepts of physical chemistry of soils andclays, with emphasis on understanding the processes involved with practicalsignificance	• Gain knowledge about different physical process in soil • Ionic activity of major nutrient ions in soil • Understanding about importance of clay in agriculture
4.	Soil 604	2+0	Soil Genesis and Micromorphology	To impart knowledge about the pedogenic processes in soils and to acquaint withthe micro-pedological study of soil profile	•Describe the primary processes and factors influencing soil genesis. Explain how climate, parent material, topography, organisms, and time contribute to soil

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					development. Demonstrate the ability to describe and classify soil profiles, including horizons and their properties. •Understand the role of microorganisms in soil formation and be able to identify microbial features in micromorphological thin sections. Use micromorphological evidence to reconstruct the history and evolution of soils, including past environmental conditions and land use practices similarly understand how soil properties and micromorphological features are related to landscape attributes and landforms. •Apply knowledge of soil micromorphology and genesis to practical scenarios, including land use planning, soil conservation, and archaeological investigations
5.	Soil 605	2+0	Bio-Chemistry of Soil Organic Matter	To impart knowledge related to chemistry and reactions of organic substances and their significance in soils.	• Gain knowledge about biological Nutrient transformation of N, P and S in soil • Develop understanding about biochemistry of humus in soil • Get acquainted with clay-organic matter-pesticide interactions
6.	Soil 606	3+0	Soil Resource Management	To impart the students basic holistic knowledge on soil resource and latest developments in its sustainable use.	These course outcomes serve as a roadmap for what students should know and be able to do upon completing the Soil Resource Management course. • They help guide curriculum development, instructional methods, and assessment

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					strategies to ensure that students attain the necessary knowledge about soil properties, formation, and classification including soil texture, structure, and the factors influencing soil development and skills in soil management through various soil conservation techniques and erosion control methods, including terracing, contour farming, and cover cropping. • Students should be able to perform basic soil tests and assessments to determine soil quality, fertility, and suitability for different land uses as well as integrating soil information into land use planning processes, making informed decisions about land development, agriculture, and environmental protection
7.	Soil 607	2+0	Modelling of Soil Plant System	To train the students in concepts, methodology, technology and use of systems. To train the students in concepts, methodology, technology and use of systems	Knowledge on soil modelling concept for forecasting productivity
8.	Soil 608	2+1	Clay Mineralogy	To develop understanding on clay and its utility in soil research	Advanced knowledge about importance of clay in soil
9.	Soil 609	2+1	Recent Trends in Soil Microbial Biodiversity	To develop knowledge about soil microbial diversity and planning for its proper utilization	Gain understanding about soil microbial diversity and planning for its proper utilization
10.	Soils 610	2+0	Research and Publication Ethics	To get acquaint with ethics in research, data management and publication	Quality research output and outstanding research publication with excellent impact factor.

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Agricultural Economics

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	AEC-601	1+1	Advanced Micro Economic Analysis	To gain fundamental understanding of consumer behavior, producer's strategy,market structure through which transactions take place and human and firmsinteract. Develop foundation of scarce resource allocation for optimum results.	After successful completion of the course, the student will be able to-Understand the different market competition. Work out strategies for attaining equilibrium in the market.
2.	AEC-602	2+0	Advanced Macro Economic Analysis	To understand the functioning of national economy, its history and models. Thepolicies governing the modern economic system and concerned institutions.	After successful completion of this course the student will be able to-Figure outhow policies are framed to safe guard the national economy. Understand therationale behind the working of different economy
3.	AEC-603	2+1	Advanced Econometrics	The course aims at providing the knowledge and command over analysis of datacollected to get the desired result. Train the student in use of econometric models.	After successful completion of the course, the student will be able to– • Analyse the data collected for testing the framed hypothesis. • Get expertise in analytical framework
4.	AEC-604	2+1	Advanced Production Economics	The course deals with the concept of advanced production economics. The expositionwould be mathematically oriented. The course would also cover the analysis ofproduction functions, its interpretation, decision	After successful complétion of the course, the student will be able to-Get familiar with different production function and use them in practise and come out with useful decision. Work out the efficiency of the production process and use models

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				making with multiple input use,factor sharing and decision making under risk and uncertainty.	for finding the optimum solution.
5.	AEC-605	2+1	Operations Research	To gain elementary knowledge of solving problems and decision making for managingfarming and organisation in resource constraint in order to achieve the objective	After successful completion of this course, the student will be able to- Gain expertise in formulating problems of management into mathematical form and work out the optimum solutions. Apply the knowledge of different models in better decision making and controlling of the firm.
6.	AEC-606	2+1	Advanced Agricultural Marketing and Price Analysis	To impact adequate knowledge and analytical skills in the field of agriculturalmarketing and enhance expertise in improving the performance of the marketinginstitutions and the players in marketing of agricultural commodities.	After successful completion of this course, the student will be able to- Gain the knowledge of marketing and agricultural prices. Work out the interactionbetween different markets and analyse their working. Gain expertise in forecastingof price and build up market intelligence.
7.	AEC-607	1+1	Quantitative Development Policy Analysis	To develop expertise in understanding the rationale behind development of policies.Conceptualization of equilibrium and working out the economic implications ofdevelopment policy	After the completion of the course, the student will be able to-Conceptualize policy framework. Get acquainted with analysing the policy and work out corrective solutions
8.	AEC-608	2+1	Natural Resource Management	Concept building on natural resources. Gaining expertise in economic aspect ofnatural resources and maintain a balance between economic gains and environment conservation	After the completion of the course, the studentwill be able to-Understand the natural resources and methodologies to develop plansfor their optimal use. Work out the economics of forest, fisheries and ground water.

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					Be able to deal with the legal matters of the natural resources
9.	AEC-609	2+1	Environmental Economics	To understand the economic outcomes of environmental degradation. Make studentsproficient in decision making regarding environment protection, resource use, andconservation policy.	After the successful completion of the course, the student will be able to- Understandthe concept of pollution and externalities caused by economic activity. Work outthe economics of productions activities in terms of losses to environment. Learnabout accounting of environmental costs and other issues related.
10.	AEC-610	2+0	Research and Publication Ethics	To get acquaint with ethics in research, data management and publication	Quality research output and outstanding research publication with excellent impact factor.

Agricultural Extension Education

S.No	Course Code	Credit Hrs	Course Title	Aim of the Course	Learning Outcome
1.	EXT-601	2+1	Policy Engagement and Extension	To orient students on the importance of policies in shaping extension's performance •To discuss ways of generating policy relevant evidence to influence policies •To develop capacities to engage with policy actors and the policy development process	After successful completion of this course, the students are expected to be able to: • Appreciate the role of policies in shaping performance of extension • Understand how to generate and communicate policy relevant evidence • Critically evaluate extension policies in different countries • How to engage in policy advocacy.
2.	EXT-602	2+1	Methodologies for Social and Behavioural	This course aims to equip the doctoral students to conduct outcome-oriented socialand	The scholars should develop critical skills in conducting systematic and objectiveresearch by using robust methods

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			Sciences	behavioural science research and to develop sound field focused extensionstrategies and models with adequate replicability, while advancing knowledge onprocesses governing success of those strategies.	while minimising biases and errors –The students should intelligently choose and apply advanced methods and tools at every stage of research and execute them in an objective way by managing theactors and processes effectively –The students should develop expertise in designing tests, scales and indexes along with other tools to measure the socio-psychological processes at individual, groupand community levels
3.	EXT-603	2+1	Technology Commercialization and Incubation	This course is aimed to develop a critical understanding among extension studentsabout how the technology commercialisation process is linked to IPR management and entrepreneurship development	At the end of the course the students are expected to develop competencies in: • Enabling stakeholders to protect and manage their IPR • Managing IPR to maximise their value realisation through commercialisation, • Providing mentoring and handholding support to agripreneurs, rural entrepreneurs, start-ups, Farmer Organisations and other forms of entrepreneurs through incubation
4.	EXT-604	2+1	Educational Technology and Instructional Design	The aim is to develop knowledgeable, responsive and effective teachers committedto educating diverse group of learners in a dynamic extension landscape. This course will help the learners to appreciate the role of technology in learning and how it can be integrated into instructional design to create	After successful completion of this course, the students are expected to be able to: • Develop a critical understanding of concepts of learning and education within the context of agricultural development • Relate and apply learning theories and models to the development, design and evaluation of courses utilizing educational technology and instructional

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				engaging learning experience in both classroom and online learning environment.	design • Hone their skills to take up research work in analysing and evaluating different learning systems, teaching-learning environments, competencies and learning outcomes
5.	EXT-605	2+1	Risk Management and Climate Change Adaptation	The course is designed to provide both basic and applied knowledge on the subjectsof risks management and climate change adaptation with reference to Indianagriculture. This course will approach the subjects from a multidisciplinaryperspective - technical, socio-economic, political, financial, and regulatory. It aimsto equip students to identify, evaluate and evolve ways to address (mitigate andmanage) risks and climate change	After successful completion of this course, the students are expected to be able to: • Appreciate the scientific foundation of risk management and climate change science and relate the key learning to the job of an extension professional • Utilise methods and tools for risk and climate related vulnerability assessments • and adaptation strategies in the context of Indian agriculture / farming scenario
6.	EXT-606	1+1	Livelihood Development	To develop an understanding on the concept of livelihood and its various forms •To acquaint the students regarding the various alternative approaches that hasbeen adopted to support livelihoods •To familiarize the students to some of the methods, tools and techniques they canutilize to design livelihood interventions •To expose the students to the context, especially the economic models and policyenvironment that	This course will equip students with perspectives, knowledge and skills to developa comprehensive understanding of the livelihood concepts, various forms, approaches,tools and techniques to analyze existing livelihood pattern and strategies thesustainable livelihood intervention in the rural areas.

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				guides the livelihood choices • To equip students to work in multidisciplinary teams and engage at multiple levelson livelihood issues	
7.	EXT-607	2+1	Facilitation for People Centric Development	To orient students on the importance facilitation • To inspires students to understand facilitation tools to influence change at theindividual, group and organisational levels • To develop capacities in multi-stakeholder engagement, facilitation and networking	After successful completion of this course, the students are expected to be able to: • Appreciate the importance of facilitation skills and tools • Understand facilitation and networking techniques • Critically evaluate strategic partnerships and linkages • How to manage group dynamics and engage multi-stakeholders and virtualplatforms

Common Courses for PG programmes

S.No	Course Code	Credit Hrs	Course Title	Learning Outcome
1.	PGS 501	0+1	Library and Information Services	To equip the library users with skills to trace information from libraries efficiently,to apprise them of information and knowledge resources, to carry out literaturesurvey, to formulate information search strategies, and to use modern tools (Internet,OPAC, search engines, etc.) of information search.
2.	PGS 502	0+1	Technical Writing and Communications Skills	To equip the students/ scholars with skills to write dissertations, research papers,etc. To equip the students/ scholars with skills to communicate and articulate in English (verbal as well as writing).
3.	PGS 503	1+0	Intellectual Property and Its Management in Agriculture	The main objective of this course is to equip students and stakeholders withknowledge of Intellectual Property Rights (IPR) related protection systems, theirsignificance and use of IPR as a tool for wealth and value creation in a

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				knowledgebasedeconomy.
4.	PGS 504	0+1	Basic Concepts in Laboratory Techniques	To acquaint the students about the basics of commonly used techniques in laboratory.
5.	PGS 505	1+0	Agricultural Research, Research Ethics and Rural Development Programmes	To enlighten the students about the organization and functioning of agriculturalresearch systems at national and international levels, research ethics, and ruraldevelopment programmes and policies of Government.

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