Semester wise distribution of courses of B.Sc.(Ag.) as per 4th Dean's committee (2013-14 to 2015-16)

Outcomes of the programme:

- The agricultural graduates will be able to guide the farmers on selection of crops/ variety and provide production technologies based on agro-ecological situations and farmers resources.
- They develop the knowledge in providing solution to raising crops with respect to management of nutrients, water and disease and pests both in agronomical and horticultural crops.
- They acquire the skill to translate the crop- based scientific recommendation in farmers language and transmit them to the farming community for adoption.
- They develop basic knowledge on different courses related to different disciplines of agricultural sciences to pursue higher education in respective discipline of their interest and employment in different govt. and non-govt. sectors and also to take up agri-based entrepreneurship.

1st Year 1st Semester

AG 111 Introductory Agriculture 1(1+0)

Outcomes

- At the end of session, students will understand the applicability of old and sustainable agril. practices in present day agricultural practices.
- Self employment capability through agro-entrepreneurship development
- Students can enhance their knowledge as well as develop eco-friendly farming system models

AG 112 Principle of Agronomy and Agricultural Meteorology 3(2+1)

Outcomes

- Students are aware to understand the occurrence of different weather parameters, recording of data of weather elements and their interpretation in crop growth and production.
- Students will be acquainted with the weather forecast system, and can help the farmers in adopting necessary measures suggested through agro advisory service.
- Develops knowledge to Identify fertilizers, can advise farmers the crop based dose and commercial requirement and suitable farm implements for crops under different land types.

PB 111 Principles of Genetics 3(2+1)

Outcome

- Knowledge on the basic principles of heredity and variation.
- Understanding on cytogenetics, polyploidy, mutation and gene expression.
- Development of analytical, quantitative and problem solving skills from classical to molecular genetics.
- Help the students in understanding the upcoming courses related to plant breeding and genetics.

SC 111 INTRODUCTION TO SOIL SCIENCE 3(2+1)

Outcome:

- Students will gain knowledge regarding soil physical properties and processes in relation to plant growth.
- They will get a brief overview on origin of the earth, rocks and minerals, weathering and soil formation.
- practical excellence in soil sampling and qualitative analysis of some important soil parameters.

AT-111 Fundamentals of Soil and Water Conservation Engineering 3(2+1)

Outcome:

- Proper management of land and water will help to maintain the soil fertility by reducing the erosion and increasing moisture content
- Enhancement of economic benefit of the farmers of the area
- Surveying and levelling will help in demarcation of land area

PP 111 Agricultural Microbiology 3(2+1)

Outcomes:

- Acquired knowledge about different microbes
- Knowledge on different beneficial microorganisms involve in production of bio gas, bio-fertilizer, microbial pesticide and bio degradation.
- Familiarization of the students with basic knowledge of handling laboratory equipments, techniques and methods required in conducting experiments .

CP 111Crop Physiology: 3(2+1)

Outcome:

- Details knowledge about the physiology of seed development, maturation and changes during seed development and physiological and biochemical changes during a seed life to a mature and during post-harvest changes.
- Physiology of crops is the fundamental importance as it provides basic knowledge ofplant internal functions and various life processes along with different growth parameters and mineral nutrition of plants role in crop growth.
- Then one can better understand on physiological performances of crops in the field under agro climatic situations to predict yield and productivity.

HT 111 Production Technology of Fruit Crops 3(2+1)

Outcome:

- Basic concepts of production technology along with different variety and its rootstock of tropical, sub-tropical and minor fruit crops.
- Different commercial propagation method with canopy management on fruit crops
- Different Intercultural operation which was suitable for fruit crops

1st Year 2nd Semester

AS-121 Statistics 2(1+1)

Outcome:

- Brain exercise with basic statistical tools will develop the student's skill.
- Practical presentation of data in graphical way.

AS-122 Introduction to Computer Applications 2(1+1)

Outcome:

- Establishment of consultancy farm
- Helping farmers in smart way

AG 121 Water Management including Micro-irrigation 3(2+1)

Outcomes:

- Know and understand the water management in field crops with some water saving technologies and increase water use efficiency without hampering to the yield.
- Students can recommend scientific based irrigation scheduling in crops and cropping systems keeping in view the water resource available with the farmers and adopting integrated water resource management approach both on station and on farm situations.
- Students will be acquainted with managing irrigation water in different crops for higher irrigation and field efficiency

CP 121 Principles of Seed Technology: 3(2+1)

Outcome:

- Details knowledge about the growth, development and production strategy of different quality seeds.
- Different Technology used for processing of the seed and long term storage methods for better seed quality.
- Forecasting of demand of quality seed and market linkage for better availability of seed to the farmer.

AE-121 Principles of Agricultural Economics 2(2+0)

Outcomes

- Students will learn the basic economic terminology related to major branches of
- Knowledge about basic working of the Indian economy at micro and macro level.
- Learn to apply these economic concepts in agricultural sector.

EE 121 Dimensions of Agricultural Extension 2(1+1)

Outcomes

- Analyze the concepts, objectives and principles of extension education & agricultural extension

- Acquaint with different development programmes
- Analyze the present extension system implemented in the country and the ongoing developmental programmes
- Acquaint with the present extension approaches

PP 121 Plant Pathogens and Principles of Plant Pathology 4(3+1)

Outcomes:

- Learned about plant pathogensand their identification in laboratory.
- Development of knowledge in plant disease forecasting.
- Knowledge on different methods of disease management which will be helpful for formulating disease management strategy.
- Preparation of various fungicides.

SC 121 SOIL CHEMISTRY, SOIL FERTILITY AND NUTRIENT MANAGEMENT 3(2+1)

Outcome:

- This course will provide various theoritical informations about soil chemistry , soil fertility and nutrient management, essential elements, nutrient transport, nutrient availability .
- They can evaluate soil fertility by using suitable methods.
- Analysis and recommendation some of the essential nutrients in soil.

2nd Year 3rd Semester

AG 211 Field Crops-I (*Kharif*) 3(2+1)

Outcomes :

- Students will develop knowledge of raising different field crops specific to *kharif* .
- Application skills in raising and managing *kharif* crops scientifically.
- Scope for agro-entrepreneurship.

PB 211 Principles of Plant Breeding 3(2+1)

Outcome:

- Understanding various modes of reproduction in crop plants and their genetic consequences.
- Idea on various breeding methods followed for development of superior cultivars.
- Practical knowledge on emasculation and hybridization techniques in both self & cross pollinated crops for development of hybrids.

EN 211 Insect Morphology and Systematics 3(2+1)

Outcome

- Knowledge on basic morphology and anatomy of an insect
- Expertization on collection, preservation of insects and its body parts and dissection techniques of insect body parts.
- Basic ideas on classification of insects upto order level.

AE-211 Agricultural Finance and Co-operation 2(1+1)

Outcomes

- Students will learn skills on financial economics tools used in agricultural finance.
- Gain knowledge about working of the financial sector of India.
- Able to analyse and apply the financial management tools in agriculture sector.

AT 211 Farm Power and Machinery 2(1+1)

Outcome:

- Practical oriented skills to use various farm machineries and equipments in field
- Knowledge on various sources of power utilized at farm
- Knowledge of equipments utilized for land development works
- Practical oriented skills in operation and maintenance of farm power eg- tractor and power tiller

HT 211: Production Technology of Vegetables and Flowers: 3(2+1)

Outcome:

- Outcome of this course is to get theoretical and practical knowledge on raising of different nursery in vegetables and flowers
- Get idea about production technology, Intercultural operation its canopy management of different vegetables and flowers.
- Planning and layout of gardens and garden designs for public and private areas.

AH 211 Live Stock Production and Management 3(2+1)

Outcome:

- Employment as a manager of livestock and poultry farms.
- Establishment of independent dairy and poultry farms.
- Manufacturing of cattle and poultry feed

PP 211 Introductory Nematology 2 (1+1)

Outcomes:

- Student acquire the basic knowledge on handling laboratory appliances and develop skill of collection of soil, extraction of nematodes and staining
- Adequate identification of the symptoms of diseases inflicted by nematodes and take appropriate steps towards developing management strategies.
- Students will know the damage potential and biology of nematode taxa that are parasitic to plants.

NC 211/221/311/322 NSS/NCC/Physical Education 1(0+1)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

2nd Year 4th Semester

AG 221 Field crops-II (Rabi) 3(2+1)

Outcomes:

- Students will develop knowledge of raising different field crops specific to Rabi crops .
- Application skills in raising and managing kharif crops scintifically.
- Scope for agro-entrepreneurship.

SC 221 MANURES, FERTILIZERS AND AGROCHEMICALS 3(2+1)

Outcome:

- Students will understand the role of fertilizers and manures in supplying nutrients to plants so as to achieve high fertilizer use efficiency.
- This will also provide an overview of pesticides with reference to their classification, structure, mode of action, synthesis.
- They will have an overall idea on preparation of organic manures and composts which is needed for sustainable agriculture
- Practical experience in determining the nutrient content of fertilizers and manures and analysis of pesticides and herbicides.

EN 221: Insect Ecology and Integrated Pest Management Including Beneficial Insects 3(2+1)

Outcome

- Knowledge on basic concepts of ecology

- Ideas on the basic tools, components of IPM which will create employability
- Knowledge on sampling techniques for the estimation of insect population and damage; Pest surveillance
- Identification of earthworms in vermiculture– visit to vermiculture unit;

AE-221 Agricultural Marketing, Trade and Prices 2(1+1)

Outcomes

- Students will learn the use of price analysis tools for agricultural market prices.
- Knowledge about practical application of marketing and price analysis tools in policy making.
- Develop an understanding on the working of markets from local to global level.

PP 221 Diseases of Field Crops and their Management 3(2+1)

Outcomes:

- Development of knowledge on diagnosing different diseases of field crops based on the symptoms expressed in the field.
- Acquire the skill of collection and preservation of diseased specimens
- Development management strategies to tackle the diseases in field crops.

AT 221 Protected Cultivation and Post-Harvest Technology 2(1+1)

Outcome:

- Design of Green house and their construction with different systems for hi-tech agriculture under controlled environment
- Handling and safe storage of agricultural product
- Practical skills on different post-harvest equipments

HT 221: Production Technology of Spices, Aromatic, Medicinal and Plantation Crops 3(2+1)

Outcome:

- To developed an idea about identification, production technology and propagation of Spices, Aromatic, Medicinal and Plantation crops.
- Outcome of this course is to get knowledge on different processing method and distillation process of Spices, Aromatic, Medicinal and Plantation crops.
- Practical knowledge on selection of mother palm, and seed nuts in coconut and oil palm.

PB 221 Breeding of Field/Horticulture Crops 3(2+1)

Outcome:

- Exposure to various conventional and modern plant breeding methods for the improvemet of important field/horticulture crops.
- Development of analytical, quantitative and problem solving skills related to plant breeding.
- Visit to seed production plots, AICRP plots of different field crops and getting a practical knowledge on hybrid development.

NC 211/221/311/322 NSS/NCC/Physical Education 1(0+1)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

3rd Year 5th Semester

AG 311 Farming Systems and Sustainable Agriculture 2(1+1)

Outcomes:

- Students are acquainted with the concept of farming system and IFS modules for different category of farmers with varying resources to generate year round income.
- Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
- Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling

AG 312 Practical Crop Production – I (*Kharif* crops) 1(0+1)

Outcomes:

- Students will gain the knowledge of selecting good quality seeds, manures, fertilizers, plant protection chemicals, farm machineries and irrigation management for different field crops in rainfed and irrigated farming.
- Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
- Students can recommend scientific based crop management practices for different crops under varying farming situations both for resource poor and resource rich farmers.

SC 311 BIOCHEMISTRY 3(2+1)

Outcome:

- Students will gain a theoritical experience on the fundamental / elementary knowledge on structure and functions and metabolism of biomolecules.
- They will get a brief overview of the applications of biochemistry in different sectors.
- Practical excellence in determining the important biomolecules through different analytical methods.

EN 311: Crop Pests and Stored Grain Pests and Their Management 3(2+1)

Outcome

- Typical knowledge on identification of pests, their damage symptoms
- Knowledge on the different tools and techniques of IPM to manage the pests in field condition as well as stored condition.

AE 311 Fundamentals of Farm-Business Management 2(1+1)

Outcomes

- Students will learn the management aspect of agricultural businesses.
- Gain knowledge directly from business economics to evaluate projects and new ventures in agricultural sector.
- Able to work on projects of agricultural business management.

EE 311 Fundamentals of Rural Sociology and Educational Psychology 2 (2+0)

Outcomes

- Understand concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society
- Understand social groups, social stratification, culture, social values, social control and attitudes
- Understand concept of educational psychology, intelligence, personality, perceptions and motivation
- Assess personality types, leadership types and emotions of human beings

HT-311: Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)

Outcome:

- To get some idea about different post-harvest practices likes sorting, grading and packaging.
- To get idea about different storage house and its method of storage in Fruits and Vegetables.
- Preparation of different value added product like jam, jelly, sauce, ketch up, chips, RTS, pickle etc.

PP 311 Diseases of Horticultural Crops and their Management 3(2+1)

Outcomes:

- Development of knowledge on diagnosing different diseases of horticultural crops based on the symptoms expressed in the field.
- Acquire the skill of collection and preservation of diseased specimens

- Development management strategies to tackle the diseases in horticultural crops.

EE 312 Extension Methodologies for Transfer of Agricultural Technology 2(1+1)

Outcomes

- To describe the meaning of communication, classify the methods and explain the meaning, objectives, procedures involved in carrying out various individual, group and mass contact methods
- To describe various factors influencing selection of extension methods
- Know about various information tools and sources like internet, cyber cafes, kiosks, video and tele conferencing including agri journalism
- Describe the importance of capacity building of extension personnel and farmers and
- Explain the meaning of training and discuss various types of training to farmers and enumerate the objectives of Farmer's training centres, mandates of KVK.

NC 211/221/311/322 NSS/NCC/Physical Education 1(0+1)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

3rd Year 6th Semester

AE-321 Production Economics and Farm Management 2(1+1)

Outcomes

- Students will have a detailed understanding about inputs and outputs in agriculture, agricultural and natural resource management.
- Knowledge about combination of inputs/outputs in production process, how can they be adjusted for optimized resource use and better profits.
- Able to understand and formulate farm plans through various farm management and optimization skills.

EE-321 Entrepreneurship Development and Communication Skills 2 (1+1)

Outcomes

- To discern distinct entrepreneurial traits,

- To know the parameters to assess opportunities and constraints for new business ideas,
- They can know about decision making, managing the enterprise, motivation and entrepreneurship development
- Familiarize with govt. policies on small and medium enterprises, EXIM policies, capital system and its partnership different agro inputs industry, Indian agricultural processing and export industry
- Develop skills in grammar, communication skills, writing skill, presentation skills, public speaking, group discussion, organizing seminars and conferences.

PB 321 Principles of Plant Biotechnology 3(2+1)

Outcome:

- Getting acquainted with various types micro-propagation methods and their application in crop improvement.
- Idea on recombinant DNA technology and various methods of gene transfer.
- Exposure to the field of oftransgenics and their application in crop improvement.
- Knowledge on various types of marker systems and their application in in crop improvement.

AG 322 Weed Management 2(1+1)

Outcomes:

- Students are enriched with recent developments in herbicide , their selectivity and mode of action, resistance development etc.
- Students will develop knowledge to select crop specefic herbicides, their use, dose calculation and safe handling.
- Students can know the critical crop weed competition period, possible phyto-toxicity and residual effects of herbicides in different crops under different crop agro-ecological systems.

SC 321 ENVIRONMENTAL SCIENCE 2(1+1)

Outcome:

- This course will make the students aware of different environmental concerns like pollution, conservation, etc and will create a pro-environmental attitude.
- Learning about the ways to manage important and frequently occurring disasters of India.
- Ability to conduct various qualitative and quantitative tests for waste samples collected from the locality

AT 321 Renewable Energy 2(1+1)

Outcome:

- Knowledge on Energy sources, biogas plants, Gasifiers, Briquettes
- A brief knowledge on Solar energy and its application
- Appreciate the need of Wind energy, its various components, classifications and applications

HT 321 Urban Agriculture and Horticulture 2(1+1)

Outcome:

- Outcome of this course is to get knowledge on growing of fruits, flowers and vegetables in pots and its maintatnce.
- Calculation of cost benefit ratio under different situation of city farming
- Preparation of formulations of pesticides and it's use in the management of pests and diseases of potted plants

SS-321 Comprehension and communication skills in English 2(1+1)

Outcomes

- To improve soft skills like communication skills, interpersonal skills, presentation skills etc.
- To learn the skills designed to help the candidates to express themselves better in academic and professional careers**.**
- To be trained in professional writing with enriched vocabulary and expertise in conversation, interviews, presentations, group discussions etc.
- Students will be able to prepare their curriculum vitae and job applications which will help them in building their professional career.

NC 211/221/311/322 NSS/NCC/Physical Education 1(0+1)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

4th Year 7th Semester

RAWE-411 Rural Agricultural Work Experience (RAWE) 20(0+20)

Outcomes

- Develop a team work and build competency in understanding real life situations,
- Learn about management of different components,
- Develop problem solving attitude, art of creative thinking, time management, art of listening, positive use of feedback, observation power, managing conflicts, working in local institutions, working with other organizations etc.

4th Year 8th Semester

Experiential Learning Programme

EL 421-CP (1-4) Crop Production

CP-1 Seed Production Technology: 3(1 + 2)

Outcome:

- Adequate practical knowledge on seed production of both OPVs and Hybrids.
- Provide knowledge regarding seed quality control and seed quality enhancement techniques.
- Visit to different seed processing units and seed production plots will enable students to involve themselves in both public and private sector seed enterprises.

CP-2 Integrated Farming System 3(1+2)

Outcomes:

- Students are acquainted with the concept of farming system and IFS modules for different category of farmers with varying resources to generate year round income.
- Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
- Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling

CP(3) Water management 4 (1+3)

Outcomes

- Students will be acquainted with managing irrigation water in different crops for higher irrigation and field efficiency
- Students will be able to recommend suitable water saving technologies and irrigation methods with an aim to produce more crop per drop.
- Students can adopt scientific based irrigation scheduling in crops and cropping systems as part of their entrepreneurship with an approach on high-tech agriculture.

CP-4 SOIL MANAGEMENT: CONSERVATION, PROBLEMATIC SOIL, AND SOIL QUALITY 4(1+3)

Outcome:

- This course will impart knowledge about soil erosion, soil quality, problematic soils their extent, distribution and nature in India and management.
- The students pursuing this course will be able to assess the problematic soils through qualitative and quantitative analysis of various soil parameters.
- Assessment and various methods of management of the detected problematic soils

ABM-1 Management of Agro based Industry 4(1+3)

Outcome

- Learning different managerial aspects of Agro-based industries
- Knowledge about the innovative ways to start the new enterprises

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.
- They will also learn about various computer applications, IT and data base management techniques.

EL 421-CPT (1-4) Crop Protection

CPT 1: IPM and Management of Post-harvest insect and Non-insect pests 4 (2+2)

Outcome

- Development of skill to estimate ETL, EIL, GEP, and determination of population size as well as different sampling procedures.
- Awareness about importance of post-harvest management of insect pests of different crops and familiarization with different storage structures.
- Profound knowledge on pest scouting in field condition which will be helpful in further future for the employment purpose.

CPT-2 IDM and Management of Important Plant Diseases 4(2+2)

Outcome:

- Student will know about collection of disease samples and raising of pure culture of pathogen.
- Knowledge on application patterns of chemicals and equipment used for it.
- Knowledge on management of Post-harvest disease of grains, vegetables and fruits.

CPT-3 Mushroom Cultivation 3(0+3)

Outcome:

- Basic knowledge on commercially grown mushroom
- Knowledge on Preparation of mother culture, spawn, substrate etc to develop enterpreneurship.
- Knowledge on economics and constraints of mushroom cultivation.
- Knowledge on Preparation of a Business Model of mushroom enterprise

CPT 4: Bio control Agents and Bio pesticides 3 (1+2)

Outcome

- This course will provide the knowledge on importance, identification, extraction and mass production of different biocontrol agents.
- Ideas of preparation of antimicrobial bio-pesticides and methods of testing bio-formulation under different field condition.
- Knowledge on use of different plant products in pest control

ABM-1 Management of Agro based Industry 4(1+3)

Outcome

- Learning different managerial aspects of Agro-based industries
- Knowledge about the innovative ways to start the new enterprises

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

By the end of this course students will be-,

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.
- They will also learn about various computer applications, IT and data base management techniques.

EL 421-PHT (1-4) Post Harvest Technology and Value addition

PHT-1: Post Harvest Technology of fruits and vegetables 3 (1+2)

Outcomes:

- To get some idea about different post harvest practices like sorting, grading and packaging
- Aim to get knowledge about different storage house and its methods for different fruits and vegetables.
- Preparation of different value added product like jam, jelly, sauce, ketch up, chips, RTS, pickle etc.

PHT-2: Unit operation for quality value, addition, processing and development of new products 4(1+3)

Outcome:

- Develops idea about different value added products related to fruits and vegetables.
- Capability to meet food requirements of a growing population by eliminating losses , making more nutritive food items from raw commodities.

- Develop idea about maturity indices, methods of storage, packaging principles of preservation, canned products, bottling, freezing, dehydration and drying.

PHT-3: Integrated storage management of fruits, flowers and vegetables. 4 (2+2)

Outcome:

- To get some idea about different post harvest practices like sorting, grading and packaging of fruits, flowers and vegetables.
- Aim to get knowledge about different storage house and its methods for different fruits, flowers and vegetables.
- They learnt about pre and post harvest treatment for improvement of shelf life.

PHT-4: Post Harvest handling of flowers. 3 (1+2)

Outcome:

- Students acquired knowledge on different post harvest treatments, grading and packing techniques for extending shelf life of flowers.
- The main objective is to get idea about drying and preservation methods of commercial flowers.
- They got sufficient knowledge about storage, distillation of essential oil as they have physically visited different cold storage and preservation unit.

ABM-1 Management of Agro based Industry 4(1+3)

Outcome

- Learning different managerial aspects of Agro-based industries
- Knowledge about the innovative ways to start the new enterprises

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.

- They will also learn about various computer applications, IT and data base management techniques.

EL 421- ABM (1-5) Agri-Business Management

ABM-1 Management of Agro based Industry 4(1+3)

Outcome

- Learning different managerial aspects of Agro-based industries
- Knowledge about the innovative ways to start the new enterprises

ABM-2 Marketing Management (Agricultural Import- Export Policy of Govt. Of India and Business Laws) (1+2)

Outcome

- Learn various aspects of marketing management
- Develop marketing strategies for efficient marketing
- Formulate policy with regard to marketing management.

ABM-3 Financial Management of Agribusiness (1+3)

Outcome

- Students will learn skills on financial management in agribusiness enterprises
- Gain knowledge about the managerial aspects of the agricultural business enterprises
- Able to analyse and apply the financial management tools in agriculture sector.

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.
- They will also learn about various computer applications, IT and data base management techniques.

CP-2 Integrated Farming System 3(1+2)

Outcomes:

- Students are acquainted with the concept of farming system and IFS modules for different category of farmers with varying resources to generate year round income.
- Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.

- Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling

PHT-1: Post Harvest Technology of fruits and vegetables 3 (1+2)

Outcomes:

- To get some idea about different post harvest practices like sorting, grading and packaging
- Aim to get knowledge about different storage house and its methods for different fruits and vegetables.
- Preparation of different value added product like jam, jelly, sauce, ketch up, chips, RTS, pickle etc.

EL 421-CA (1-5) Commercial Agriculture

CA-1: Commercial floriculture 3(0+3)

Outcome:

- Students have learnt about different propagation practices in commercial flowers.
- They have got the idea about different cultural practices followed in annual flowers as they have raised the crop in their practical field.

CA-2: Commercial fruit production 3(1+2)

Outcome:

- Basic concept of production technology along with different varieties and its rootstock of tropical, subtropical and minor fruit crops.
- Different commercial propagation methods with canopy management on fruit crop.
- Different intercultural operations which was suitable for fruit crops.

CA-3: Propagation and nursery management of horticultural crops 3 (1+2)

Outcomes:

- To know about the basic principle in plant propagation of horticultural crops
- Practical, hand on experience in plant propagation methods
- Principle, practices and skill required in the culture and management of nut=rsery plant

CA-4: Cultivation of commercially importantimportant Medicinal & Aromatic Plants 2(1+1)

Outcome:

- To get practical idea about identification of different medicinal and aromatic plants.
- To know about the standardized methods for raising nursery of different medicinal and aromatic plants.
- Better knowledge on field preparation and intercultural operation along with different harvesting method and its isolation and extraction process of chemical constituents from medicinal & aromatic plants

CA-5: Commercial vegetable production 3(1+2)

Outcome:

- Basic concepts on nursery management, quality planting material production.
- Identification of different vegetable crops and their varieties
- To develop knowledge about transplanting of vegetable seedlings in main field, seed extraction, seed production, intercultural operations in case of vegetable crops.
- To develop knowledge about harvesting, grading, packaging and storage of different vegetable crops.

ABM-2 Marketing Management (Agricultural Import- Export Policy of Govt. Of India and Business Laws) (1+2)

Outcome

- Learn various aspects of marketing management
- Develop marketing strategies for efficient marketing
- Formulate policy with regard to marketing management.

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.
- They will also learn about various computer applications, IT and data base management techniques.

Semester wise distribution of courses of B.Sc. (Hons.) Agriculture as per 5th Dean's committee (2016-17)

Outcomes of the programme:

- The agricultural graduates will be able to guide the farmers in adoption of recommended package of practices in growing crops/ variety on sole and cropping system mode.

- They develop practical knowledge in providing location specific solutions to crops with real time management approach in respect to nutrients, water and disease and pests both in agronomical and horticultural crops.
- They acquire the skill to translate the crop- based scientific recommendation in farmers language and transmit them to the farming community for adoption.
- They acquire the basic knowledge on different course(s) of their choice related to different specialized disciplines of agricultural sciences to pursue higher education in the field of their interest.
- They develop knowledge and experience through learning mode to take up entrepreneurship by establishing Integrated Farming System module in holistic manner involving different commodities from crops, livestock and poultry.
- They acquire knowledge, skill and earn the eligibility to be employed in different sectors of agriculture and allied branches.

1st Year 1st Semester

AG-111 Fundamentals of Agronomy 4(3+1)

Outcome:

- Students can identify and select seasonal crop(s), judging seed good quality, skill to identify different weed flora and their management under different ecosystem
- Develops knowledge to Identify fertilizers, can advise farmers the crop-based dose and commercial requirement and suitable farm implements for crops under different land types.
- Students can work out irrigation requirement and can advise farmers on adoption of irrigation methods under varying water resource and availability conditions.

HT-111 Fundamentals of Horticulture 2(1+1)

Outcome:

- Basic knowledge about scope and importance and botanical classification of different horticultural crops.
- This course is able to make easier for the students to understand preparation of different nursery and it's maintenance in horticultural crop.
- Layout and planning for different horticultural crops
- Getting knowledge on modern intercultural operation practiced in horticultural crops.

SC-111 Fundamentals of Soil Science 3(2+1)

Outcome:

- Students will gain knowledge regarding soil physical, chemical and biological properties and processes in relation to plant growth.

- A brief overview on origin of the earth, rocks and minerals, weathering and soil formation.
- Practical excellence in soil sampling and qualitative analysis of some important soil parameters.

EE 111 Fundamentals of Agricultural Extension Education 3(2+1)

Outcomes:

By the end of this course students will be able to learn-

- Principles and methods of extension approach, rural development programs, communication models, programme formulation and evaluation
- New trends in agriculture extension: privatization extension.
- Monitoring and evaluation – concept and definition, monitoring, and evaluation of extension programmes. Transfer of Technology- Concept and models.
- Skill development in handling audio-visual equipments, preparation of presentation
- Can learn about agricultural journalism and process of programme production of radio and TV.

AS-111 Statistical Methods 2(1+1)

Outcome:

- Brain exercise with basic statistical tools will develop the student's skill.
- Practical presentation of data in graphical way.
- Knowledge of design and sampling help for future research programme.

AT-111 Farm Machinery and Power 2(1+1)

Outcome:

- Impart knowledge about different farm machineries used and their operation
- Maintenance and economics in operation
- Repair, maintenance and hiring of tractors through Agro-service centre
- Practical oriented skills to use various farm equipments in field

SS 111 Comprehension and Communication Skills in English 2(1+1)

Outcomes

- To improve soft skills like communication skills, interpersonal skills, presentation skills etc.
- To learn the skills designed to help the candidates to express themselves better in academic and professional careers**.**
- To be trained in professional writing with enriched vocabulary and expertise in conversation, interviews, presentations, group discussions etc.
- Students will be able to prepare their curriculum vitae and job applications which will help them in building their professional career.

AG-112 Agricultural Heritage 1(1+0)

Outcomes

- At the end of session, the students can blend old and sustainable agril. practices with present day agricultural practices.
- Students can suggest the old ways and means of farming under poor soil conditions to mitigate the harmful effect of injudicious use of agrochemicals.
- The background knowledge can help the students in higher studies as part of their research programmed.

EE-112 Human values and ethics 1(1+0) (Non Gradial Course)

Outcomes

By the end of this course-

- Students will appreciate the essential complimentarily between values and skills to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- The process of self-exploration and self-awareness will enable the students to evaluate their pre-conditioning and present beliefs.
- Students will develop a holistic perspective towards life, profession and happiness based on a correct understanding of human reality, human body and rest of the existence.

PRM-111 Elementary Mathematics 2(2+0)

Outcomes

- To improve an ability to apply mathematics and its application in agriculture and its applied sectors.
- To learn the skills designed to help and understand the plant and its ecosystem by using mathematics application**.**
- Students will be able to prepare and apply the knowledge gained in designing fields.

PRB-111 Introductory Biology 2(1+1)

Outcomes

- To improve skills in interpreting the plant organs and describe their roles and mechanisim.
- To learn the skills designed to help the candidates to understand better in the subject related concepts of B.Sc. (Hons.) Agriculture**.**
- Students will be able to understand the description of plants and the role of animal in agriculture.

NSS-111 NSS/NCC/Physical Education & Yoga Practices 2(0+2)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

1st year 2nd Semester

AG-123 Introductory Agro-meteorology and climate change 2(1+1)

OUTCOME:

- Students develop the technical know-how on layout of an agricultural meteorological observatory, the instruments required, their installation.
- Equipped with the knowledge of recording data on weather elements, calculation, tabulation, calculation and their relations vis-a-vis interpretation with crop growth and development.
- Students will be acquainted with the weather forecast system, and can help the farmers in adopting necessary measures suggested through agro-advisory service.

AG-124 Course Name: Introduction to Agroforestry 2(1+1)

Outcomes

- Students will be able to know different agroforestry systems for varying agroecological situations and their suitability with conventional agriculture.
- At the end of session, students will be able to suggest different agroforestry-based models in companion with field and horticultural crops and their management.
- Students can become a part of the team engaged in adoption agroforestry-based solution to restore soil health through carbon sequestration and mitigating climate change impact

PB-121 Fundamentals of Genetics 3(2+1)

Outcome:

- Knowledge on the basic principles of heredity and variation.
- Understanding on cytogenetics, polyploidy, mutation and gene expression.
- Development of analytical, quantitative and problem-solving skills from classical to molecular genetics.
- Help the students in understanding the upcoming courses related to plant breeding and genetics.

HT-122: Production Technology for Fruit and Plantation Crops 3(2+1)

Outcome:

- To get practical knowledge about the scientific production technology of fruit and plantation crops.
- To know about the processing methods in plantation crops.
- To understanding the production constraints through various field visits.

SC-122 Agricultural Microbiology 2(1+1)

Outcome:

• Knowledge on the principles of microbiology and details of important microorganisms

• Appraisal on the role of microorganism in improving soil fertility

• Practical experience in extracting the microbes from soil culturing the microbes in the laboratory.

EN 121: Fundamentals of Entomology 4(3+1)

Outcome

- Students will gain the basic knowledge about external morphology of the insect's body i.e., head, thorax and abdomen, their appendages and functions, basic aspects of anatomy of different systems, elementary physiology, nutritional physiology and their application in entomology.
- Students will know about classification of insects up to the level of families with hands-on experience in identifying the families of insects.
- Concepts of ecology, basic principles of distribution and abundance of organisms and their causes will be known by all the students. Study life tables, organization of communities, diversity indicies. Train students in sampling methodology, calculation of diversity indicies, constructing life tables, relating insect population fluctuations to biotic and/or abiotic causes,
- All will be familiarized with principles of insect pest management, including concept and philosophy of IPM. Train students in computation of ETL, implementing IPM programmes.

PP-121 Fundamentals of Plant Pathology 3(2+1)

Outcome:

- Acquaintance with various laboratory equipment and basic knowledge on laboratory techniques.
- Knowledge on disease symptoms and identification of various micro-organisms.
- Basic idea on pesticides, calculations and the method of applications.

CP-121 Fundamentals of Crop Physiology—1 2(1+1)

Outcome:

- Physiology of crops is the fundamental importance as it provides basic knowledge of plant internal functions and various life processes.
- Provide knowledge regarding different growth parameters and mineral nutrition of plants role in crop growth.

- Then one can better understand on physiological performances of crops in the field under agro climatic situations to predict yield and productivity.

AE-121 Fundamentals of Agricultural Economics 2(2+0)

Outcomes

- Students will learn the basic economic terminology related to major branches.
- Knowledge about basic working of the Indian economy at micro and macro level.
- Learn to apply these economic concepts in agricultural sector.

EE-123 Rural Sociology & Educational Psychology 2(2+0)

Outcomes

By the end of this course students will be able to-

- Understand concept of rural sociology, its importance in agricultural extension, characteristics of Indian rural society
- Understand social groups, social stratification, culture, social values, social control and attitudes
- Understand concept of educational psychology, intelligence, personality, perceptions and motivation

NSS-111 NSS/NCC/Physical Education & Yoga Practices 2(0+2)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

2nd Year 3rd Semester

AG-215 Crop Production Technology-I (*Kharif*Crops) 2(1+1)

Outcomes:

- Students will develop knowledge of raising different field crops specific to *kharif* season.
- Application skills in raising and managing *kharif* crops scientifically.
- Scope for agro-entrepreneurship.

PB-212 Fundamentals of Plant Breeding 3(2+1)

Outcome:

- Understanding various modes of reproduction in crop plants and their genetic consequences.

- Idea on various breeding methods followed for development of superior cultivars.
- Practical knowledge on emasculation and hybridization techniques in both self & cross pollinated crops for development of hybrids.

HT-213: Production Technology for Vegetable and Spices 3(2+1)

Outcome:

- Practical knowledge about raising of vegetable seedlings and production technology in field condition
- To get idea for solving field related problems
- Better knowledge on field preparation and intercultural operation along with different harvesting method and its maturity stage is the outcome of this course.

SC-213 Environmental Studies and Disaster Management 3(2+1)

Outcome:

•This course will make the students aware of different environmental concerns like pollution, conservation, etc and will create a pro-environmental attitude.

• Learning about the ways to mitigate important disasters in the World and India in particular.

• Ability to conduct various qualitative and quantitative tests for waste samples collected from the locality

PP-212 Introductory Nematology 2 (1+1)

Outcome:

- Students acquire the basic knowledge on handling nematological laboratory appliances and develop skill on collection, extraction and identification of nematode.
- Adequate identification of the symptoms of diseases inflicted by nematodes and take appropriate steps towards developing management strategies.
- Students will know the damage potential and biology of nematode taxa that are parasitic to plants.

ST-211 Principles of Seed Technology: 2(1+1)

Outcome:

- Details knowledge about the growth, development and production strategy of different quality seeds.
- Different Technology used for processing of the seed and long-term storage methods for better seed quality.
- Forecasting demand of quality seed and market linkage for better availability of seed to the farmer.

AE-212 Agricultural Finance and Co-Operation 3(2+1)

Outcomes

- Students will learn skills on financial economics tools used in agricultural finance.
- Gain knowledge about working of the financial sector of India.
- Able to analyse and apply the financial management tools in agriculture sector.

AT – 212 Soil and Water Conservation Engineering2(1+1)

Outcome:

- Management of land and water to eradicate the draught condition
- Increasing the production and productivity of land for economic upliftment of the people of the area
- Control of Soil from water and wind erosion
- Knowledge on installation of water harvesting structures

AH-211 Livestock & Poultry Management 4(3+1)

Outcome:

- Employment as a manager of livestock and poultry farms.
- Establishment of independent dairy and poultry farms.
- Manufacturing of cattle and poultry feed

NSS-111 NSS/NCC/Physical Education & Yoga Practices 2(0+2)

Outcomes

- The social leadership capability will be developed among the students
- Students will be awared about the social problems, stigmas and make the students capable to tackle them
- Students will be able to know various programmes related to society and their skills will be enhanced.

2nd Year 4th Semester

AG-226 Crop Production Technology-II (rabi crops) 2(1+1)

Outcomes:

- Students will develop knowledge of raising different field crops specific to Rabi crops.
- Application skills in raising and managing rabi crops scientifically.
- Scope for agro-entrepreneurship.

AG-227 Farming System and Sustainable Agriculture 1(1+0)

Outcomes:

- Students are acquainted with the concept of farming system and IFS modules for different category of farmers with varying resources to generate year round income.

- Self-employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
- Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling

AG-228 Course Name: Principles of Organic Farming 2(1+1)

Outcomes

- At the end of the session, students will understand organic packages for different crops, organic certification procedure
- Students will develop their skill to prepare organic products and their application.
- Develop skills through practical orientation to organic production technologies.

PB-223 Intellectual Property Rights 1(1+0)

Outcome:

- Exposure to various types intellectual property rights.
- Idea on various acts and organization related to IPR.
- Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

HT-224: Production Technology for Ornamental, Medicinal & Aromatic Plants 2(1+1)

Outcome:

- To get practical idea about identification of different ornamental, medicinal and aromatic plants.
- To know about the standardized methods for raising nursery of different flowers and medicinal and aromatic plants.
- Better knowledge on field preparation and intercultural operation along with different harvesting method and its isolation and extraction process of chemical constituents from medicinal & aromatic plants

SC-224 Problematic Soils and their Management 2(2+0)

Outcome:

- Knowledge about soil quality, health, distribution of waste land and problem soils in India.
- Categorization and management of wastelands to be utilised effectively.
- Understanding the quality and standards of irrigation water, bio remediation and land capability and land suitability classification.

PP-223 Principles of Integrated Pest and Disease Management 3(2+1)

Outcome:

- Acquire knowledge of pest surveillance and develop models for disease forecasting.
- Student will know about proper detection and diagnosis of pest and diseases.
- Assessment of disease intensity, determination of various injury levels and crop yield loss.

- Development of different IPM modules for management of different pests and their application.
- Acquire knowledge about mass multiplication of various important biocontrol agents.

ST-222Seed production and Seed Testing: 1(0+1)

Outcome:

- Details knowledge about the foundation and certified seed production techniques of OPVs and hybrids.
- Different seed testing methods used for quality seed production.
- 3.Chemical, biochemical, molecular methods used for genetic purity testing.
- 4.Knowledge regarding different health testing methods for identification of seed borne diseases.

CP-222 Fundamentals of Crop Physiology—ll: 1(1+0)

Outcome:

- Details knowledge about the physiology of seed development, maturation and changes during seed development.
- Knowledge regarding maturity indices, dormancy, seed quality parameters and factors affecting quality of seed and crop.
- One can better understand the concepts of physiological and biochemical changes during a seed life to a mature and during post-harvest changes.

AE-223 Agricultural Marketing, Trade and Prices 3(2+1)

Outcomes

- Students will learn the use of price analysis tools for agricultural market prices.
- Knowledge about practical application of marketing and price analysis tools in policy making.
- Develop an understanding on the working of markets from local to global level.

AS-222 Agri-Informatics 2(1+1)

Outcome:

- Establishment of consultancy farm
- Helping farmers in smart way

AT-223 Renewable Energy and Green Technology 2(1+1)

Outcome:

- Knowledge on different energy sources.
- Select appropriate energy technologies to meet the energy demand of the state in agriculture except the use of hydro power energy.
- It will enable students to understand the concepts in the production process of biodiesel, bio-fuels and briquettes.

AE-224 Agri-business Management 3(2+1)

Outcomes

- Students will learn the management aspect of agricultural businesses.
- Gain knowledge directly from business economics to evaluate projects and new ventures in agricultural sector.
- Able to set up projects on agricultural business management.

SC-225 Agrochemicals 3(2+1)

Outcome:

• This course will give both theoretical and practical experience to students about agrochemicals, their type and role in agriculture, management of agrochemicals for sustainable agriculture.

• They will be aware of pesticides with reference to their classification, structure, mode of action, synthesis and formulations and quality

• Knowledge on Fertilizers, their manufacturing process, quality and their importance.

AG-229 Weed Management 3(2+1)

Outcomes:

- Students are enriched with recent developments in herbicide, their selectivity and mode of action, resistance development etc.
- Students will develop knowledge to select crop specific herbicides, their use, dose calculation and safe handling.
- Students can know the critical crop weed competition period, possible phyto-toxicity and residual effects of herbicides in different crops under different crop agro-ecological systems.

3rd Year 5th Semester

AG-311 Course Name: Practical Crop Production (*Kharif* Crops) 2(0+2)

Outcomes:

- Students will gain the knowledge of selecting good quality seeds, manures, fertilizers, plant protection chemicals, farm machineries and irrigation management for different field crops in rainfed and irrigated farming.
- Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
- Students can recommend scientific based crop management practices for different crops under varying farming situations both for resource poor and resource rich farmers.

PB-314 Crop Improvement – I (*Kharif*) 2(1+1)

Outcome:

- Getting idea on centers of origin, distribution of species, wild relatives of various *kharif* crops.
- Exposure to various conventional and modern plant breeding methods for the improvement of important *kharif* crops.
- Visit to seed production plots, AICRP plots of different field crops and getting a practical knowledge on hybrid development.

PB-315 Fundamentals of Plant Biotechnology 2(1+1)

Outcome:

- Getting acquainted with various micro-propagation methods and their application in crop improvement.
- Idea on recombinant DNA technology and various methods of gene transfer.
- Exposure to the field of transgenic and their application in crop improvement.
- Knowledge on various types of marker systems and their application in crop improvement.

HT-315: Post-harvest Management and Value Addition of Fruits and Vegetables 2(1+1)

Outcome:

- To get some idea about different post-harvest practices likes sorting, grading and packaging.
- To get idea about different storage house and its method of storage in Fruits and Vegetables.
- Preparation of different value-added product like jam, jelly, sauce, ketch up, chips, RTS, pickle etc.

SC-316 Geoinformatics, Nano-technology and Precision Farming 2(1+1)

Outcome:

• Basic knowledge on fundamentals of geoinformatics, its application in precision farming and fertiliser recommendation approaches.

• Adequate information on nanotechnology, its concept, different commercial nano-formulations and their practical utility in seed, water, fertilizer and plant protection.

• Hand-on skill on use of various GIS database and softwares to generate thematic maps.

• Woking experience on handling of GPS hardware for real-time access of time and positional information.

SC-317 Fundamentals of Plant Biochemistry2(1+1)

Outcome:

• Theoretical experience on the elementary knowledge on structure and functions of biomolecules.

• They will get a brief overview of the metabolism of the biomolecules.

• Practical excellence in determining the important biomolecules through different analytical methods.

EN 312: Pests of Crops and Stored Grains and their Management 3(2+1)

Outcome

- The students will be familiarized about nature of damage and seasonal incidence of insect pests that cause loss to major crops.
- Students will know effective management of harmful pests by different methods and also know the economic aspect of IPM techniques which will be further useful.

PP-314 Diseases of Field & Horticultural Crops & their Management-I 3(2+1)

Outcomes:

- Development of knowledge on diagnosing different diseases of field and horticultural crops based on the symptoms expressed in the field.
- Acquire the skill of collection and preservation of diseased specimens
- Development management strategies to tackle the diseases in *Kharif* Season.

EE-314 Communication Skills and Personality Development 2 (1+1)

Outcomes

By the end of this course students will be able to-

- Develop effective communication skills (spoken and written)
- Develop effective presentation skills
- Become self confident individuals by mastering inter-personnel skills, team management skills which will help them in their job life in future.
- Development of all round personalities with mature outlook to function effectively in different circumstances
- Write papers, proposals, reports etc. which will also help them in achieving their academic degree.
- They will be able to appreciate any piece of writing and comprehend it.

EN 313 (E): Biopesticides & biofertilizers 3(2+1)

Outcome:

- This course will impart knowledge to the students on the fundamental knowledge on classification, production, application and quality control of biopesticides
- Knowledge on classification, preparation method and quality control of biofertilizer.
- Practical exposure isolation, purification and quality control of biopesticides and mass multiplication of biofertilizers.

AT-314 Protected Cultivation (Elective) 2(1+1)

Outcome:

- Knowledge on design of green house for raising high value crops
- Enhancement of economic condition of the green house entrepreneurs on production of quality products
- Knowledge on Growing off-season, medicinal, aromatic and ornamental crops to boost the development demand of the society
- Self employment for educated youth in farm sector can be increased

PB-316 Commercial Plant Breeding 3(1+2)

Outcome:

- Exposure to the principles and techniques of quality seed production in various crops; their maintenance, release and notification system.
- Learning techniques in hybrid seed production using male-sterility in field crops.
- Knowledge on DUS testing and registration of varieties under PPV & FR Act

EE- 315 Agricultural Journalism 3(2+1) (Elective Course)

Outcomes

By the end of this course students will develop

- Knowledge and skill writing news/magazine articles
- Students will be able to analyze various aspects of agricultural journalism. conceptual knowledge about gathering various sources of agricultural information, organizing the materials and treatment of the stories.
- Students would also gain knowledge about the editorial mechanics of copy reading, proof reading, lay outing etc.

3rd Year 6th Semester

AG-321 Course Name: Rainfed Agriculture and Watershed Management 2(1+1)

Outcomes

- Students will develop working knowledge in managing soil and crops under rainfed condition.
- Students will be able to use technical skills develop their own skill for better management of crops and soil in different watersheds based on rainfall characteristics.
- Students will learn to coordinate with line departments in managing the crops under aberrant weather conditions and develop alternate crop plan.

AG-322 Course Name: Practical Crop Production (*Rabi* Crops) 2(0+2)

Outcomes:

- Students will gain the knowledge of selecting good quality seeds, manures, fertilizers, plant protection chemicals, farm machineries and irrigation management for different field crops in rainfed and irrigated farming.
- Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
- Students can recommend scientific based crop management practices for different crops under varying farming situations both for resource poor and resource rich farmers.

PB-327 Crop Improvement – II (*Rabi*) 2(1+1)

Outcome:

- Getting idea on centres of origin, distribution of species, wild relatives of various *rabi* crops.
- Exposure to various conventional and modern plant breeding methods for the improvemet of important *rabi* crops.
- Visit to seed production plots, AICRP plots of different field crops and getting a practical knowledge on hybrid development.

SC-328 Manures, Fertilizers and Soil Fertility Management 3(2+1)

Outcome:

• Students will understand the role of fertilizers and manures in supplying nutrients to plants so as to achieve high fertilizer use efficiency.

• They will have an overall idea on preparation of organic manures and composts which is needed for sustainable agriculture

• Evaluation soil fertility by using suitable methods.

• Analysis and recommendation some of the essential nutrients in soil and plants.

EN 324: Management of Beneficial Insects 2(1+1)

Outcome

- Students will able to know the basic knowledge regarding the biology and basic concepts of apiculture, sericulture and lac culture
- Students will know the techniques and tools of apiculture, sericulture and lac culture and the commercial aspects which will helpful to create employability.

PP-325 Diseases of Field & Horticultural Crops & their Management-II 3 (2+1)

Outcomes:

- Development of knowledge on diagnosing different diseases of field and horticultural crops based on the symptoms expressed in the field.
- Acquire the skill of collection and preservation of diseased specimens
- Development management strategies to tackle the diseases in *rabi* Season.

AE-325 Farm Management, Production and Resource Economics 2(1+1)

Outcomes

- Students will have a detailed understanding about inputs and outputs in agriculture, agricultural and natural resource management.
- Knowledge about combination of inputs/outputs in production process, how can they be adjusted for optimized resource use and better profits.
- Able to understand and formulate farm plans through various farm management and optimization skills.

EE-326 Entrepreneurship Development and Business Communication 2 (1+1)

Outcomes

By the end of this course students will be

- Understand theories of entrepreneurship and business development
- Be able to state, understand and evaluate the key factors needed to develop a successful business
- Describe the concepts of entrepreneurship, agri-preneurship, characteristics of entrepreneur, motivation and entrepreneurship and project management
- Gain knowledge and skills in project formulation, project report preparation and evaluation of projects
- Explain entrepreneurship development programme, government policies, schemes and incentives for promotion of entrepreneurship and social responsibility of business
- Develop the skills of an effective manager through simulated exercises on communication skills
- Get opportunities for agri-entrepreneurship and rural enterprise

AT-325 Protected Cultivation and Secondary Agriculture 2(1+1)

Outcome:

- To impart knowledge on design and construction of green house under controlled system and their maintenance
- It will enable students to understand the concepts on different engineering properties of food materials in application of Post harvest equipment
- A brief knowledge on equipments used for drying of agricultural produces
- Knowledge on Material handling equipments, their principle, working and selection

HT-326 Hi-tech. Horticulture 3(2+1)

Outcome:

- Modern nursery management and mechanisation on micro and protected cultivation techniques.
- Regarding GIS, DGPS, VRA and precision farming.
- Regarding microprapagation, EC and pH based fertilizer scheduling.
- To study about canopy management and high density planting for higher yield and economy.

HT-327: Landscaping 3(2+1)

Outcome:

- Students are able to identify different flowering and foliage trees, shrubs, annuals, pot pants used for different landscaping purposes like avenue plantation, hedge, edge, shrubbery, borders, beds etc.
- Different tools and implements used in landscape design are being identified by the students.
- As the students are physically visited different gardens and parks within the city they are able to distinguish different styles of garden

AG-323 Course Name: Water Management 3(2+1)

Outcomes

- Students will be acquainted with managing irrigation water in different crops for higher irrigation and field efficiency
- Students will be able to recommend suitable water saving technologies and irrigation methods with an aim to produce more crop per drop.
- Students can adopt scientific based irrigation scheduling in crops and cropping systems as part of their entrepreneurship with an approach on high-tech agriculture.

PB-328 Micro propagation Technologies 3(1+2)

Outcome:

- Knowledge and practical skills on different plant tissue culture techniques for crop improvement.
- Acquaintance to modern germplasm conservation approach.
- Entrepreneurship development through in-vitro production of secondary metabolites, like perfumery, pharmaceutical, botanical pesticide etc.

4th Year 7th Semester

RAWE-411 Rural Agricultural Work Experience 20(0+20)

Outcomes

By the end of this programme students will develop-

- Team work and build competency in understanding real life situations
- They can learn about management of different components, problem solving attitude.
- Develop art of creative thinking, time management, art of listening, positive use of feedback, observation power, managing conflicts, working of local institutions, working with other organizations etc.
- Students will acquaint with on-going extension and rural development programmes

4th Year 8th Semester

EL-421 PRODUCTION TECHNOLOGY FOR BIOAGENTS AND BIOFERTILIZER (0+10)

Outcome:

• Ability to understand laboratory equipments and conditions required for producing bioagents and biofertilizers on commercial scale.

• Acquaintance with the isolation and characterization of important microorganisms involved to control plant pests.

• Students will be able to isolate, purify and maintain the laboratory cultures of different biofertilizers and understand their role in soil fertility and crop production

EL – 422 Seed Production and Technology: 10(0+10)

Outcome:

- Adequate practical knowledge on seed production of both OPVs and Hybrid
- Provide knowledge regarding seed quality control and seed quality enhancement techniques.
- Visit to different seed processing units and seed production plots will enable students to involve themselves in both public and private sector seed enterprises.

EL-423 Mushroom Cultivation Technology 10(0+10)

Outcome:

- Basic knowledge on commercially grown mushroom
- Knowledge on Preparation of mother culture, spawn, substrate etc to develop entrepreneurship.
- Knowledge on economics and constraints of mushroom cultivation.

EL- 424 Soil, Plant, Water and Seed Testing 10(0+10)

Outcome:

• It may possible to predict nutritional disorders before the appearance of visual symptoms in the plant tissue and helpful to determine the effects of nutrient addition on the nutrient supply to the plant.

• Study the relationship between nutrient status of the plant and crop performance.

• By the end of these practical exercises, the students will be able to analyse various soil, plant, water and seed testing parameters which are important for agriculture.

EL-425: Commercial Horticulture (0+10)

Outcome:

- Outcome of this subject is use and its formulation and preparation of plant growth regulators
- Identification of nutrient deficiencies; Identification of physiological disorders;
- Harvest indices and maturity standards; Post-harvest handling and storage, marketing; Seed extraction

- Cost of cultivation for tropical and sub-tropical vegetable crops
- Project preparation for commercial cultivation of horticultural crops

EL-426: Floriculture and Landscaping (0+10)

Outcome:

- Students will be able to identify the commercial flower crop both for cut and loose flower purpose
- Students will be able to draw a sketch and apply the same practically in the field for layout and planning of a Garden.
- They can gain knowledge regarding different modern cultivation practices for growing flower and foliage crop.

EL-427 Agricultural Waste Management 10(0+10)

Outcome:

- Proper utilisation/management of agricultural wastes/byproducts/animal wastes
- Students can be self employed in making bio-composts, building materials, feed materials for animals etc.
- The students can be engaged as consultants/service providers for composting and water treatment plants
- Waste management helps to maintain a healthy environment of the region

EL 428 Organic Production Technology 10(0+10)

Outcomes:

- Students can adopt the practices related to organic farming can demonstrate the preparation of organic formulations in crop, cropping systems and farming systems along with the procedure used for organic certification.
- Students will develop their skill to prepare organic products and their application.
- Develop skills through practical orientation to organic production technologies.

ABM 6: Project Formulation, Evaluation and Monitoring 3(1+2)

Outcome

By the end of this course students will be-,

- Learn about tools and techniques for preparing and evaluating agribusiness projects.
- On other hand they can learn monitoring and evaluation as effective tools for enriching quality of interventions through their role in decision making and learning.
- They will also learn about various computer applications, IT and data base management techniques.

Master's Program in Agriculture

Programe Outcome:

- Enriched knowledge on recent developments in soil and crop management with respect to improvement and productivity, water and nutrient management and their interaction with integrated approach and the disease and pest management in integrated manner. The economic indices on package of practices develop and their transfer to farmers makes the students eligible for advanced studies at doctoral level.
- With specialized knowledge in a particular discipline of agricultural sciences, the students are worth to be absorbed in different fields of academics, research and extension under different organizations.
- Agriculture being the applied science, the skills as developed in the fields of crop improvement, crop production, crop protection and social science fields makes the students an asset for taking up the assignments both at organizational and field level.
- The knowledge, skill and expertise gained during the `study of course curriculum provides an opportunity to take up entrepreneurships holistically as a joint venture.

M.Sc. (Ag).Soil Science and agricultural Chemistry

Programme Specific Objective:

- Agricultural soil science studies the chemical, physical, biological, mineralogical composition of soils, soil hydrology, soil ecology, soil genesis, fertilizer use, soil erosion, radioisotopes, soil conservation, crop studies and biofertilizers as they relate to agriculture.
- M.Sc. (Ag) in Soil Science and Agricultural Chemistry program aims at providing knowledge about developing sustainable and manageable agricultural production strategies.
- The program concentrates on soil significance and importance as well as sustainable resources.
- The broad study and examination help students to understand the soil structure, water crisis, contamination, pollution and changing climatic conditions, soil preservation and to bring out research on the applied and fundamental aspects of the chemical, physical and biological properties of soil; manures and fertilizers and their communication with soil and plant; improvement and support of soil fertility maintenance at optimum level.

Programme Specific Outcomes:

- The M.Sc. (Ag) in Soil Science and Agricultural Chemistry program is intended to empower candidates to keep pace with recent developments in the concerned territories for present and future requirements.

- The course equips candidates with a strong establishment in soil development and sustainable agricultural production with proper practical exposure.
- An agricultural soil scientist may come up with a plan that can maximize production using sustainable methods and solutions.
- M.Sc.(Ag) in Soil Science and Agriculture Chemistry students have plenty of job offers, can get jobs in public and private organisations, environment consultancies, research establishments, commercial and industrial enterprises, higher education institutes as Soil Scientist, Professor, Soil Pedologist, Ecologist, Environmental Scientist, Geologist, Hydrologist, Scientific Laboratory Technician, Soil Conservation Technician and many more.

MAJOR COURSES

Soils 501 SOIL PHYSICS 2+1

Objective

To impart basic knowledge about soil physical properties and processes in relation to plant growth.

Outcome

Knowledge on soil physical properties and processes in relation to plant growth.

• Knowledge on soil water management with respect to crop growth.

• Techniques of analysing various physical properties of soil.

Soils 502 SOIL CHEMISTRY 2+1

Objective

To introduce the classical concepts of soil chemistry and to familiarize students with modern developments in chemistry of soils in relation to using soils as a medium for plant growth.

Outcome

• Theoritical informations about chemical properties and processes in relation to soil fertility and plant growth.

• Knowledge on chemistry of acid, salt affected and submerged soils and their management.

• Analysis of various chemical properties of soil, use of instruments.

Soils 503 SOIL, WATER AND AIR POLLUTION 2+1

Objective

To make the students aware of the problems of soil, water and air pollution associated with use of soils for crop production.

Outcome

• Knowledge on problem of soil, water and air pollution, their nature, estimation techniques for water quality, heavy metal etc.

• Knowledge on remediation of contaminated soils.

• Ability to conduct various qualitative and quantitative tests for waste samples collected from the locality

Soils 504 ANALYTICAL TECHNIQUES AND INSTRUMENTAL 0+2

METHODS IN SOIL AND PLANT ANALYSIS

Objective

To familiarize the students with commonly used instruments – their working, preparations of common analytical reagents for qualitative and quantitative analysis of both soil as well as plant samples.

Outcome

• Working knowledge on the principles of commonly used instruments in the laboratory

• Practical exposure on preparations of common analytical reagents for qualitative and quantitative analysis of both soil and plant samples, electro-chemical tritartion of clays, analysis of soil extraction and irrigation water.

• Ability to analyse different essential nutrients in plant and soil samples

Soils 505 PLANT BIOCHEMISTRY 2 + 1

Objective

Detailed information about biochemical and molecular basis of various plant processes and plant growth regulatory substances.

Outcome

• Theoritical experience on biochemical and molecular basis of various plant processes and plant growth regulatory substances.

• Extraction and estimation of carbohydrates and aminoacids, ascorbic acid

• techniques of isolation and purification of enzymes, estimation of DNA and RNA.

• Practical excellence in determining the important biomolecules through different analytical methods.

Soils 506 SOIL FERTILITY AND FERTILIZER USE 3+1

Objective

To impart knowledge about soil fertility and its control, and to understand the role of fertilizers and manures in supplying nutrients to plants so as to achieve high fertilizer use efficiency.

Outcome

• Knowledge on essential plant nutrients for soil fertility and its control, role of fertilizers and manures in supplying nutrients to plants .

• Evaluation soil fertility by using suitable methods and integrated nutrient management for fertilizer use efficiency.

• Analysis and recommendation some of the essential nutrients in soil and plants.

Soils 507 SOIL MINERALOGY, GENESIS, CLASSIFICATION 2+1

AND SURVEY

Objective

To acquaint students with basic structure of alumino-silicate minerals and genesis of clay minerals; soil genesis in terms of factors and processes of soil formation, and to enable students conduct soil survey and interpret soil survey reports in terms of land use planning.

Outcome

• Knowledge on basic structure of alumino-silicate minerals and genesis of clay minerals in soils.

• Knowledge on soil formation, classification of soil, soils of India and soil profile study.

• Appraisal on soil survey and land capability classification.

Soils 508 RADIOISOTOPES IN SOIL AND PLANT STUDIES 1+1

Objective

To train students in the use of radioisotopes in soil and plant research

Outcome

• Knowledge on atomic structure, radioactivity and radioisotopes

• Appraisal on various radiation monitoring instruments and application of isotopes in various studies on soil and plant

• Practical experience in handling radioactive substances and using them for various experiments relating to soil fertility and water management

Soils 509 SYSTEM APPROACHES IN SOIL AND CROP STUDIES 2+1

Objective

To train the students in concepts, methodology, technology and use of systems simulation in soil and crops studies.

Outcome

• Brief knowledge on system concept, simulation models: its design and analysis

• Basic information on application of simulation models in understanding system behaviour for soil, crop studies and decision support system.

• Practical experience on use of simulation model programmes under different soil, water, nutrient, climatic and cultural conditions.

Soils 510 MANAGEMENT OF PROBLEM SOILS AND WATERS 2+1

Objective

To educate students about basic concepts of problem soils and brackish water, and their management. Attention will be on management of problem soils and safe use of brackish water in relation to crop production.

Outcome

• Knowledge about distribution, characterization and management of problem soils.

• Understanding the quality and standards of irrigation water and management of brackish water for improved irrigation.

• Estimation techniques of cations and anions in problematic soils and ground water, characterization on base of soil reaction and recommendation.

Soils 511 INTRODUCTION TO AGROCHEMICALS 2+1

Objective

To give an overview of pesticides with reference to their classification, structure, mode of action, synthesis and formulations and pesticide residue analysis.

Outcome

• Appraisal of students about agrochemicals, their type and role in agriculture, management of agrochemicals for sustainable agriculture.

• Knowledge of pesticides with reference to their classification, structure, mode of action, synthesis and formulations and pesticide residue analysis.

• Testing of common pesticides and herbicides.

Soils 512 SOIL EROSION AND CONSERVATION 2+1

Objective

To enable students to understand various types of soil erosion and measures to be taken for controlling soil erosion to conserve soil and water.

Outcome

• Understanding soil, water and wind erosion to conserve soil and water.

• Knowledge on soil erodibility indices and management of watersheds for conservation.

• Computation of kinetic energy of falling rain drops and rainfall erosivity index.

Soils 513 SOIL BIOLOGY AND BIOCHEMISTRY 2+1

Objective

To teach students the basics of soil biology and biochemistry, including biogeochemical cycles, plant growth promoting rhizobacteria, microbial interactions in soil and other soil activities.

Outcome

• Understanding the basics of soil biology and biochemistry, including biogeochemical cycles, plant growth promoting rhizobacteria, microbial interactions in soil, plants and other soil activities.

• Knowledge on importance of biofertilizers and biodegradation of pesticides as an irreplaceable function of soil microorganisms.

• Determination of soil microbial population, soil microbial process and rhizosphere effect.

Soils 514 GEOMORPHOLOGY AND GEOCHEMISTRY 2+0

Objective

To impart knowledge about the landforms, physiography and morphology of the earth surface, and distribution and weathering elements in the earth crust.

Outcome

• A brief knowledge on geology and geochemistry, major and minor morphogenic and genetic landforms with special reference to India.

• Knowledge on methodology of geomorphology, weathering and erosion

• Learning the geochemistry of major and micronutrients and trace elements .

Soils 515 REMOTE SENSING AND GIS TECHNIQUES FOR SOIL, WATER AND CROP STUDIES 2+1

Objective

To impart knowledge about the basic concepts of remote sensing, aerial photographs and imageries, and their interpretation; application of remote sensing in general and with special reference to soil, plants and yield forecasting; to impart knowledge about geo-statistical techniques with special reference to krigging, and GIS and applications in agriculture.

Outcome

• Basic knowledge on fundamentals of remote sensing, different remote sensing equipment and their practical utility in relation to soil, water and crop studies.

• Hands-on skill on use of different remote sensing database and image processing softwares.

• Experience on handling of GIS software and GPS hardware for creating thematic maps.

Soils 516 LAND DEGRADATION AND RESTORATION 1+0

Objective

To impart knowledge related to various factors and processes of land degradation and their restoration techniques.

Outcome

• Knowledge on various factors and processes of land degradation

• Appraisal on different techniques of land restoration and conservation.

• Learning the methods of monitoring and mapping of land degradation

Soils 517 BIOFERTILIZER TECHNOLOGY AND USE 1+1

Objective

To familiarize the students and farmers with mass scale production of different agriculturally important microorganisms which are being used as biofertilizers for maintaining the soil and plant health for sustaining crop productivity and their importance in organic farming.

Outcome

• Knowledge on different groups of agriculturally important beneficial microorganisms to be used as biofertilizers

• Knowledge on microorganisms for recycling of organic waste, improving crop productivity , soil & plant health

• Learning the techniques for isolation of beneficial microorganisms to be used as biofertilizer and their production and quality control.

Soils 518 FERTILIZER TECHNOLOGY 1+0

Objective

To impart knowledge about how different fertilizers are manufactured using different kinds of raw materials and handling of fertilizers and manures.

Outcome

• Knowledge on manufacturing processes of fertilizers and their handling for maintenance of quality of the fertilizers as per fertilizer control order.

• Knowledge on Recent developments in secondary and micronutrient fertilizers

• Learning the modern techniques for production and use of slow and controlled release fertilizers, supergranules fertilizers and fertilizers for specific crops/situations.

MINOR COURSES

PP 503 PHYSIOLOGICAL AND MOLECULAR 2+1

RESPONSES OF PLANTS TO ABIOTIC STRESSES

Objective

To apprise the students regarding abiotic stress to plant and its molecular basis.

Outcome

• Knowledge on physiological and molecular responses to various abiotic stresses.

• Study of different physiological processes and molecular responses to stress.

• Measurement and screening of stress parameters and behaviour towards tolerance.

Agron 506 PRINCIPLES AND PRACTICES OF ORGANIC FARMING 2+1

Objective

To study the principles and practices of organic farming for sustainable crop production.

Outcome

• Students can adopt the practices related to organic farming can demonstrate the preparation of organic formulations in crop, cropping systems and farming systems along with the procedure used for organic certification.

• Students will develop their skill to prepare organic products and their application.

• Develop skills through practical orientation to organic production technologies.

PP 510 MINERAL NUTRITION 2+1

Objective

To impart knowledge about physiological and molecular aspects of carbon reduction cycle and nitrogen assimilation

Outcome

• Mechanism of nutrient availability near the root, nutrient uptake by root cells and its transportation.

• Molecular mechanism of ion uptake functions and regulations.

• Physiological and molecular mechanisms underlying differential nutrient efficiency in crop genotypes and toxicity.

SUPPORTIVE COURSES

STAT-510 EXPERIMENTAL DESIGNS 2+1

Objective

This course is meant for students of agricultural and animal sciences other than Statistics. Designing an experiment is an integrated component of research in almost all sciences. The students would be exposed to concepts of Design of Experiments so as to enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

Outcome

• It will enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

• The knowledge of design will significantly affect about pair-wise comparison of treatments.

• The inference about certain treatment from the pair-wise comparison will cost less with more output.

• Varietal development leads for job creation.

NON-CREDIT COMPULSORY COURSES

PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome

• Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.

• Identify keywords, synonyms and related terms in order to flexibly search information resources including: Internet, electronic library catalogs, and print materials

• Identify the range of information source types available (such as peer-reviewed journals, newspaper articles, books, reference sources, etc.), their distinguishing characteristics and intended audiences, in order to select those appropriate based on the information need.

• Identify the features and content of different research tools (such as databases, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 0+1

Objective

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).

Outcome

• Develop skills that will enable to produce clear and effective scientific and technical documents.

• Use visual items in effectively constructing meaning in communication situations.

• Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.

• Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1+0

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome

• Exposure to various types intellectual property rights.

• Idea on various acts and organization related to IPR.

• Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

• A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.

• Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.

• Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES 1+0

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcome

• By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.

• The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.

• Students will also be motivated towards practising and promoting ethics in

research and developmental endeavours.

PGS 506 DISASTER MANAGEMENT 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

• A brief knowledge on nature and effects of different natural disasters and their management

• Knowledge on different types of man-made disasters and their management

• Appraisal on different organizations involved in disaster management at national and global level

M.Sc. (Ag). Horticulture

Programme Specific Objective:

1) The objective is to equip the students to apply knowledge of various plant groups and their growth, development and reproduction specially with reference to Horticulture plants
2) To train the students and also sensitize them for research.

Programme Specific Outcome (PSO):

1) The students would also be able to explain production technology for local fruits, vegetables, spices, medicinal plants and plantation crops.
2) Advanced knowledge and skills necessary to function as a creative and professional practitioner, communicator, educator, or investigator in the field of horticulture.
3) Intellectual means of identifying and assessing the interactions among the many issues associated with horticulture and society at large.
4) Skills and intellectual means of contributing new knowledge to the profession of horticulture

Major Courses

Hort-501 - Horticultural Plant Propagation and Nursery Management (1+1)

Objective:

- The course is aimed to understanding the basic concept and physiology of different propagation method, tissue culture technique and nursery management of horticultural crops.

Outcome:

- To know about basic concept and principles of plant propagation
- To get a clear idea about nursery management, rootstock and scion relationship.
- To know about the different propagation methods of horticultural crops.

Hort-502 - Principles and Production of Vegetables Crops (2+1)

Objective:

- The objective of this course is to provide about various botanical classification of vegetable crops
- To know about the advance production technology of vegetable crops.

Outcome:

- To get idea about the nursery raising of different vegetable.

- Identification of different varieties of vegetable, pest, diseases and physiological disorders of vegetable crops.

Hort-503-Principles of Landscaping and Production Technology of Ornamental Plants (2+1)

Objective:

- The aim of this course is to provide insight into various about identification, production technology and processing of different Spices, Aromatic, Medicinal Crops and Landscape plants.

Outcome:

- Knowledge on floriculture and landscaping, gardening style and designs, bio-aesthetic planning, indoor gardening, packaging and marketing techniques of crops.
- This course will helpful to the student about preparation of bonsai and flower arrangement.
- Improving our knowledge about these crops through various field visits.

Hort-504 - Horticultural Biotechnology (1+1)

Objective:

- Understanding the principles, theoretical aspects and developing skills in biotechnology of horticultural crops.

Outcome:

- Student will know about the tissue culture techniques like micro propagation, somaclonal variation, Invitro mutagenesis, protoplast culture, somatic hybridization, micro grafting, genetic transformation technique,
- To get a brief idea about the production of bio-agent and bio-fertilizer, nutrient media, inoculation of explant, protoplast isolation

Hort-505 - Nutrition of Horticultural Crops 1+1

Objective:

- The sole objective is to get knowledge of nutrition of horticultural crops, techniques of diagnosis of mineral nutrient deficiency in fruits, vegetables, ornamental, plantation crops, techniques on root distribution in fruit crops

Outcome:

- This course helps to identifying the different symptoms of nutritional disorders and their diagnosis.
- It helps to get a clear idea about leaf sampling techniques, analysis of sample and root distribution pattern in fruit crops.
- It helps to understanding the effect of nutrition on growth, yield and quality of horticultural crops.

Hort-506 - Growth and Development of Horticultural Crops 2+1

Objective:

- The objective of this course is to impart knowledge about physiology, bio chemistry and morphogenesis of horticultural crops.
- To get a clear cut idea about growth regulator, synthesis, action and its effect on plant growth and development.

Outcome:

- Knowledge regarding growth dynamics, Bio-synthesis of growth regulators, inhibitor, application techniques of growth regulating substances.
- Idea about induction of parthenocarpic fruits and techniques of breaking of dormancy of seed.

Hort-507 - Principles and Production of Fruit Crops 2+1

Objective:

- This course is aimed at understanding the basic concepts of production technology on tropical, sub-tropical and minor fruit crops.
- To impart knowledge about unfruitfulness associated with internal and external factors of fruit crops.

Outcome:

- This course will helps for student to understand package and practices of fruit crops.
- Students will able to identify the different varieties of fruit crops.
- Student will understand about the special cultural methods such as training and pruning.
- Students will get a clear idea about the cost of cultivation of fruit crops.

Hort-508: Principles of Post- harvest Management and Processing of Horticultural Crops (2+1)

Objective:

- To get knowledge about nature, structure and composition of different horticultural crops.
- To study about the Maturity, harvesting, grading, packaging and other post harvest handling of perishable horticultural produces.
- To study about the different Post harvest treatments for improving the shelf life of horticultural produces.

Outcome:

- Student will understand the different post harvest technology.
- Students will get knowledge about the preparation of different products such as jam, jelly, tomato sauce and ketch up etc.

- Field visits to different storage units, factory and processing unit to improve their knowledge.

Hort-509 - Breeding of Vegetable and Ornamental Crops 2+1

Objective:

- The aim of this course is to know different breeding objectives and breeding methods in vegetable and ornamental crops.
- To know about the male sterility and self incompatibility problems regarding vegetable and ornamental crops.

Outcome:

- This course will helps for the student to know about the floral biology of vegetables and ornamental crops.
- Students will get knowledge about the different breeding methods followed in vegetable and ornamental crops.

Hort-510 Fruit and Plantation Crop Breeding 2+1

Objective:

- To impart comprehensive knowledge about the principles and practices of breeding of fruit and plantation crops.

Outcome:

- Students will know the different breeding method for fruit and plantation crops.
- Student will understand the reproductive biology of cultivars
- Knowledge about the markers used in fruit and plantation crops.

Hort-511 Medicinal, Aromatic, Plantation Crops and Spices Production (2+1)

Objective:

- To know about the difference between medicinal, Aromatic, Plantation crops and Spices.
- To impart basic knowledge about the production technology of these crops.

Outcome:

- This course helps for identifications of medicinal, aromatic, plantation and spice crops.
- Student will know about the package and practices of these crops.
- To develop effective ideas related to harvesting, processing and extraction of oils from medicinal, aromatic, plantation and spice crops.

Hort-512 Vegetable and Flower Seed Production Technology 2+1

Objective:

- To know about the vegetable and ornamental seed industry in India and World.
- This course imparts knowledge on hybrid seed production in vegetable and ornamental crops.

- To know about the role of climatic and adaphic factor on seed production.

Outcome:

- To develop idea about the production and maintenances of nucleus, breeder, foundation and certified seeds.
- Students will understand about the agro techniques followed in vegetable and ornamental crops for seed production.
- This course helps for the student to understand about IPR and WTO in relation to vegetable and ornamental crops seed production.

Hort-513: Laboratory Techniques and Research Methodology in Post-harvest Technology 2+1

Objective:

- To know about the different techniques for food analysis.
- To facilitate deeper understanding about the chromatography, spectrophotometer, NMR, flame photometer etc.

Outcome:

- To understand the role of instruments in food industry.
- Student will get a clear idea about the principle and method of food analysis instruments such as chromatography, spectrophotometer, NMR, ESR, amino acid analyzer etc.

Hort-514 Protected Cultivation of Vegetables 1+1

Objective:

- Understanding the principles, theoretical aspects and developing skills in protected cultivation of vegetables.

Outcome:

- Knowledge on protected cultivation of vegetables, Fertigation, cover specific technology for raising vegetables, soil less culture, study of various type of glass house is the outcome of this course.

Hort-515 Commercial Floriculture 1+1

Objective:

- The aim of this course is to provide insight into advances in production technology and post-harvest handling various ornamental crops, orchids, cacti and various foliage plants. Different types of culture, bio-fertilizers, growth regulators, growth retardant.
- To know about the national and international floriculture industry.

Outcome:

- Student will know about the production technology of flower crops.
- This course helps to know about the different flower products, extraction of oil and pigments.

- Student will understand the different post harvest management including precooking, grading, packaging and storage of flowers.

Hort-516 Orchard Management 1+1

Objective:

- This course is aimed at understanding the basic concepts Knowledge on orchard management, soil management practices, techniques of training and pruning.

Outcome:

- Students will know about different methods of layout, selection of plants and planting, different method of irrigation.
- Different soil management practices on growth and productivity of fruit crops.
- Ideas regarding pet and diseases control in fruit crops.

Minor Course

PBG 503 - PRINCIPLES OF PLANT BREEDING 2+1

Objectives:

- This Course is aimed at understanding the basic concepts of genetics,
- Helps students to develop their analytical, quantitative and problem solving skills from classical to molecular genetics.

Outcome:

- Floral biology in self and cross pollinated species, selfing and crossing techniques. Selection methods in segregating populations and evaluation of breeding material.
- Analysis of variance (ANOVA); Estimation of heritability and genetic advance;
- Maintenance of experimental records; Learning techniques in hybrid seed production using male-sterility in field crops.

PBG 511 BIOTECHNOLOGY FOR CROP IMPROVEMENT 2+1

Objectives:

- To impart knowledge and biotechnological tools in crop improvement.

Outcome:

- Requirements for plant tissue culture laboratory-Techniques in plant tissue culture - Media components and media preparation, Inoculation of explants; Callus induction and plant regeneration.

PL PATH 517 - POST HARVEST DISEASES 2+1

Objectives:

- To acquaint with post harvest diseases of agricultural produce and their ecofriendly management.

Outcome:

- Isolation characterization and maintenance of pathogens, role of different storage conditions on disease development, application of antagonists against pathogens *in vivo* and *in vitro* conditions.
- Comparative efficacy of different chemicals, fungicides, phyto extracts and bioagents.

ENT-507 - Biological control of crop pest and weeds 1 + 1

Objectives:

- To train the students with theory and practice of biological control, mass production techniques and field evaluation of various biological control agents like parasitoids, predators and various entomo pathogenic microorganisms.

Outcome:

- Identification of common natural enemies of crop pests (parasitoids, predators, microbes) and weed killers.
- Visits (only where logistically feasible) to bio-control laboratories to learn rearing and mass production of egg, egg-larval, larval, larval-pupal and pupal parasitoids, common predators, microbes and their laboratory hosts, phytophagous natural enemies of weeds

PP 503: Physiological and molecular responses of plants to abiotic stresses 2 + 1

Objectives:

- To apprise the students regarding abiotic stress to plant and its molecular basis.

Outcome:

- Student will understand about the response of plants to abiotic stresses and factors affecting plant productivity.
- Basic principles of a crop improvement programme under stress, Interactions between biotic and abiotic stresses

PP 504 - Hormonal regulation of plant growth and development 2+1

Objectives:

- To apprise the students about structure function of plant growth regulator on growth and development of plant.

Outcome:

- Knowledge regarding the different plant growth regulators.
- Students get idea about role of plant growth regulator which influence on plant growth development.

PP- 510 Mineral nutrition 2+1

Objectives:

- Impart knowledge about physiological and molecular aspects of carbon reduction cycle and nitrogen assimilation.

Outcome:

- Overview of essential mineral elements, kinetics of nutrient uptake by plants. Biological actions influencing nutrient availability near the root system

Supporting Subject

STAT- 510: EXPERIMENTAL DESIGNS 2+1

Objectives:

- This course give concepts of Design of Experiments so as to enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

Outcomes:

- The student will get idea about uniformity trial data analysis, formation of plots and blocks, Fairfield Smith Law.
- Analysis of data obtained from CRD, RBD, LSD; Analysis of factorial experiments without and with confounding; Analysis with missing data; Split plot and strip plot designs.

Non Credit course

PGS-501: LIBRARY AND INFORMATION SERVICES 0+1

Objectives:

- To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

- Student will know about library and its services.
- Role of libraries in education, research and technology transfer; Classification systems and organization of library

PGS-502: TECHNICAL WRITING AND COMMUNICATIONS SKILLS 0+1

Objectives:

- To equip the students/scholars with skills to write dissertations, research papers, etc

Outcome:

- Various forms of scientific writings- theses, technical papers, reviews, manuals, etc; Various parts of thesis and research communications

PGS-503 intellectual property and its management in agriculture 1+0

Objectives:

- The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

- Intellectual Property Right regime; TRIPs and various provisions in TRIPS Agreement; Intellectual Property and Intellectual Property Rights (IPR), benefits of securing IPRs

PGS-504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 1+0

Objectives:

- To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome:

- Safety measures while in Lab; Handling of chemical substances; Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; washing, drying and sterilization of glassware

PGS-505: Agricultural research, research ethics and rural development programmes 1+0

Objectives:

- To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of government.

Outcome:

- Need, scope, opportunities; Role in promoting food security, reducing poverty and protecting the environment

PGS-506: DISASTER MANAGEMENT 1+0

Objectives:

- To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome:

- Natural Disasters- Meaning and nature of natural disasters, their types and effects, Man Made Disaster, Disaster Management

M.Sc.(Ag) in Agronomy

Programme Specific Objectives:

1. To make the students understand the techniques on crop growth analysis, crop modeling, crop response production functions and sceinctific ways to manage different agronomic crops
2. To impart knowledge on recent developments in weed science, ecology, water management, nutrient management on itegration mode, practices of organic farming on system mode and resource conservation technologies.
3. To teach the students on aspects of agroforestry, agrometeorology, dryland farming and watershed management for better understanding of diffenet crop growig situations
4. To train the students on aspects of designing research trials, preparation of synopsis, their execution, data collection, tabulation, analysis and interpretation of result.

Programme Specific Outcomes (PSO):

- Student is able to understand scientific basis of crop production, how different factors affect its growth and development and how to manage the crops under varying soil-water-atmospheric conditions for higher productivity, profitability and sustainability
- Students get practical experience to raise different field crops in sole and intercropping systems with proper geometry and architecture by accommodating cereals, pulses, oilseeds, commercial crops, fodders and crops under agro-forestry
- Students learn the techniques to analyze the soil for its various physico-chemical properties, nutrient status, water related issues and thereby managing the crops for higher use efficiency under varying land and weed dynamic scenario
- Students develop the skill to use resources in dry land rain –fed agriculture following watershed, climate resilient and farming system approach for livelihood and sustainability
- Students develops knowledge **can conceptualize** on field research, its execution using appropriate statistical design, methodology to collect data on various biometric and yield related parameters following sampling techniques and use of statistical tools to analyze data and develops skill in writing a dissertation and gets trained to take up research at higher level of academics
- Students can demonstrate the techniques of transmitting the crop-based agro-advisory to farmers for adoption as extension scientist

MAJOR COUECES

MODERN CONCEPTS IN CROP PRODUCTION

COURSE NO- AGRON 501 **CREDIT hrs.-** 3+0

Objectives:

To make the students understand the techniques on crop growth analysis, crop modeling, crop response production functions , farming system modules and resource conservation technologies.

Outcomes:

1. Students can perform techniques and interpretate the principles involved in scientific crop production and situation based IFS modules and RCT.
2. Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
3. Students can apply crop production principles to establish cause and effective relationship with different agronomic traits

PRINCIPLES & PRACTICES OF SOIL FERTILITY AND NUTRIENT MANAGEMENT

COURSE No: AGRON 502 **CREDIT hrs. :** 2+1

Objectives :

To teach the students the principles and practices of soil fertility and productivity related factors techniques of preparation of organic based manures and technologies for increasing fertilizer use efficiencies.

Outcomes:

1. Students can analyse interpretate and recommend the nutrient requirement of crops through inorganic and organic sources.
2. Students can advise farmers the crop based dose and commercial requirement and suitable farm implements for crops under different land types.
3. Scope for agro-entrepreneurship.

PRINCIPLES AND PRACTICES OF WEED MANAGEMENT

COURSE No: AGRON 503 **CREDIT hrs. –** 2+1

Objectives:

To make the student understand weed biology and ecology, Allelopathy effects, different weed management approaches- their feasibility in crops and cropping systems.

Outcomes:

1. Students are enriched with recent developments in herbicide , their selectivity and mode of action, resistance development etc.

2. Students will develop knowledge to select crop specefic herbicides, their use, dose calculation and safe handling.
3. Students can know the critical crop weed competition period, possible phyto-toxicity and residual effects of herbicides in different crops under different crop agro-ecological systems.

PRINCIPLES AND PRACTICES OF WATER MANAGEMENT

COURSE No. : AGRON 504 **CREDIT hrs.-** 2+1

Objectives:

To make the students understand about water intake in soil, its storage, movement within the soil and its uptake by the plant through energy concept both in normal and poor quality of water.

Outcomes :

1. Students can recommend scientific based irrigation scheduling in crops and cropping systems keeping in view the water resource available with the farmers and adopting integrated water resource management approach both on station and on farm situations.
2. Students will be able to recommend suitable water saving technologies and irrigation methods with an aim to produce more crop per drop.
3. Students will be acquainted with managing irrigation water in different crops for higher irrigation and field efficiency

AGRONOMY OF MAJOR CEREALS AND PULSES

COURSE No.:-AGRON 505 **CREDIT hrs. :-2+1**

Objectives:

Students are told about the agronomic practices of major cereals and pulse crop with respect to soil, water nutrition and culture requirements.

Outcomes:

1. Student can recommend the crops and the varieties along with their package of practices towards higher productivity, profitability and sustainability. Keeping the quality and reducing the losses during processing.
2. Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
3. Application skills in raising and managing of cereals and pulses crops scientifically.

PRINCIPLES AND PRACTICES OF ORGANIC FARMING

COURSE No.:- AGRON 506 **CREDIT hrs. :-**2+1

Objectives:

Students are taught about the concept, scope and practices of organic farming along with the formulation of different organic products, their use both under normal cultivation and farming system mode.

Outcomes:

1. Students can adopt the practices related to organic farming can demonstrate the preparation of organic formulations in crop, cropping systems and farming systems along with the procedure used for organic certification.
2. Students will develop their skill to prepare organic products and their application.
3. Develop skills through practical orientation to organic production technologies.

FIELD EXPERIMENTS

COURSE No.:- AGRON 507 **CREDIT hrs. :-** 1+2

Objectives:

To train the students on formulation of research hypothesis, field experiments, its aims and objectives, execution techniques.

Outcomes:

1. Students can formulate research field experiments, can execute following suitable layout plan.
2. Analysis of research data using statistical software.
3. Opting a career as analyst.
4. Development of consultancy firms and project formulation.

AGRONOMY OF OILSEED, FIBRE AND SUGAR CROPS

COURSE No.:-AGRON 508 **CREDIT hrs. :-** 2+1

Objectives:

Students are told about the agronomic practices of major oilsedd, fibre and sugar crop with respect to soil, water nutrition and culture requirements

Outcomes:

1. Student can recommend the crops and the varieties along with their package of practices towards higher productivity, profitability and sustainability. Keeping the quality and reducing the losses during processing
2. Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
3. Application skills in raising and managing of fiber and sugar crops scientifically.

AGRONOMY OF FODDER AND FORAGE CROPS

COURSE No.: AGRON 50**9** **CREDIT hrs. –** 2+1

Objectives:

Students are told about the agronomic practices of major fodder and forage crop with respect to soil, water nutrition and culture requirements

Outcomes:

1. Student will gain knowledge about cultivation practices of fodder and forage crops and also they will gain practical experience in cultivating these crop in field practical classes.
2. Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
3. Application skills in raising and managing of fodder and forage crops scientifically.

DRYLAND FARMING AND WATERSHED MANAGEMENT

COURSE No.:-AGRON510 **CREDIT hrs. :-** 2+1

Objectives:

Students are taught about the dry land and rainfed farming, the constraints, analysis of rainfall data and the moisture conservation in different watersheds.

Outcomes:

1. students will develop working knowledge in managing soil and crops under dry land condition.
2. Students will be able to use technical skills develop their own skill for better management of crops and soil in different watersheds based on rainfall characteristics
3. Students will learn to coordinate with line deparments in managing the crops under aberrant weather conditions and develop alternate crop plan.

AGROMETEOROLOGY AND CROP WEATHER FORECASTING

COURSE No.:-AGRON 511 **CREDIT hrs. :-** 2+1

Objectives:

Students are taught about agro-meteorology, their parameters and their effects on crop growth and developments along with the measures to minimize different types of abiotic stresses.

Outcomes:

1. Student can recommend the crops and varieties suiting to the climatic conditions and suggest different measures to cope up the aberrant weather conditions during the crop growth

2. Students will be acquainted with the weather forecast system, and can help the farmers in adopting necessary measures suggested through agro advisory service.
3. Equipped with the knowledge of recording data on weather elements, calculation, tabulation, calculation and their relations vis-a-vis interpretation with crop growth

AGRONOMY OF MEDICINAL, AROMATIC AND UNDER- UTILIZED CROPS

COURSE No.:-AGRON 512 **CREDIT hrs. :-** 2+1

Objectives:

Students are told about the agronomic practices of major fodder and forage crop with respect to soil, water nutrition and culture requirements

Outcomes:

1. Student will gain knowledge about cultivation practices of medicinal, aromatic and underutilized field crops crops and also they will gain practical experience in cultivating these crop in field practical classes.
2. Students will get the benefit of imparting training to the farmers and farm women in their practical life after entering to the service at the state government and central government.
3. Application skills in raising and managing of medicinal,aromatic and under-utilized crops scientifically.

AGROSTOLOGY AND AGRO-FORESTRY

COURSE No.:-AGRON 513 CREDIT hrs. :-2+1

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Objectives:

Students are taught on grassland ecology, their importance, agroforestrry, their types in crop production technology in agroforestry and agrostology systems.

Outcomes:

1. Students will be able to know different agro forestry systems for varying agro ecological situations and their suitability with conventional agriculture.

2. At the end of session, students will be able to suggest different agroforestry based models in companion with field and horticultural crops and their management..

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3. Students can become a part of the team engaged in adoption agroforestry based solution to restore soil health through carbon seqestration and mitigating climate change impact.

CROPPING SYSTEMS AND SUSTAINABLE AGRICULTURE

COURSE No.:-AGRON 514 **CREDIT hrs. :-** 2+0

Objectives:

The students are taught on concepts and approaches of sustainability in cropping systems, types of disasters and their management with respect to crops.

Outcomes:

1. A student can formulate a cropping systems and recommend the packages in order to maintain the ecosystems and also guide the end users on different disastrous managements, policies and recommendation.
2. Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
3. Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling

MASTERS SEMINAR

COURSE No.:-AGRON 591 **CREDIT hrs. :-** 0+1

Objectives:

To develop capacity among the students to select reseaech topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

The students can select topic of research on emerging and important issues and present on powerpoint.

MASTERS RESEARCH

COURSE No.:-AGRON 599 **CREDIT hrs. :-** 0+20

Objectives:

To develop capacity among the students to select reseaech topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

The students can select topic of research on emerging and important issues and present on powerpoint.

MINOR COURCES

ANALYTICAL TECHNIQUES AND INSTRUMENTAL METHODS IN SOIL AND PLANT ANALYSIS

COURSE No.:- Soils 504 **CREDIT hrs. :-** 0+2

Objective

To familiarize the students with commonly used instruments – their working, preparations of common analytical reagents for qualitative and quantitative analysis of both soil as well as plant samples.

Outcomes

- Working knowledge on the principles of commonly used instruments in the laboratory
- Practical exposure on preparations of common analytical reagents for qualitative and quantitative analysis of both soil and plant samples, electro-chemical tritartion of clays, analysis of soil extraction and irrigation water.
- Ability to analyse different essential nutrients in plant and soil samples

REMOTE SENSING AND GIS TECHNIQUES FOR SOIL, WATER AND CROP STUDIES

COURSE No.:- Soils 515 **CREDIT hrs. :-** 2+1

Objectives

To impart knowledge about the basic concepts of remote sensing, aerial photographs and imageries, and their interpretation; application of remote sensing in general and with special reference to soil, plants and yield forecasting; to impart knowledge about geo-statistical techniques with special reference to krigging, and GIS and applications in agriculture.

Outcomes

- Basic knowledge on fundamentals of remote sensing, different remote sensing equipment and their practical utility in relation to soil, water and crop studies.
- Hands-on skill on use of different remote sensing database and image processing softwares.
- Experience on handling of GIS software and GPS hardware for creating thematic maps.

PHYSIOLOGICAL AND MOLECULAR RESPONSES OF PLANTS TO ABIOTIC STRESSES

COURSE No.:- PP 503 **CREDIT hrs. :-** 2+1

Objective

To apprise the students regarding abiotic stress to plant and its molecular basis.

Outcomes: 1. Knowledge on physiological and molecular responses to various abiotic stresses.

2. Study of different physiological processes and molecular responses to stress.

3. Measurement and screening of stress parameters and behaviour towards tolerance.

PHYSIOLOGY OF GROWTH AND YIELD AND MODELING

COURSE No.:- PP 505 **CREDIT hrs. :-** 1+1

Objective

To impart knowledge regarding crop growth analysis and different yield prediction models.

Outcomes: 1. Knowledge regarding crop growth analysis and different yield prediction models.

2. Plant sampling to estimate growth and yield parameters.

3. Computer applications in plant physiology, crop productivity and modeling.

SUPPORTING COURSES

STAT-510: EXPERIMENTAL DESIGNS

COURSE No.:- STAT-510 **CREDIT hrs. :-** 2+1

Objective

I. This course is meant for students of agricultural and animal sciences other than Statistics.
II. Designing an experiment is an integrated component of research in almost all sciences.
III. The students would be exposed to concepts of Design of Experiments.

Outcomes

I. It will enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.
II. The knowledge of design will significantly affect about pair-wise comparison of treatments.
III. The inference about certain treatment from the pair-wise comparison will cost less with more output.
IV. Varietal development leads for job creation.

DATA ANALYSIS USING STATISTICAL PACKAGES

COURSE No.:- STAT-513 **CREDIT hrs. :-** 2+1

Objective

I. This course is meant for exposing the students in the usage of various statistical packages for analysis of data.

II. It would provide the students an hands on experience in the analysis of their research data. This course is useful to all disciplines.

Outcomes

I. Analysis of research data using statistical software.

II. Opting a career as analyst.

III. Development of consultancy firms and project formulation.

NON-CREDIT COURSES

LIBRARY AND INFORMATION SERVICES

COURSE No.:- PGS 501 CREDIT hrs. :- 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcomes:

1. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
2. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.
3. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.

4. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

TECHNICAL WRITING AND COMMUNICATIONS SKILLS

COURSE No.:- PGS 502 CREDIT hrs. :- 0+1

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE

COURSE No.:- PGS 503 CREDIT hrs. :- (1+0)

Objective:

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcomes:

1) Exposure to various types intellectual property rights.
2) Idea on various acts and agreements related to IPR.
3) Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

BASIC CONCEPTS IN LABORATORY TECHNIQUES

COURSE No.:- PGS 504 CREDIT hrs. :- (0+1)

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcomes

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

(e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES

COURSE No.:- PGS 505 CREDIT hrs. :- (1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

DISASTER MANAGEMENT

COURSE No.:- PGS 506 CREDIT hrs. :- 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcomes

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

M. Sc. (Ag) in Plant Pathology

Programme Specific Objective:

1. To diagnose diseases of different crops and identify their possible cause.
2. To formulate management strategies for effective and eco-friendly disease management.
3. To develop new techniques for production of mushroom.
4. To identify and mass multiplication of beneficial micro-organisms for sustainable agriculture.
5. To emphasize on disease epidemiology and development of disease forecasting models.
6. To impart training on various methods, laboratory techniques and acquaint with instruments for in depth study of agriculturally important micro-organism.

Programme Specific Outcomes (PSO):

1. Diagnosis of disease to save heavy loss of crop.
2. Development of disease management strategies for effective, economic and eco-friendly management of the crop using IDM tools.
3. Modelling of different diseases for early detection.
4. Development of skills of mushroom cultivation for entrepreneurial activity.
5. Mass multiplication of beneficial micro-organism for sustainable agriculture which also provide entrepreneurship.
6. Encourages higher studies and helpful for solving plant protection issues at field level.

Pl. Path 501 MYCOLOGY 2+1

Objective

To study the nomenclature, classification and characters of fungi.

Out come

- Knowledge on importance of fungus in agriculture and human welfare.
- Knowledge on morphology, character and classification of fungus.
- Enable students to identify of plant pathogenic fungi which is helpful for job creation.

Pl Path 502 PLANT VIROLOGY 2+1

Objective

To acquaint with the structure, virus-vector relationship, biology and management of plant viruses.

OUTCOME

- Knowledge on structure, virus-vector relationship, biology of virus.
- Provide knowledge on management of plant viruses.
- Enable students to know method of raising antisera, serological tests.

- Knowledge on handling electron microscopy, ultratomy and PCR.

Pl Path 503 PLANT BACTERIOLOGY 2+1

Objective

To acquaint with plant pathogenic prokaryote and their structure, nutritional requirements, survival and dissemination.

OUTCOME

- Provide knowledge on plant pathogenic prokaryote (procarya) and their structure, nutritional requirements
- Student will know about survival and dissemination.
- Develop skills on Isolation, purification, identification and host inoculation and isolation techniques.
- Acquire knowledge about use of antibacterial chemicals/antibiotics.

Pl Path 504 PRINCIPLES OF PLANT PATHOLOGY 3+0

Objective

To introduce the subject of Plant Pathology, its concepts and principles.

OUTCOME

- Knowledge on strategies for management of plant diseases.
- Knowledge on disease cycle and role of environment on disease development.
- Student will know about pathogenesis.

PL PATH 505 PRINCIPLES OF PLANT DISEASE MANAGEMENT 2+1

0bjectives

To acquaint with different strategies for management of plant diseases.

Outcome

- Knowledge on different strategies of disease management will helpful for managing disease at field level.
- Student will know about different method of chemical application.
- Knowledge on sprayer and duster helpful to reduce apply accurate amount of chemicals in the field without any loss.

PL PATH 506 DISEASES OF FIELD AND MEDICINAL CROPS 2+1

Objective

To educate about the nature, prevalence, etiology, factors affecting disease development and control measures of field and medicinal crop diseases.

OUTCOME

- Understanding of nature, prevalence, etiology, factors affecting disease development.
- Knowledge on Symptoms and Management of field and medicinal crop diseases.
- Acquire the knowledge of collection and dry preservation of diseased specimens.

PL PATH 507 INSECT VECTORS OF PLANT VIRUSES AND OTHER PATHOGENS 1+1

Objective

To teach the students about the different groups of insects that vector plant pathogens, vector-plant pathogen interaction, management of vectors for controlling diseases.

OUTCOME

- Knowledge on different groups of insects that vector plant pathogens, vector-plant pathogen interaction.
- To acquire knowledge about management of vectors for controlling diseases.
- Development of skill for identification of common vectors of plant pathogens.

PL PATH 508 INTEGRATED DISEASE MANAGEMENT 2+1

Objective

To emphasize the importance and need of IDM in the management of diseases of important crops.

OUTCOME

- Knowledge on integrated disease management strategies of important crops.
- To acquaint the student about principles, concept, tools, limitations and implications of IDM.
- To acquire knowledge about application of various chemicals, biocontrol agents and cultural methods in integrated disease management.

PL PATH 509 MUSHROOM PRODUCTION TECHNOLOGY 2+1

Objective

To develop mushroom cultivation skills for entrepreneurial activity. Historical development of mushroom cultivation and present status of mushroom industry in India.

OUTCOME

- Basic knowledge on mushroom, structure, classification, life cycle and uses.
- Knowledge on Preparation of mother culture, spawn, substrate etc will helpful to generate income.
- Acquired information on composting of spent mushroom substrate.
- Development of ideas on suitable conditions for growing mushroom.
- Knowledge about economics and constraints of mushroom cultivation.

PL PATH 510 EPIDEMIOLOGY AND FORECASTING OF PLANT DISEASES 2+1

Objective

To acquaint with the principles of epidemiology and its application in disease forecasting.

Outcome

- Knowledge on principles of epidemiology and its application in disease forecasting.
- Measuring diseases, spore dispersal and trapping, weather recording.
- Knowledge on computerized data analysis, function fitting, model preparation and validation.

PL PATH 511 DISEASES OF FRUITS, PLANTATION AND ORNAMENTAL CROPS 2+1

Objective

To acquaint with diseases of fruits, plantation, ornamental plants and their management.

Outcome

- Knowledge on diseases of fruits, plantation, ornamental plants
- Knowledge on type of pathogen responsible, epidemiology and their management.
- Student will know about symptoms and host parasite relationship
- Knowledge about Collection and dry preservation of diseased specimens.

PL PATH 512 DISEASES OF VEGETABLE AND SPICE CROPS 2+1

Objective

To impart knowledge about symptoms, epidemiology of different diseases of vegetables and spices and their management.

Outcome

- Knowledge about symptoms different diseases of vegetables and spices
- Student will know about pathogen responsible for the disease and their management.
- Knowledge on host pathogen interaction of important diseases of vegetable and spice crops.

PL PATH 513 CHEMICALS IN PLANT DISEASE MANAGEMENT 2+1

Objective

To impart knowledge on the concepts, principles and judicious use of chemicals in plant disease management.

Outcome

- Knowledge on the concepts, principles and classification of different chemicals that is used for disease management.
- Familiarization with different formulation of different fungicides
- Student will know about different plant protection appliances
- Provides knowledge on various evaluation techniques, Persistence and economics.
- Knowledge on handling and storage as well as precautions to be taken while using fungicides.
- Student will know about various methods of application of fungicide

PL PATH 514 ECOLOGY OF SOIL-BORNE PLANT PATHOGENS 2+1

Objective

To provide knowledge on soil-plant disease relationship.

Outcome

- Knowledge on soil-plant disease relationship.
- Knowledge on Quantification of rhizosphere and rhizoplane microflora
- Student will know about isolation and identification of different biocontrol agents.
- Knowledge on potentiality of biocontrol agents against management of soil borne disease.

PL PATH 515 DISEASE RESISTANCE IN PLANTS 2+0

Objective

To acquaint with disease resistance mechanisms in plants.

Outcome

- Knowledge on disease resistance mechanisms in plants.
- Knowledge on identification of physiological races of pathogens.
- It will enable student to know about management of resistant gene for development of resistant varieties.

PL PATH 516 BIOLOGICAL CONTROL OF PLANT DISEASES 2+1

Objective

To study principles and application of ecofriendly and sustainable management strategies of plant diseases.

Outcome

- It will enable the students about Isolation, characterization and maintenance of antagonists .
- It will be helpful for students to know about different method of application of antagonists against pathogen in vitro and in vivo conditions.
- It will enable students to produce antagonists in commercial scale for empowering organic farming.
- Knowledge on quality control system will helpful to register new microbial pesticides.

PL PATH 517 POST HARVEST DISEASES 2+1

Objective

To acquaint with post-harvest diseases of agricultural produce and their ecofriendly management.

Outcome

- Knowledge on post-harvest diseases of agricultural produce and their ecofriendly management.
- Student will know about Comparative efficacy of different chemicals, phytoextracts and biocontrol agents.
- Student will know how to improve the shelf life of agricultural produce.
- Knowledge of Codex Alimentarious for each product and commodity will helpful for export of produce.
- Application and monitoring of health hazard due to toxin produce by fungi.

SUPPORTING COURSES

PL PATH 518 DETECTION AND DIAGNOSIS OF PLANT DISEASES 0+2

Objective

To impart training on various methods/techniques/instruments used in the study of plant diseases/pathogens.

Outcome

- Acquintance with different laboratory instruments and basic lab techniques.
- Knowledge on preservation of plant pathogens and disease specimens.
- Knowledge on disease diagnosis using serological and molecular techniques.
- Provide knowledge on various methods to evaluate fungicide, bactericide etc.
- Student will know about layout, field experiments, data collection and preparation of references.

PL PATH 519 SEED HEALTH TECHNOLOGY 2+1

Objective

To acquaint with seed-borne diseases, their nature, detection, transmission, epidemiology, impacts/loses and management.

Outcome

- Knowledge on Morphology and anatomy of seed.
- Student will know about disease development in seed, seed borne pathogens and factors influencing their transmission.
- Provide knowledge on forecasting of epidemics through seed borne infection.
- Knowledge on different aspects of seed certifications.

- Development of techniques for seed testing.

PL PATH 520 PLANT QUARANTINE 2+0

Objective

To acquaint the learners about the principles and the role of Plant Quarantine for containment of exotic pests and diseases, international and domestic plant quarantine regulations and set-up.

Outcome

- Knowledge on rules and regulations of quarantine and safety measures to be taken during movement of agricultural products.
- Knowledge on invasive alien pest and diseases and damage cause by them.
- Provided information regarding good laboratory practices for pesticide laboratories and pesticide industry.
- Symptomatic diagnosis and other techniques to detect pest/pathogen infestations.
- Learned techniques to disinfest the infected material.

SST-507 SEED QUALITY TESTING 3(2+1)

Objective

To provide a comprehensive knowledge on all aspects of seed quality evaluation and their relevance to crop performance.

Outcome

- Knowledge on Seed structure and quality will provide basic idea to students.
- Seed testing will helpful to get test quality seed for farmers.
- It will enable the students to know about the health of seed and management can be taken accordingly.

STAT-510 EXPERIMENTAL DESIGNS 2+1

Objective

IV. This course is meant for students of agricultural and animal sciences other than Statistics.
V. Designing an experiment is an integrated component of research in almost all sciences.
VI. The students would be exposed to concepts of Design of Experiments.

Outcome

V. It will enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

VI. The knowledge of design will significantly affect about pair-wise comparison of treatments.

VII. The inference about certain treatment from the pair-wise comparison will cost less with more output.

VIII. Varietal development leads for job creation.

EN-507 Biological Control of crop pests and weeds 2(1+1)

Objective

To train the students with theory and practice of biological control, mass production techniques and field evaluation of various biological control agents like parasitoids, predators and various entomopathogenic microorganisms.

Outcome:

- Students will know the importance and basic knowledge of biocontrol
- Students will be trained with mass production techniques and field evaluation of different bioagents.
- Knowledge on identification of common natural enemies of crop pests (parasitoids, predators, microbes) and weed killers, field collection of parasitoids and predators. Hands-on training in culturing, identification of common insect pathogens

EN- 511 Pests of Field Crop 2(1+1)

Objective

To familiarize the students about nature of damage and seasonal incidence of insect pests that cause loss to major field crops and their effective management by different methods.

Outcome

- Students will able identify the different harmful insect pests of different field crops and estimation of infestation and losses in different crops
- Students will know about the integrated management tools and techniques to manage the insect pests

EN-513 Storage Entomology 2(1+1)

Objective: To focus on requirement and importance of grain and grain storage, to understand the role of stored grain pests and to acquaint with various stored grain pest management techniques for avoiding losses in storage.

Outcome

- Students will be familiarized with the stored grains/seed insect pests and nature of damage caused by them; detection of insect infestation in stored food grains;
- Estimation of losses in stored food grains; determination of moisture content in stored food grains; familiarization of storage structures, demonstration of preventive and curative measures

PGS 501 LIBRARY AND INFORMATION SERVICES 1(0+1)

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

5. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
6. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.
7. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.
8. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.

- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 (e-Course) INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1(1+0)

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

1. Exposure to various types intellectual property rights.
2. Idea on various acts and organization related to IPR.
3. Knowledge on protection of plant varieties under UPOV and PPV & FR Act of India. Plant breeders rights, and Farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 1(0+1)

Objective – To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome:

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 (e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMS 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.

- Students will also be motivated towards 60racticing and promoting ethics in research and developmental endeavours.

PGS 506 DISASTER MANAGEMENT 1(1+0)

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

1. A brief knowledge on nature and effects of different natural disasters and their management
2. Knowledge on different types of man-made disasters and their management
3. Appraisal on different organizations involved in disaster management at national and global level

Pl Path 591 Master's seminar 1(1+0)

Objective:

To develop capacity among the student to select research topic on important issue, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the question.

Outcome:

The student can select the topic of research on emerging and important issues and present on power point.

Pl Path-599 Master's Research 20(0+20)

Objective

To expose the student on research methology, selection of researchable issue, preparation of synopsis and execution of program following suitable experimental design.

Outcome:

- Students can select a research topic, prepare synopsis and execute the program as per suitable design.

- Student will undertake research *in vitro* as well as *in vivo* and interpret the findings after proper analysis.
- Student can publish research paper in good journals.

M. Sc. (Ag) in Plant Breeding and Genetics

Programme Objectives:

1) Imparting knowledge on the fundamental aspects of genetics, plant breeding and their applications in crop improvement.
2) Knowledge on basic plant biotechnological methods *viz.*, tissue culture, transgenics and marker assisted breeding
3) Imparting knowledge on the use of genetic resources for developing suitable crop varieties to face the changing agro-climatic situations
4) Inculcate research ethics, methodology and execution capability among the students to take up the responsibility in the field of Plant Breeding as a Researcher
5) To develop practical knowledge and skill among the students in order to make them the future entrepreneur in seed industry

Programme Specific Outcomes:

1) Enhancing fundamental knowledge and developing problem-solving skills pertaining to classical genetics, cytogenetics, plant breeding, biometrical genetics and molecular genetics.
2) Knowledge on biotechnological and other modern technologies used for crop improvement makes the students eligible for advanced studies at doctoral level.
3) With specialized knowledge in genetics and plant breeding, the students are worth to be absorbed in the fields of academics and research under different organizations dealing with crop improvement.
4) With the practical knowledge, skill and expertise of various crop improvement procedures, students can be the future entrepreneur in the field of tissue culture, seed industry etc.

***PBG 501: PRINCIPLES OF GENETICS (2+1)**

Objective:

The course is aimed at understanding the basic concept of genetics and helping students to develop their analytical, quantitative and problem solving skills from classical to molecular genetics.

Outcome:

- Knowledge on the basic principles of heredity and variation.

- Understanding on genomics and proteomics, mutation and gene expression.
- Development of analytical, quantitative and problem solving skills from classical to molecular genetics.
- Idea on DNA extraction and PCR amplification

***PBG 502: PRINCIPLES OF CYTOGENETICS (2+1)**

Objective:

The objective of this course is to provide insight into structure and function of chromosome, chromosome mapping, polyploidy and cytogenetics aspects of crop evolution.

Outcome:

- Knowledge on structure and functions of chromosomes, chromosome mapping
- Understanding the concepts of chromosomal aberrations and their application in crop breeding.
- Practical idea on fixation, dehydration, embedding, staining and observation of cell division.

***PBG 503: PRINCIPLES OF PLANT BREEDING (2+1)**

Objective:

The objective of this course is to impart theoretical knowledge and practical skills about various conventional and modern breeding methods for crop improvements.

Outcome:

- Understanding various modes of reproduction in crop plants and their genetic consequences.
- Idea on various breeding methods followed for development of superior cultivars.
- Practical knowledge on emasculation and hybridization techniques in both self & cross pollinated crops for development of hybrids.

***PBG 504: PRINCIPLES OF QUANTITATIVE GENETICS (2+1)**

Objective:

The objective of this course is to impart theoretical knowledge and computational skills regarding various biometrical methods used in plant breeding experiments to analyse and interpret quantitative data.

Outcome:

- Theoretical knowledge on various biometrical methods and tools.
- Use of various mating designs in field experiments.
- Development of analytical and problem solving skills on plant breeding experiments.

***PBG 505: CELL BIOLOGY AND MOLECULAR GENETICS (2+1)**

Objective:

The objective of this course is to impart knowledge in theory and practice about cell structure, organelles and molecules like proteins and nucleic acids.

Outcome:

- Knowledge on theory and practice about cell organelles and their functions, molecules like proteins and nucleic acids.
- Exposure to the concept of gene expression and their regulation in prokaryotes and eukaryotes
- Understanding of cell signalling.
- Quantitative estimation of DNA, RNA and protein in an organism

PBG 506: HETEROSIS BREEDING (1+1)

Objective:

The course is aimed at understanding the mechanisms of heterosis and its exploitation for yield improvement through conventional and biotechnological approaches.

Outcome:

- Understanding the mechanisms of heterosis and its exploitation for yield improvement.
- Use of male sterility and self-incompatibility in hybrid seed production.
- Exposure to 3-line, 2-line and 1-line system of hybrid seed production and development and maintenance of parental lines- A, B and R lines.
- Idea on commercial exploitation of heterosis.

PBG 507: GENE REGULATION AND EXPRESSION (2+0)

Objective:

Knowledge on recent advances in the phenomenon of gene regulation and mechanisms by which plants and microbes express through different traits and how these are modified during different stages.

Outcome:

- Idea on regulation of gene expression in both prokaryotes and eukaryotes.
- Knowledge on recent advances in the phenomenon of gene regulation and mechanisms,
- Insight into transgene expression and gene silencing mechanisms.

PBG 508: POPULATION GENETICS (1+1)

Objective:

The objective of this course is to impart knowledge on structure, properties and breeding values of different population.

Outcome:

- Knowledge on structure, properties and breeding values of different, population.
- Understanding the Hardy-Weinberg law - Proof – Applications
- Genetics exercise on probability, measurement of genotype and environment effect on phenotype

PBG 509: MUTAGENESIS AND MUTATION BREEDING (2+1)

Objective:

The objective of this course is to impart knowledge about mutation, mutagen, general principles of radiation and various tests/methods for detection of radiation effects on the living cells, genetic risks involved and perspective of advances made.

Outcome:

- Knowledge on general principles of radiation and various methods for detection, handling of mutagens, radiation hazards.
- Understanding the use of mutagens in creating oligogenic and polygenic variations – Case studies
- Exposure to the use of mutation for crop improvement.

PBG 510: GERMPLASM COLLECTION, EXCHANGE AND QUARANTINE (2+1)

Objective:

To provide information about collection, germplasm exchange, quarantine, maintenance and use of plant genetic resources including genetically modified plants.

Outcome:

- Knowledge on collection, germplasm exchange, quarantine, maintenance and use of plant genetic resources including genetically modified plants.
- Understanding the techniques for the detection of insects, mites, nematodes, bacteria, weeds, pathogens and viruses on seed and planting materials
- Exposure to the concepts of biosafety, risk analysis and consequences of spread of GE crops on the environment

PBG 511: BIOTECHNOLOGY FOR CROP IMPROVEMENT (2+1)

Objective:

The objective of this course is to impart knowledge and practical skills to use biotechnological tools in crop improvement.

Outcome:

- Getting acquainted with various types micro-propagation methods and their application in crop improvement.

- Idea on recombinant DNA technology and various methods of gene transfer.
- Exposure to the field of of transgenics and their application in crop improvement.
- Knowledge on various types of marker systems and their application in in crop improvement.

PBG 512: BREEDING FOR BIOTIC AND ABIOTIC STRESS RESISTANCE (2+1)

Objective:

To apprise about various abiotic and biotic stresses influencing crop yield, mechanisms and genetics of resistance and methods to breed stress resistance varieties

Outcome:

- Mechanisms and genetics of abiotic and biotic stresses resistance
- Exposure to various methods to breed stress resistant varieties.
- Phenotypic screening techniques, evaluating the available populations, use of MAS procedures, to combat biotic and abiotic stresses.

PBG 513: BREEDING CEREALS, FORAGES AND SUGARCANE (2+1)

Objective:

To provide insight into recent advances in improvement of cereals and forage crops and sugarcane using conventional and modern biotechnological approaches.

Outcome:

- Idea on evolution; Genetics – cytogenetics and genome relationship of important cereals, forages and sugarcane
- Knowledge on recent advances in improvement of cereals and forage crops and sugarcane using conventional and modern biotechnological approaches.
- Practical exposure to emasculation - pollination techniques, Standard Evaluation System

PBG 514: BREEDING LEGUMES, OILSEEDS & FIBRE CROPS (2+1)

Objective:

To provide insight into recent advances in improvement of legumes, oilseeds and fibre crops using conventional and modern biotechnological approaches.

Outcome:

- Idea on evolution, genetics – cytogenetics and genome relationship of important cereals, forages and sugarcane
- Knowledge on recent advances in improvement of legumes, oilseeds and fibre crops using conventional and modern biotechnological approaches.

- Practical exposure to emasculation – pollination techniques approaches,
- Idea on mechanisim of resistance, evaluation techniques of germplasm

PBG 515: BREEDING FOR QUALITY TRAITS (2+1)

Objective:

To provide insight into recent advances in improvement of quality traits in cereals, millets, legumes, oilseeds and forage crops and for physiological efficiency using conventional and modern biotechnological approaches.

Outcome:

- Exposure to developmental biochemistry and genetics of carbohydrates, proteins, fats, vitamins, amino acids and anti-nutritional factors -
- Knowledge on quality improvement in important crops using conventional and modern biotechnological approaches
- Use of tissue culture for improving physiological effeciency, grain quality.

PBG 516: MAINTENANCE BREEDING AND CONCEPTS OF VARIETY RELEASE AND SEED PRODUCTION (1+1)

Objective:

To apprise the students about the variety deterioration and steps to maintain the purity of varieties and hybrids and principles of seed production in self and cross pollinated crops.

Outcome:

- Exposure to the techniques for maintaining the purity of varieties & hybrids,
- Idea on variety testing, release and notification systems in India and abroad.
- Knowledge on principles of seed production in self & cross pollinated crops.
- Idea on DUS testing- DUS Descriptors for major crops;

PBG 517: DATA BASE MANAGEMENT, EVALUATION AND UTILIZATION OF PGR (2+1)

Objective:

To provide information about germplasm data base management using modern tools and softwares, basics of computer and operating systems, Statistical techniques, evaluation procedure and experimental protocols, characterization of germplasm; molecular markers **Outcome:**

- Idea on germplasm data base management using modern tools and softwares,
- Exposure to basics of computer and operating systems, Statistical techniques, Evaluation procedure and experimental protocols,
- Knowledge on techniques of germplasm characterization and use of Molecular markers in characterization.

PBG- 591: Maters seminar 1(0+1)

Objectives:

To develop capacity among the students to select reseaech topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

The students can select topic of research on emerging and important issues and present on powerpoint.

PBG- 599: Maters research 20(0+20)

Objectives:

To expose the students on research methodology, selection of researchable issues, preparation of synopsis and execution of programme following suitable experiment design

Outcomes:

Students can select a research topic, prepare synopsis and execute the programme as per suitable design.

PP 503: PHYSIOLOGICAL AND MOLECULAR RESPONSES OF PLANTS TO ABIOTIC STRESSES 3(2+1)

Objective

To apprise the students regarding abiotic stress to plant and its molecular basis.

Outcome: 1. Knowledge on physiological and molecular responses to various abiotic stresses.

2. Study of different physiological processes and molecular responses to stress.

3. Measurement and screening of stress parameters and behaviour towards tolerance.

STAT-510: EXPERIMENTAL DESIGNS 2+1

Objective

VII. This course is meant for students of agricultural and animal sciences other than Statistics.

VIII. Designing an experiment is an integrated component of research in almost all sciences.

IX. The students would be exposed to concepts of Design of Experiments.

Outcome

IX. It will enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

X. The knowledge of design will significantly affect about pair-wise comparison of treatments.

XI. The inference about certain treatment from the pair-wise comparison will cost less with more output.

XII. Varietal development leads for job creation.

STAT-513(2+1): DATA ANALYSIS USING STATISTICAL PACKAGES

Objective

III. This course is meant for exposing the students in the usage of various statistical packages for analysis of data.

IV. It would provide the students an hands on experience in the analysis of their research data. This course is useful to all disciplines.

Outcome

IV. Analysis of research data using statistical software.

V. Opting a career as analyst.

VI. Development of consultancy firms and project formulation.

PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

- Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
- Identify keywords, synonyms and related terms in order to flexibly search information resources including: Internet, electronic library catalogs, and print materials
- Identify the range of information source types available (such as peer-reviewed journals, newspaper articles, books, reference sources, etc.), their distinguishing characteristics and intended audiences, in order to select those appropriate based on the information need.
- Identify the features and content of different research tools (such as databases, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

1) Develop skills that will enable to produce clear and effective scientific and technical documents.
2) Use visual items in effectively constructing meaning in communication situations.
3) Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
4) Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1(1+0)

Objective:

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

4) Exposure to various types intellectual property rights.
5) Idea on various acts and agreements related to IPR.
6) Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.

- Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 (e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

PGS 506 DISASTER MANAGEMENT 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

M. Sc. (Ag) in Agricultural Extension and Communication

Program Specific Objective-

This course is intended to prepare the students for future role in advisory services, agricultural sales, agricultural media, agri-tech companies, consultancy and education delivery as well as providing opportunities for continuous professional development in areas of knowledge transfer with farmers. Also, to develop scientific and research minded human resource, who will face new challenges of using information communication and technologies in agricultural development, while working in the Department of Agriculture, Krishi Vigyan Kendra, NGOs and SAUs in India.

Program Specific Outcome (PSO)-

- Develop fundamental understanding of extension principles and their application to agricultural resource and rural related issues
- Develop appropriate level of problem identification and conceptualization skills to focus on realistic and relevant research problems.
- Capability to integrate theory, technical information and appropriate methods in effectively analyzing and solving agricultural and rural related problems
- Apply appropriate level of communication skills to effectively disseminate research and technical information, including practical implications of research analyses
- Demonstrate an ability to conduct independent research
- Develop competencies in analysis of the context of agricultural change, design and development of appropriate advisory strategies to support agricultural development

Ext 501* DEVELOPMENT PERSPECTIVES OF EXTENSION EDUCATION 1+1

Objectives

The course is intended to orient the students with the concept of extension education and its importance in Agriculture development and also to expose the students with various rural development programmes aimed at poverty alleviation and to increase employment opportunities and their analysis.

Outcomes

By the end of this course students can be able to understand-

- Concept of extension education and its importance in Agriculture development,
- On going Rural development programmes,
- New innovations being brought into the Agricultural extension in India.

- Poverty alleviation programmes
- Current approaches in extension (ATIC, KCC, NAIP)

Ext 502*. DEVELOPMENT COMMUNICATION AND INFORMATION MANAGEMENT 2+1

Objectives:

In this course, students will learn about the concept, meaning and process of communication and various methods and modern media of communication. Besides, the students will also learn the information management and journalistic writing of various information materials and also study their readability.

Outcome

- Understand the concept, meaning and process of communication, modern media of communication, information management and journalistic writing of various information.
- They will be able to write news for farm news paper/magazines/ articles
- Preparing and delivering effective speech.
- Handling of communication and recording equipments.
- They can learn about various computer applications, modern communication media and its applications

Ext 503* DIFFUSION AND ADOPTION OF INNOVATIONS 2+1

Objectives

The students will learn how the agricultural innovations spread among the farmers in the society by getting into the insights of diffusion concept and adoption process, stages of adoption and innovation decision process, adopter categories and their characteristics, opinion leaders and their characteristics, attributes of innovations, and factors influencing adoption. In addition, the students would be learning various concepts related to diffusion and adoption of innovations.

Outcome

By the end of this course students will be able to learn about-

- Agricultural innovations, its diffusion and adoption and innovation decision process
- Attributes of current farm technologies,
- Techniques to identify opinion leaders and can develop decision making capacity

Ext 504* RESEARCH METHODS IN BEHAVIOURAL SCIENCE 2+1

Objectives

This course is designed with a view to provide knowledge and skills in methods of behavioural sciences research and student will learn the appropriate statistics for data analysis.

Outcome

By the end of this course students will be able to

- Get better understanding, knowledge and skills in methods of behavioural science research.

- Learn about various statistical packages for social sciences.
- Selection and formulation of research problem and research articles
- Learn about presentation of reports, report writing, thesis writing and scientific article writing.

Ext 505* e- EXTENSION 2+1

Objectives

Students will gain knowledge and skills in understanding the concepts of Information and communication technologies and how these ICT tools can be used for Agricultural Extension. Besides, he studies various ICT projects which are successful in delivering the services to the clientele fulfilling the objective of Transfer of Technology i.e. Reaching the unreached.

Outcome

- Students will develop skills in agricultural content analysis of ICT projects,
- Handling of ICT tools
- E-learning approaches
- Creation of extension blogs.

Ext 506* ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT IN EXTENSION 2+1

Objective

The first part of the course is intended to provide overall picture of planning and development of enterprises for extending sustainable livelihoods for rural people. The second part of the course is structured to help the students to gain knowledge and skills in different concepts and techniques of management in extension organizations

Outcome

By the end of this course students will be-

- Motivate for entrepreneurial career and it will make them capable of perceiving successful opportunities for enterprises,
- Motivate to start their own enterprise and approach various institutions for financing, helps in develop entrepreneurial project & their successful management.
- Able to utilize the available resources for different entrepreneurial activities.
- Able to learn about different management approaches, decision making and organization control mechanisms

Ext 507* HUMAN RESOURCE DEVELOPMENT (HRD) 2+1

Objective

To orient the students about key concepts importance, scope & conceptual frame work, growth & development of Human Resource Development, Subsystems of Human Resource Development for extension organization and process of HRD.

Outcome

On completion of this course, the students will be able

- To develop the understanding of the concept of human resource management & its relevance in organization,
- To develop necessary skill set for application of various HR issues,
- To analyse the strategic issues and strategies required to select and develop manpower resources, to integrate the knowledge of HR concepts to take correct business decision.
- To prepare themselves for better career planning
- Students will be able to develop counseling and mentoring capability

Ext 508 VISUAL COMMUNICATION 2+1

Objective

This course is intended to give a clear perspective about the importance of visuals and graphics in communication. The course starts with the delineating about the characteristics of visuals and graphics followed by its main functions, theories of visual perception and its classification and selection. Further, the course deals with the designing the message, graphic formats and devices and presentation of data.

Outcomes

By the end of this course students will be able to

- Gain knowledge on importance of visuals and graphics in communication.
- Understand visual perception and classification, designing message for visuals, graphic formats and devices
- Understand, prepare and present the scientific data effectively by using low cost visuals.
- The course also exposes the students to various Digitized video material in multimedia and also enable to design visuals for print, TV and know-how about scanning of visuals.

Ext 509 PARTICIPATORY METHODS FOR TECHNOLOGY DEVELOPMENT AND TRANSFER 1+1

Objective

This course is intended to orient the students with the key concepts, principles process of different participatory approaches for technology development and transfer and also to expose the students with various participatory tools and techniques like space related, time related, relation oriented

methods. Besides the students will be learning the preparation of action plans participatory monitoring and evaluation.

Outcomes

By the end of this course students will-

- Learn about key concepts, principles, process of different participatory approaches for technology development and transfer
- They will learn about various participatory tools and techniques, participatory monitoring and evaluation.
- They can learn simulated exercises on space, time, flow & decision related methods.

Ext 510 GENDER SENSITIZATION FOR DEVELOPMENT 1+1

Objective

In this course the students will learn about an overview of the concept of gender and gender balance on development and develop skills of identifying gender roles, rights, responsibilities and relationships on development. Besides the students will also learn the attitudinal change to internalize gender equity concerns as fundamental human rights and also enhance the capability for identifying and analyzing gender issues in agriculture and allied sectors.

Outcomes

- Develop a better understanding on concept of gender and gender balance, gender analysis tools and techniques
- Know about various policies and developmental programmes for women and how gender mainstreaming and budgeting will help them to know its importance in agriculture and allied sectors
- Familiarize with various women empowerment approaches like forming SHGs , PPP for economic empowerment and various women entrepreneurship approaches.

Ext 511 PERSPECTIVES OF DISTANCE EDUCATION 1+1

Objective

The course is intended to orient the students with the concept of Distance Education, Characteristics of Distance Education, Evolution, Methods of Distance Education, Different Approaches in Planning Distance Education, Educational Technology in Distance Education, Management of Resources for distance education, Strategies for maximizing the reach and programme evaluation and quality assessment.

Outcomes

On the completion of this course students will learn the

- Concept of distance education, characteristics, evolution methods, approaches, educational technologies

- Strategies for maximizing the reach and programme evaluation and quality assessment. Curriculum development and evaluation and assessment
- Students will also learn about how using distance education system they can develop course for farming community

Ext 512 MARKET LED EXTENSION MANAGEMENT 2+0

. **Objective**

The student will learn the significance of post harvest management& value addition in present market environment and the challenges and future strategy for market led extension management. Also identifies the information sources and develop strategy for market intelligence and the marketing infrastructure, multilevel marketing and linkages for market led extension. In addition the students would be learning the public private partnerships for market led extension management, the features of contract farming, WTO its implications on agriculture and Understanding the role of IT for market intelligence.

Outcomes

On the completion of this course students will learn

- Market led extension and its need in current agriculture scenario
- Post harvest management & value addition, strategy for market-led-extension, market intelligence,
- They will also learn about multi level marketing and linkages for MLE, Market led extension on PPP mode, Contract farming

Ag Econ 511 AGRICULTURAL MARKETING AND PRICE ANALYSIS 2+1

Objective

To impart adequate knowledge and analytical skills in the field of agricultural marketingissues and enhance expertise in improving the performance of the marketing institutionsand the players in marketing of agricultural commodities.

Outcome

1. Gaining knowledge of agricultural marketing and price policy in India.
2. Enhancing expertise in improving the performance of the marketing institutions and the players in marketing of agricultural commodities.
3. Acquiring skills for technical analysis of price movements and its applications in risk management in agriculture

Ag Econ 503 AGRICULTURAL FINANCE AND PROJECT MANAGEMENT 2+1

Objective

The Objective of the course is to impart knowledge on issues related to lending topriority sector

credit management and financial risk management. The course would bringin the various appraisal techniques in project - investment of agricultural projects.

Outcomes

1. Basic understanding of the financial sector of India.
2. Gain knowledge relating to disbursement of institutional finance to priority sector.
3. Credit and financial risk management appraisal techniques.
4. Acquire the basic knowledge on various appraisal techniques in investment of agricultural projects.

STAT-509: STATISTICAL METHODS FOR APPLIED SCIENCES 3+1

Objective

- This course is meant for students who do not have sufficient background of Statistical Methods.
- The students would be exposed to concepts of statistical methods and statistical inference that would help them in understanding the importance of statistics.
- It would also help them in understanding the concepts involved in data presentation, analysis and interpretation.
- The students would get an exposure to presentation of data, probability distributions, parameter estimation and tests of significance, regression and multivariate analytical techniques.

Outcome

- Expertise in statistical knowledge will lead for good decisions in research.
- Inference about certain experiment will come very exact.
- Practical data analysis techniques will empower students to work as analyst in different firms.

PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

- Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
- Identify keywords, synonyms and related terms in order to flexibly search information resources including: Internet, electronic library catalogs, and print materials
- Identify the range of information source types available (such as peer-reviewed journals, newspaper articles, books, reference sources, etc.), their distinguishing characteristics and intended audiences, in order to select those appropriate based on the information need.
- Identify the features and content of different research tools (such as databases, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE (1+0)

Objective:

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

7) Exposure to various types intellectual property rights.

8) Idea on various acts and agreements related to IPR.
9) Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 (e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

PGS 506 (e-Course) DISASTER MANAGEMENT 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management

- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

M. Sc. (Ag) in Crop Physiology

Programme Specific Objective:

Plant physiology being one of the most important fields as it concerned with life processes of the plants and supplied basic knowledge on various physiological events carried out throughout its life cycle. It aims to increase the yield of the plant economically as it completely depends on plant performance in the field.

Programme Specific Outcome (PSO):

1. The predictions and manipulations of its sub applied fields projected to get more yield and productivity under those agro climatic conditions.
2. Plant physiology provides adequate knowledge on plant life cycle, nutrition, development, growth and metabolism.
3. The basic concepts have been incorporated in recent developments on the view of nutritional research, food assimilation, energy metabolism, growth modelling, hormonal regulations, crop management, plant tissue culture, stress physiology and adaptations.

MAJOR COURSES SYLLABUS

PP- 501 PRINCIPLES OF PLANT PHYSIOLOGY: 4(3+1)

Objective

To acquaint the students with the basic concepts of plant physiology and their application in agriculture.

Outcome: 1. Basic concepts of plant physiology and their application in agriculture.

2. Various mechanisms and metabolic events at vegetative and reproductive stages of plants, seed physiology and their hormonal regulations.

3. Go through the principle based techniques to know the concepts and quantification of values, is helpful during application and yield prediction.

PP-502 PLANT DEVELOPMENTAL BIOLOGY PHYSIOLOGICAL AND MOLECULAR BASIS: 2(2+0)

Objective

To explain about basic physiological and molecular processes concerning various facets of growth and development of plants.

Outcome: 1. Knowledge on Physiological and molecular basis of plant growth and development of different plants parts, seed germination physiology and seedling growth.

2. Molecular mechanisms of light perception and control on plant development.

3. Molecular basis of embryo formation, regeneration, differentiation and genetic aspects.

PP 503 PHYSIOLOGICAL AND MOLECULAR RESPONSES OF PLANTS TO ABIOTIC STRESSES: 3(2+1)

Objective

To apprise the students regarding abiotic stress to plant and its molecular basis.

Outcome: 1. Knowledge on physiological and molecular responses to various abiotic stresses.

2. Study of different physiological processes and molecular responses to stress.

3. Measurement and screening of stress parameters and behaviour towards tolerance.

PP-504 HORMONAL REGULATION OF PLANT GROWTH AND DEVELOPMENT: 3(2+1)

Objective

To apprise the students about structure function of plant growth regulator on growth and development of plant.

Outcome:

1. Structure and function of hormones on plant growth and development.

2. Metabolism and applications of hormones on various aspects of plant development.

3. Quantification of hormones-Principles and techniques of bioassays of hormones from plant tissues.

PP- 505 PHYSIOLOGY OF GROWTH AND YIELD AND MODELING: 2(1+1)

Objective

To impart knowledge regarding crop growth analysis and different yield prediction models.

Outcome: 1. Knowledge regarding crop growth analysis and different yield prediction models.

2. Plant sampling to estimate growth and yield parameters.

3. Computer applications in plant physiology, crop productivity and modeling.

PP- 506 GENOME ORGANIZATION IN HIGHER PLANTS: 3(2+1)

Objective

To impart basic concept on genome organization in prokaryotic and eukaryotic system.

Outcome:

1. To get basic knowledge on gene and genome organization of prokaryotic and eukaryotic systems.

2. Mechanism of gene expression and operon concept involves in transcription, translation and their post modificational controls.

3. To know the techniques of isolation and analysis of genetic materials and their quantification.

PP -507 MORPHOGENESIS, TISSUE CULTURE AND TRANSFORMATION: 3(2+1)

Objective

To impart knowledge about cellular basic of growth and morphogenesis in plants.

Outcome: 1. Knowledge on cellular basis of growth and morphogenesis in plants.

2. In vitro culture of different explants such as leaf, stem, shoot apex, cotyledonary nodes.

3. Effect of explant age on propagation potential.

PP-508 MOLECULAR ASPECTS OF BIOLOGICAL NITROGEN FIXATION: 2(2+0)

Objective:

To impart teaching on physiological, biochemical and molecular aspects of nitrogen fixation.

Outcome

1. Knowledge on Nitrogen fixing organisms and biochemistry of nitrogen fixation.

2. Mechanism of Nitrogenase and its regulation during biological nitrogen fixation.

3. Genetics of nif genes and regulation in symbiotic system.

4. Genetic engineering of nif genes and their applications in plant cropping systems.

PP-509 PHYSIOLOGICAL AND MOLECULAR ASPECTS OF PHOTOSYNTHESIS-CARBONANDNITROGENASSIMILATION: 3(2+1)

Objective

To impart knowledge about physiological and molecular aspects of carbon reduction cycle and nitrogen assimilation.

Outcome: 1. Knowledge about physiological and molecular aspects of carbon reduction cycle and nitrogen assimilation.

2. Physiological and biochemical changes in plants under nutrient sufficiency and deficiency levels.

3. Quantification of pigment levels, enzyme activities.

PP -510 MINERAL NUTRITION: 3(2+1)

Objective: To impart knowledge about physiological and molecular aspects of carbon

reduction cycle and nitrogen assimilation.

Outcome:

1. Mechanism of nutrient availability near the root, nutrient uptake by root cells and its transportation.

2. Molecular mechanism of ion uptake functions and regulations.

3. Physiological and molecular mechanisms underlying differential nutrient efficiency in crop genotypes and toxicity.

PP -511 PHYSIOLOGY OF CROP PLANTS SPECIFIC CASE STUDIES: 2(2+0)

Objective

To impart knowledge of physiological aspects of different crop plants.

Outcome

1. Physiological aspects of different crop plants selection based on local importance

2. Crop specific topics and features.

3. Specific application of physiological concepts to influence yield.

PP-591 Master's Seminar: 1(1+0)

Objective: To appraise the students about presenting the outcome of the research conducted.

Outcome:

1. Understanding of working area and experimental design.
2. Exposure to preparation of power point presentation.
3. Explanation of work plan and ability to answer.

PP-599 Master's Research: 20(0+20)

Objective: To develop the skills required for conducting research activities in field and laboratory conditions.

Outcome: 1. Knowledge on laying out and execution of field experiments.

2. Observation and data collection on field and laboratory studies.

3. Data calculation, tabulation, analysis and interpretation, writing of references cited

MINOR COURSES

PP-513 SEED PHYSIOLOGY: 3(2+1)

Objective

To provide an insight into physiological processes governing seed quality and its survival.

Outcome:

1. Knowledge on chemical composition of seed, physiology of seed development and maturation.

2. Provide knowledge regarding different seed quality parameters, seed dormancy and seed longevity.

3. Knowledge on Seed ageing and physiology of seed deterioration.

AGRON 501* MODERN CONCEPTS IN CROP PRODUCTION: 3(3+0)

Objectives:

To make the students understand the techniques on crop growth analysis, crop modelling, crop

response production functions, farming system modules and resource conservation technologies.

Outcomes:

4. Students can perform techniques and interpretate the principles involved in scientific crop production and situation based IFS modules and RCT.
5. Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterprise.
6. Students can apply crop production principles to establish cause and effective relationship with different agronomic traits.

PBG 511 BIOTECHNOLOGY FOR CROP IMPROVEMENT: 3 (2+1)

Objective:

The objective of this course is to impart knowledge and practical skills to use biotechnological tools in crop improvement.

Outcome:

Getting acquainted with various types micro-propagation methods and their application in crop improvement.

Idea on recombinant DNA technology and various methods of gene transfer.

Exposure to the field of of transgenics and their application in crop improvement.

Knowledge on various types of marker systems and their application in in crop improvement.

SUPPORTING COURSES SYLLABUS

Soils -505 PLANT BIOCHEMISTRY: 3(2 + 1)

Objective

Detailed information about biochemical and molecular basis of various plant processes and plant growth regulatory substances.

Outcome

- Theoritical experience on biochemical and molecular basis of various plant processes and plant growth regulatory substances.
- Extraction and estimation of carbohydrates and aminoacids, ascorbic acid
- techniques of isolation and purification of enzymes, estimation of DNA and RNA.
- Practical excellence in determining the important biomolecules through different analytical methods.

STAT-513 DATA ANALYSIS USING STATISTICAL PACKAGES: 3(2+1)

Objective

This course is meant for exposing the students in the usage of various statistical packages for analysis of data.It would provide the students an hands on experience in the analysis of their research data. This course is useful to all disciplines.

Outcome:

1. Analysis of research data using statistical software.
2. Opting a career as analyst.
3. Development of consultancy firms and project formulation.

PGS COURSE

PGS 501 LIBRARY AND INFORMATION SERVICES : 1(0+1)

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

9. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
10. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.
11. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.
12. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS: 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 (e-Course) INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1(1+0)

Objective

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

1. Exposure to various types intellectual property rights.
2. Idea on various acts and organization related to IPR.
3. Knowledge on protection of plant varieties under UPOV and PPV & FR Act of India. Plant breeders rights, and Farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES: 1(0+1)

Objective - To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 (e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES: 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavors.

PGS 506 DISASTER MANAGEMENT:1(1+0)

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

M. Sc. (Ag) in Agricultural Economics

Programme Specific Objective:

The main objective is to Prepare our students for policy driven Agro-economic research based upon the economic experiences and applications thereof and to foster the growth of Agricultural sector at national level in general and the state in particular through its research and development towards the policy support.

Programme Specific Outcome (PSO):

1. Students gain first hand experience in applied research enabling them to pursue careers in academia.

2. The students shall learn the art of farm management and Project development at the field level.

3. Learning the Farm planning and farm budgeting operations to optimise the accounting at the farm level.

4. Learning to deal with the direct and indirect market failures creating stress on the farming and providing possible solutions to bridge the gap.
5. Learning to explore the novel areas for research and development to meet the current agrarian distress.

Ag Econ 501 MICRO ECONOMIC THEORY AND APPLICATIONS
2(2+0)

Objectives:

1. This course is intended to provide an overview of microeconomic theory and its applications.
2. The course starts with the theory of consumer behaviour consisting of consumer's utility maximization problem and demand theory. It intends to provide fundamental concepts and models in the theory of production and costs and sets out to provide a basic understanding of price and / or output determination under different types of market structures including factor markets.
3. This course will also expose the students to the theory of general equilibrium and welfare economics.

Outcomes:

1. Basic fundamental of microeconomic theories will be learned.
2. Understanding of price and or output determination under different types of market structures including factor markets with regard to agriculture.
3. Application of microeconomics theory and social welfare concepts in agrarian economy.

Ag Econ 502 RESEARCH METHODOLOGY FOR SOCIAL SCIENCES 2(1+1)

Objective

To expose the students to research methodology used in social sciences. The focus will be on providing knowledge related to research process, data collection and data analysis etc.

Outcomes

1. Understand the research process – identification of research problems.
2. Formulation of objectives, construction of hypotheses, sampling techniques.
3. Research design, data collection and data analysis, hypothesis testing, interpretation of results, report writing.
4. Project evaluation and appraisal techniques for agriculture.

Ag Econ 503 AGRICULTURAL FINANCE AND PROJECT MANAGEMENT

3(2+1)

Objective

The Objective of the course is to impart knowledge on issues related to lending to priority sector credit management and financial risk management. The course would bring in the various appraisal techniques in project - investment of agricultural projects.

Outcomes

5. Basic understanding of the financial sector of India.
6. Gain knowledge relating to disbursement of institutional finance to priority sector.
7. Credit and financial risk management appraisal techniques.
8. Acquire the basic knowledge on various appraisal techniques in investment of agricultural projects.

Ag Econ 504 RURAL MARKETING 2(2+0)

Objective

To provide understanding regarding issues in rural markets like marketing environment, consumer behaviour, distribution channels, marketing strategies, etc.

Outcomes

1. Understanding the rural marketing practices in India.
2. Formulating the strategies to overcome the challenges of rural markets.
3. Effective product promotion and distribution in rural markets.

Ag Econ 505 MACRO ECONOMICS AND POLICY

2(2+0)

Objective

Macroeconomics and Policy course is intended to expose the students to macroeconomic concepts and theory, the application of the macro economic theory, and implication of the macroeconomic policies.

Outcomes

1. Understand the basics of macroeconomics with the help of established theories.
2. Analyze the implication of the macroeconomic policies with special reference to agriculture and allied sciences.

3. Understand the implication of fiscal, monetary policies along with balance of payment issue.

Ag Econ 506 AGRICULTURAL PRODUCTION ECONOMICS 2(1+1)

Objective

To expose the students to the concept, significance and uses of agricultural production economics.

Outcomes

1. Expose the students to production economics principles and their applications.
2. Use of tools of optimization in farm planning in agriculture sector.
3. Use of technology and efficiency measures for effective evaluation and project appraisals of farm business.

Ag Econ 507 ECONOMETRICS 3(2+1)

Objective

The Course Objective of the course is to impart knowledge on econometric tools to the students of agricultural economics. Training in econometrics will help the student to analyze the economic problem by applying quantitative techniques.

Outcomes

1. Basic understanding of the econometric techniques for measuring and mapping economic theories and problems.
2. Application of econometric techniques to solve problems in agrarian economy.
3. Development of general models to measure the economic problems of agrarian economy.

Ag Econ 508 NATURAL RESOURCE AND ENVIRONMENTAL 1+1 ECONOMICS

Objectives

1. To introduce economics principles related to natural resource and environmental economics
2. To explore the concept of efficiency and the efficient allocation of natural resources
3. To understand the economics of why environmental problems occur.

4. To explore the concept of efficiency and the efficient allocation of pollution control and pollution prevention decisions.
5. To understand the environmental policy issues and alternative instruments of environmental policies

Outcome

1. Basic understanding of economics principles related to natural resources and environmental economics.
2. Gain practical knowledge on efficient allocation and extraction of natural resources with natural resource accounting.
3. Learn about the laws regarding pollution control, waste management, and other environmental issues.

Ag Econ 509 INSTITUTIONAL ECONOMICS 1(1+0)

Objective

The course exposes the students to the institutional problems and remedies of the economy.

Outcomes

1. Basic understanding of concepts and theories of institutional economics.
2. Knowledge Institutional problems and remedies and understanding economic performance.
3. Application of institutional economics concepts in agricultural institutions.

Ag Econ 510 EVOLUTION OF ECONOMIC THOUGHT 1(1+0)

Objective

To introduce the students to the evolution of economic thought over a period of time, the background of emanation of thoughts and approaches, as acts of balancing and counter balancing events and criticisms. The course will also in a comprehensive way help the students to know and appreciate the contributions of the Galaxy of Economists.

Outcome

1. Understanding of the economics theories and their historical development perspectives.
2. Develop insights into economic history of India and the world.
3. Application and analysis of current economic problems in retrospective.

Ag Econ 511 AGRICULTURAL MARKETING AND PRICE ANALYSIS 3(2+1)

Objective

To impart adequate knowledge and analytical skills in the field of agricultural marketing issues and enhance expertise in improving the performance of the marketing institutions and the players in marketing of agricultural commodities.

Outcome

4. Gaining knowledge of agricultural marketing and price policy in India.
5. Enhancing expertise in improving the performance of the marketing institutions and the players in marketing of agricultural commodities.
6. Acquiring skills for technical analysis of price movements and its applications in risk management in agriculture.

Ag Econ 512 COMMODITY FUTURES TRADING 2(2+0)

Objective

This course is aimed at providing the basic understanding and the mechanics and value of futures markets for speculators and hedgers who in turn will serve as price risk management activities of agribusiness firms.

Outcomes

1. Gaining knowledge about the commodity markets and their development in India and world.
2. Understanding, the role, mechanism and value of commodity futures markets for price risk management and price discovery in the Indian commodity markets.
3. Acquiring technical skills required to practically operate in a commodity market.

Ag Econ 513 INTERNATIONAL ECONOMICS 2(1+1)

Objective

The expected outcome of this course will be creating awareness among the students about the role of International Economics on National welfare.

Outcomes

1. Understanding the basics of the international economics and its application in finance and trading.
2. Knowledge and application of international economics in the agriculture sector.

3. Technical skills regarding trade analysis.

Ag Econ 514 AGRICULTURAL DEVELOPMENT AND POLICIES 2(2+0)

Objectives

To provide orientation to the students regarding the concepts and measures of economic development

To provide orientation on theories of economic growth and relevance of theories in developing countries.

Outcomes

1. Knowledge about measures of economic growth and development.
2. Gaining knowledge on theories and models related to development of an economy.
3. Understanding the agricultural policies and its effect on sustainable agricultural development and the globalization and its impact on agricultural development.

Master's seminar AGECON 591 1(1+0)

Objectives

To train the students fit for position in various organizations also it will help them to acquire professional competencies for their future activities. It helps students develop research skills and analytical skills and prepare for writing the term paper and master's thesis.

Outcomes

By the end of this course students will be able to

- Refine their skills of research, text processing, searching scholarly information and presenting their work.
- It will also help in improving their understanding of study designs.

Master's research AGECON 599 20(0+20)

Objectives

To enable students to develop deeper knowledge, understanding, capabilities and attitudes in the context of the programme of the study.

Outcomes

By the end of the thesis

- Students will have more in-depth knowledge of the field of the study including deeper understanding into current research and development work.
- They can contribute to research and development work,
- Students will be able to formulate and deal with complex issues also capability to systematically integrate knowledge, identify issues that must be addressed within the framework of the specific thesis

EXT 506* ENTREPRENEURSHIP DEVELOPMENT AND MANAGEMENT IN EXTENSION 3(2+1)

Objective

The first part of the course is intended to provide overall picture of planning and development of enterprises for extending sustainable livelihoods for rural people. The second part of the course is structured to help the students to gain knowledge and skills in different concepts and techniques of management in extension organizations

Outcome

By the end of this course students will be-

- Motivate for entrepreneurial career and it will make them capable of perceiving successful opportunities for enterprises,
- Motivate to start their own enterprise and approach various institutions for financing, helps in develop entrepreneurial project & their successful management.
- Able to utilize the available resources for different entrepreneurial activities.
- Able to learn about different management approaches, decision making and organization control meachanisms

STAT-509: STATISTICAL METHODS FOR APPLIED SCIENCES 3+1

Objective

I. This course is meant for students who do not have sufficient background of Statistical Methods.
II. The students would be exposed to concepts of statistical methods and statistical inference that would help them in understanding the importance of statistics.
III. It would also help them in understanding the concepts involved in data presentation, analysis and interpretation.

IV. The students would get an exposure to presentation of data, probability distributions, parameter estimation and tests of significance, regression and multivariate analytical techniques.

Outcome

I. Expertise in statistical knowledge will lead for good decisions in research.
II. Inference about certain experiment will come very exact.
III. Practical data analysis techniques will empower students to work as analyst in different firms.

STAT-513: DATA ANALYSIS USING STATISTICAL PACKAGES. (2+1)

Objective

V. This course is meant for exposing the students in the usage of various statistical packages for analysis of data.
VI. It would provide the students an hands on experience in the analysis of their research data. This course is useful to all disciplines.

Outcome

VII. Analysis of research data using statistical software.
VIII. Opting a career as analyst.
IX. Development of consultancy firms and project formulation.

PGS 501 LIBRARY AND INFORMATION SERVICES 0+1

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

13. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
14. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.

15. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.
16. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 TECHNICAL WRITING AND COMMUNICATIONS SKILLS 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE 1(1+0)

Objective:

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

10) Exposure to various types intellectual property rights.
11) Idea on various acts and agreements related to IPR.
12) Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

PGS 504 BASIC CONCEPTS IN LABORATORY TECHNIQUES 0+1

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

PGS 505 (e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

PGS 506 DISASTER MANAGEMENT 1+0

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

M. Sc. (Ag) in Entomology

PROGRAMME OBJECTIVES

1. To develop professionalism, innovativeness as well as entrepreneurship skills in the field of plant protection specialization to Entomology and to make the students successful in perusing higher studies in the field of Entomology.

2. To make the students very clear about the fundamental concepts about insect morphology, systematics, anatomy, physiology and ecology.

3. To promote the different innovative approaches of pest management tactics in agriculture like physical control, mechanical control, biological control as well as chemical control giving importance with the concepts of ETL, EIL , GEP and other basic concepts regarding pest management.

4. To make the students understand about the basic research ethics, concepts and methodologies helpful to farming communities.

5. To develop the student ability and make them skilled in the field of commercial entomology like beekeeping, sericulture and lac culture.

PROGRAMME OUTCOMES (PSO)

1. Develop fundamental knowledge on different theories, concepts of basic and applied entomology

2. Skills of teaching, research and extension activities in the field of plant protection specialization to entomology.

3. Capability to implement Different basic and innovative tools of pest management in crop field benefiting the farming communities and their commercial use.

4. Entrepreneurship ability in the commercial field of entomology like bee keeping, sericulture and lac culture.

5. Skill in practical aspects like pesticide formulation, calculation of dose of specific pesticide as well as skill to handle different instruments in laboratory useful in entomological research.

EN 501: Insect Morphology 2(1+1)

Objective:

To acquaint the students with external morphology of the insect's body i.e., head, thorax and abdomen, their appendages and functions.

Outcomes

- Students will able to know the fundamentals of structural organization of insect
- Students will know the basic structure of head, thorax and abdomen.
- Students will know the art of preservation of insect body parts
- Preparation of permanent mount techniques will be learnt.

EN 502: Insect Anatomy, Physiology and Nutrition 3(2+1)

Objective

To impart knowledge to the students on basic aspects of anatomy of different systems, elementary physiology, nutritional physiology and their application in entomology.

Outcome

- Students will know the scope and importance of anatomy, physiology along with the fundamental knowledge about different internal organs, their physiology and functions
- An idea will be developed on thermodynamics and its role in insect physiology
- To know about details in insect nutrition and preparation of artificial diets.
- Knowledge on dissection of isects for comparative study of anatomy, preparation of permaet mouts, chromatographic analysis of free amino acids, determination of chitin in insect cuticle; examination of insect haemocytes; determination of respiratory quotient;

EN 503: Principles of Taxonomy **2(2+0)**

Objective

To sensitize the students on the theory and practice of classifying organisms and the rules governing the same.

Outcome

- Students will know the basic ideas of Identification, purpose, methods-character matrix, taxonomic keys
- Students will be awared about ICZN and different organisations associated with biological classification.

EN 504: Classification Of Insects **3(2+1)**

Objective

To introduce the students to the classification of insects up to the level of families with hands-on experience in identifying the families of insects.

Outcomes

- Students will know the basic knowledge of different concepts and theories of classification of insects
- Students will know the keys of classification and able to know the techniques of identification of insects.

EN 505: Insect Ecology **2(1+1)**

Objective

To teach the students the concepts of ecology, basic principles of distribution and abundance of organisms and their causes. Study life tables, organization of communities, diversity indicies. Train students in sampling methodology, calculation of diversity indicies, constructing life tables, relating insect population fluctuations to biotic and/or abiotic causes.

Outcome

- Students will know the basic concepts and ideas of ecology

- Syudents will be trained with the sampling methods, calculation of diversity indices, constructing life tables.

EN 506: Insect Pathology 2(1+1)

Objective

To teach the students about various microbes that are pathogenic to insects, factors that affect their virulence; provide hands-on training in identification, isolation, culturing various pathogens and assessing pathogenicity.

Outcome

- Students will be acquainted with equipment used in insect pathology laboratory
- Students will be able to know the Epizootiology, symptomatology and etiology of diseases caused by the above and the factors controlling these. Defense mechanisms in insects against pathogens
- Students will be familiarized with the techniques of extraction of pathogens and the mass production techniques of pathogens.. Bioassays to determine median lethal doses.
- Knowledge on mass production techniques of pathogens. Safety and registration of microbial pesticides. Use of insect pathogens in integrated management of insect pests.

EN 507: Biological Control of crop pests and weeds 2(1+1)

Objective

To train the students with theory and practice of biological control, mass production techniques and field evaluation of various biological control agents like parasitoids, predators and various entomopathogenic microorganisms.

Outcome:

- Students will know the importance and basic knowledge of biocontrol
- Students will be trained with mass production techniques and field evaluation of different bioagents.

- Knowledge on identification of common natural enemies of crop pests (parasitoids, predators, microbes) and weed killers, field collection of parasitoids and predators. Hands-on training in culturing, identification of common insect pathogens

EN 508: Toxicology of insecticides 3(2+1)

Objective

To orient the students with structure and mode of action of important insecticides belonging to different groups, development of resistance to insecticides by insects, environmental pollution caused by toxic insecticides and their toxicological aspects.

Outcomes

- Students will know about bioassay techniques; probit analysis; evaluation of insecticide toxicity and joint action and pesticide appliances.
- Students will know about the safe use of insecticide according to their toxicity and also sensitized about the resistance and resurgence issues.
- Students will know about the insecticide dose calculation and some basics about their application

EN 509: Plant Resistance to Insects 2(1+1)

Objective

To familiarize the students with types, basis, mechanisms and genetics of resistance in plants to insects and role of plant resistance in pest management.

Outcome

- Students will know the importance and concept of host plant resistance and the role of resistance in integrated pest management.
- Knowledge on Screening techniques for measuring resistance; measurement of plant characters and working out their correlations with plant resistance; testing of resistance in important crops; bioassay of plant extracts of susceptible/resistant varieties; demonstration of antibiosis, tolerance and antixenosis.

EN 510: `Principles of Integrated Pest Management 2(1+1)

Objective

To familiarize the students with principles of insect pest management, including concept and philosophy of IPM**.** Train students in computation of ETL, implementing IPM programmes.

Outcomes

- Knowledge on sampling methods and factors affecting sampling; population estimation methods; crop loss assessment-direct losses, indirect losses, potential losses, avoidable losses, unavoidable losses. Computation of EIL and ETL
- Students will know about the tools of pest management and their integration-legislative, cultural, physical and mechanical methods.
- Students will be familiarized with pest survey and surveillance, forecasting and types of surveys. crop modeling; designing and implementing IPM system.

EN 511: Pests of Field Crops 2(1+1)

Objective

To familiarize the students about nature of damage and seasonal incidence of insect pests that cause loss to major field crops and their effective management by different methods.

Outcome

- Students will able identify the different harmful insect pests of different field crops and estimation of infestation and losses in different crops
- Students will know about the integrated management tools and techniques to manage the insect pests

EN 512: Pests of Horticultural And Plantation Crops 2(1+1)

Objective

To impart knowledge on major pests of horticultural and plantation crops regarding the extent and nature of loss, seasonal history, their integrated management.

Outcome

- Students will able identify the different harmful insect pests of different horticultural crops.

- Students will know about the integrated management tools and techniques to manage the insect pests

EN 513: Storage Entomology 2(1+1)

Objective

To focus on requirement and importance of grain and grain storage, to understand the role of stored grain pests and to acquaint with various stored grain pest management techniques for avoiding losses in storage.

Outcome

- Students will be familiarized with the stored grains/seed insect pests and nature of damage caused by them; detection of insect infestation in stored food grains;
- Estimation of losses in stored food grains; determination of moisture content in stored food grains; familiarization of storage structures, demonstration of preventive and curative measures

EN 514: Insect Vectors Of Plant Viruses And Other Pathogens 2(1+1)

Objective

To teach the students about the different groups of insects that vector plant pathogens, vector-plant pathogen interaction, management of vectors for controlling diseases.

Outcome

- Know and identify the particular vectors.
- Basic principles and techniques on culturing and handling of vectors
- Students will able to demonstrate the virus transmission through vectors- aphids, leafhoppers and whiteflies.

EN 515: General Acarology 2(1+1)

Objective

To aquaint 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.

Outcome

- Students will be acquianted with external morphology of different groups of mites
- Students will know about the collection and preservation and culturing of mites.
- studying different rearing techniques for mites.
- Knowledge on the management tools of different phytophagous mites which will be further useful for employability.

EN 516: Soil Arthropods And Their Management 2(1+1)

Objective

To impart knowledge about the different groups of arthropods found in soil, interaction between the different groups, and role of soil arthropods in humus formation. Hands-on training in sampling and identification of different groups of soil arthropods.

Outcome

- Students will acquainted with sampling, extraction methods and identification of various types of soil fauna; estimation and assessment of soil arthropod population; techniques and culturing soil invertebrates.
- Students will be concerned about management options and techniques of harmful and beneficial soil arthropods which will create the employability in further future.

EN 517: Vertebrate Pest Management 2(1+1)

Objective

To impart knowledge on vertebrate pests like birds, rodents, mammals etc.of different crops, their biology, damage they cause and management strategies.

Outcome

- Students will be able to identify different vertebrate harmful pests and beneficial organisms.
- Students will acquinted with the different management strategies to combat the loss by the vertebrate pests.
- Students will able to assess the damage and estimate the control operation.

EN 518: Techniques In Plant Protection 1(0+1)

Objective

To acquaint the students with appropriate use of plant protection equipments and techniques related to microscopoy, computation, pest forecasting, electrophoresis etc.

Outcome

- Students will know about the manufacturing details, principles, operation methodologies of different pest control equipments.
- Students will also know about the protein isolation techniques, tissue culture techniques in plant protection which will create employability.

EN 519: Commercial Entomology 2(1+1)

Objective

To familiarize the students with entrepreneurial opportunities in entomology, provide information on productive insects and their products, as well as insect pests of public health and veterinary importance and their management.

Outcome

- Students will able to know the basic knowledge regarding the biology and basic concepts of apiculture, sericulture and lac culture
- Students will know the techniques and tools of apiculture, sericulture and lac culture and the commercial aspects which will helpful to create employability.
- Students will be familiarized with entrepreneurial opportunities in entomology, provide information on productive insects and their products, as well as insect pests of public health and veterinary importance and their management.

EN 520: Plant Quarantine 2(2+0)

Objective

To acquaint the learners about the principles and the role of Plant Quarantine in containment of pests and diseases, plant quarantine regulations and set-up.

Outcome

- The students will know Symptomatic diagnosis and other techniques to detect pest/pathogen infestations; VHT and other safer techniques of disinfestation/salvaging of infected material.
- Knowledge on different acts, rules, regarding quarantine, Pest risk analysis, good laboratory practices for pesticide laboratories; pesticide industry; Sanitary and Phytosanitary measures.

EN 591: Masters seminar 1(0+1)

Objectives:

To develop capacity among the students to select reseaech topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

The students can select topic of research on emerging and important issues and present on powerpoint.

EN 599: Masters Research 20(0+20)

Objectives:

To expose the students on research methodology, selection of researchable issues, preparation of synopsis and execution of programme following suitable experiment design

Outcomes:

Students can select a research topic, prepare synopsis and execute the programme as per suitable design.

Pl Path 504: Principles Of Plant Pathology 3(3+0)

Objective

To introduce the subject of Plant Pathology, its concepts and principles.

OUTCOME

- Knowledge on strategies for management of plant diseases.
- Knowledge on molecular basis for resistance; marker-assisted selection; genetic engineering for disease resistance.
- Student will know about pathogenesis.

Pl Path 511: Diseases Of Fruits, Plantation And Ornamental Crops

3(2+1)

Objective

To acquaint with diseases of fruits, plantation, ornamental plants and their management.

Outcome

- Knowledge on Collection and dry preservation of diseased specimens.
- Baic ideas on symptoms and etiology of different diseases of fruits, plantation and ornamental crops so that identification process will be easier.
- Students will e expertized on the management tools and techniques which will be further useful for employability.

STAT-510: Experimental Designs 3(2+1)

Objective

X. This course is meant for students of agricultural and animal sciences other than Statistics.

XI. Designing an experiment is an integrated component of research in almost all sciences.

XII. The students would be exposed to concepts of Design of Experiments.

Outcome

XIII. It will enable them to understand the concepts involved in planning, designing their experiments and analysis of experimental data.

XIV. The knowledge of design will significantly affect about pair-wise comparison of treatments.

XV. The inference about certain treatment from the pair-wise comparison will cost less with more output.

XVI. Varietal development leads for job creation.

PGS 501 Library And Information Services 1(0+1)

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

17. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
18. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.
19. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.
20. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

PGS 502 Technical Writing And Communications Skills 1(0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

PGS 503 (e-Course) Intellectual Property And Its Management In Agriculture 1(1+0)

Objective : The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

1. Exposure to various types intellectual property rights.
2. Idea on various acts and organization related to IPR.
3. Knowledge on protection of plant varieties under UPOV and PPV & FR Act of India. Plant breeders rights, and Farmers rights.

PGS 504 Basic Concepts In Laboratory Techniques 1(0+1)

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome:

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

\PGS 505 (e-Course)

Agricultural Research, Research Ethics And Rural Development Programmes 1(1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

PGS 506: Disaster Management 1(1+0)

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

Doctoral Program in Agriculture:

Programme Outcome:

- The holders of doctorate degree in the respective fields of specialization are the boon for producing human resources at various levels of course curriculum as teaching faculty.
- They are equipped with advance techniques in the fields of agriculture to become a part of agricultural research system as an agricultural scientist to develop real time environmental friendly management strategies for economical, and sustainable crop production.
- They become an important member of agricultural scientist team for on farm studies to develop and validate the new findings on resource conservation technologies on interdisciplinary mode using advanced techniques.

Ph.D. (Agriculture) in Horticulture

Programme Specific Objective:

5) To prepare students to enter successfully into the many and varied professions of horticulture and/or its related fields.

6) To prepare students to be successful researchers in horticultural science and/or related fields.

Programme Specific Outcome(PSO):

1) Ability to design, conduct, analyze, and communicate a research plan and results.

2) Critical thinking skills and ability to question or re-evaluate current thinking and standards related to horticultural science.

3) Skills to identify, locate, and apply knowledge discovered from horticultural science and related fields of study.

4) Opportunities to develop and communicate scientific hypotheses and problem solving.

19PHDHT-611 ADVANCES IN VEGETABLE PRODUCTION 3 (2+1)

Objective:

- The course is aimed at understanding the basic concept of advances in production technology of important vegetable crops of Solanaceous, Cucurbits, Cole crops, Bulb crops and legumes etc.

Outcome:

- Basic concept and knowledge of use of plant growth substances,
- Diagnosis and control of nutritional and physiological disorders.
- Market survey and quality analysis etc

19PHDHT-612 ADVANCES IN POST-HARVEST MANAGEMENT AND PROCESSING OF HORTICULTURAL PRODUCE 2 (1+1)

Objective:

- Objective of this course is post harvest management and processing of horticultural produce.
- Post harvest physiology, knowledge on physicochemical changes and their influence on storage quality, post harvest treatment for quality retention, regulation of ripening, storage system, storage structure.
- Special techniques for preservation.

Outcome:

- To get idea about Post harvest management and processing of horticultural produce, post harvest physiology
- knowledge on physicochemical changes and their influence on storage quality, post harvest treatment for quality retention.
- Regulation of ripening, storage system, storage structure, special techniques for preservation

19PHDHT-613 ADVANCES IN FLORICULTURE AND LAND SCAPING 2 (1+1)

Objective:

- The aim of this course is to provide insight into presents status of floriculture in india and its potential in global market.

Outcome:

- Knowledge on floriculture and landscaping.
- Gardening style and designs, bio-aesthetic planning, indoor gardening, packaging and marketing techniques.

19PHDHT-621. ADVANCES IN FRUITS AND PLANTATION CROPS. 3 (2+1)

Objective:

- Objective of this course to get better understanding on elucidation of problems of unfruitfulness and periodicity of cropping in fruits and perennial crops.
- Study of orcharding systems, varietals classification and problems of individual fruits and plantation crops

Outcome:

- Knowledge of Study of symptoms of major pathological and viral disorders.
- Nutritional disorders and their control.
- Experiments in the use of growth regulators with special reference to fruit crop and quality improvement.

19PHDHT-622 ADVANCES IN BREDDING OF FRUIT CROPS 3 (2+1)

Objective:

- The sole objective is to get knowledge of overcoming breeding problems, long juvenile phase, hybrid sterility, gametophytic incompatibility, genetic and phylogenetic relationships, inheritance of economically important traits, root stock breeding, resistance breeding for biotic and abiotic stress

Outcome:

- Theory and practices of cross compatibility, incompatibility, using in vivo pollen tube growth studies.
- Embryo rescue culture. Cytological & isozymic studies in cultivars.
- Identification & characterization of varieties

19PHDHT-623 HI-TECH HORTICULTURE 3 (2+1)

Objective:

- This Course is aimed at understanding the basic concepts of drip and sprinkler irrigation system of fruit crops.
- Canopy management, Integrated nutrient management, Pest management and fertigation of fruit crops

Outcome:

- Various types of structures, methods to control temperature, CO_2, Light humidity.
- Demonstration for sanitation, different media, hydroponics, fertigation and nutrition management.
- Control of diseases and pest in green house

19PHDHT-624 ADVANCES IN LABORATORY TECHNIQUES AND RESEARCH METHODOLOGY 2 (1+1)

Objective:

- To equip the library users with skills to trace Chromatography and bioassay methods for estimation of plant hormones, in relation to growth, differentiation and flowering tree crops,
- Aseptic culture of nucellar embryos and induction of polyembryony., organogenesis in horticultural crops in relation to plant hormones

Outcome:

- Outcome of this subject is to get idea about aseptic culture of nucellar embryos and induction of Polyembryony.

- Organogenesis in horticultural crops in relation to plant hormones

19PHDHT-625 RESISTANCE BREEDING IN VEGETABLE AND ORNAMENTAL CROPS 3 (2+1)

Objective:

- To equip the students/scholars with skills to breeding for biotic and abiotics stress in tomato, eggplant, chili, cucurbits French bean and Okra.
- Origin, evolution and distribution of important ornamental crop. cytogenetics of important ornamental crop

Outcome:

- Identification of the sources of resistance in various vegetable crops.
- Exploitation of interspecific and intergeneric hybridization.
- Use of in vitro techniques like embryo culture and somatic hybridization.
- Study of floral biology and hybridization techniques of ornamental crops

19PHDHT- 631 ADVANCES IN GROWTH AND DEVELOPMENT IN HORTICULTURAL CROPS 3 (2+1)

Objective:

- The objective of this course is to impart knowledge in theory and practice about physiology of horticultural plants.
- To get better knowledge on biosynthesis of Auxin , Gibberellin , Cytokinin , Abscisic Acid and Ethylen, mode of action and transport, their role in development process such as juvenility, senescence and flowering

Outcome:

- Outcome of this subject is to Extraction, isolation and bioassay of Auxin, Gibberellins, Cytokinins, Abscisic Acid.
- Study of impact of growth regulators and other growth promoting substances on horticultural crops.

19PHDHT-632 ADVANCES IN WASTE MANAGEMENT HORTICULTURAL PROCESSING INDUSTY. 2 (1+1)

Objective:

- This course is aimed at understanding the basic concepts of requirements for waste management.
- Survey and nature of waste from processing industries,
- Preparation of useful materials from waste viz. colour, essence, pectin, oil etc.

Outcome:

- Knowledge on Analysis of waste.
- Commercial products from waste.
- Visit to processing industries equipped with waste disposal system.

19PHDHT-633 ADVANCES IN SEED PRODUCTION OF VEGETABLES AND ORNAMENTAL CROPS 3 (2+1)

Objective:

- The aim of this course to know different recent advancement seed production.
- Environmental factors in relation to vegetable seed production. Topography, climate and soli requirements, growth regulators in seed production.
- Isolation, pollination and pollinators of vegetable crops.
- Seed harvesting, processing, seed treatment and packing of vegetable and ornamental plants.

Outcome:

- Outcome of this subject is to know about studies of flower behavior of different vegetable crops.
- Methods of seed production in different vegetable crops, Seed testing, seed viability and seed vigour test.
- Seed cleaning, grading and packaging. Seed treatment methods, seed extraction techniques of important crops.
- Visit to seed production area, seed testing laboratories and packaging plants

Supporting Subject

STM-502 Research methodology 1+1

Objective:

- To acquaint the students with basic concepts of research methods and processes.
- To develop research skills for planning, designing, conduct and reporting of research.

Outcome:

- Conduct of a mock research including designing a research programme, conducting experiment / field research, data collection, analysis.
- Report writing and presentation, writing a research article.
- Writing a winning research proposal is the outcome.

STM-501 Statistical method 2+1

Objective:

- To acquaint the students with various statistical methods and techniques
- To provide hands on training in data analysis through statistical software.

Outcome:

- Outcome of this subject is *Tests of hypothesis based* on Z, t, X2 and F.
- Basic concepts of sampling techniques.
- Hands on experience in using the statistical software packages MS Excel, Systat and SPSS in data analysis and interpretation
- Simple correlation and regression, Rank correlation; Analysis of variance: one way and two way; Simple random, stratified, systematic, cluster and two stage sampling**.**

Ph.D. (Agriculture) in Plant Pathology

Programme Specific Objective:

7. To identify micro-organisms and understand host-pathogen interactions using molecular and serological tools.
8. To formulate management strategies for effective and eco-friendly manner using IDM tools.
9. To facilitate deeper understanding on plant biosecurity, biosafety issues and procedure of certification.
10. To expose with various research methodology and statistical methods for research work**.**
11. To identify and mass multiplication of beneficial micro-organisms for sustainable agriculture.
12. To educate about the advanced techniques and new developments in the field of Plant pathology for in depth study of agriculturally important micro-organism.

Programme Specific Outcomes (PSO)-

7. Formulation of disease management strategies for effective, economic and eco-friendly management of the crop using IDM tools.
8. Use of modern tools for developing protocols for identification of various micro-organisms, host –pathogen interaction.
9. Mass multiplication of beneficial micro-organisms for generating employment.
10. Promotes research in the field of plant pathology for solving plant protection issues at field level and publication of research paper.
11. Awareness about possible agricultural threats, invasive alien species, quarantine organisms and other bioweapons.

PL PATH 601 MOLECULAR BASIS OF HOST-PATHOGEN INTERACTION 2+1

Objective

To understand the concepts of molecular biology and biotechnology in relation to host-pathogen interactions.

Outcome

- Knowledge on host and pathogen interaction at molecular level
- Knowledge on molecular techniques.
- Knowledge on development of disease resistance plants using genetic engineering approaches will helpful for development of new disease resistant varieties

PL PATH 602 ADVANCED MYCOLOGY 2+1

Objective

To acquaint with the latest advances in Mycology.

Outcome

- Knowledge on Nomenclature, classification and characters of fungi
- Student will know about comparative study of different groups of fungi.
- Knowledge on recent trends on mycological research.
- Student will able to Identify different fungi using identificantion keys.

PL PATH 603 ADVANCED VIROLOGY 2+1

Objective

To educate about the advanced techniques and new developments in the field of Plant Virology.

Outcome

- Knowledge on virus structure, virus-vector relationship.
- Knowledge on method of raising antisera, serological tests, electron microscopy and ultratomy, PCR.
- Student will know about basic laboratory techniques for isolation and identification of viral genome.
- Knowledge on management of plant viruses using tissue culture.

PL PATH 604 ADVANCED BACTERIOLOGY 2+1

Objective

To provide knowledge about the latest advances in phytobacteriology.

Outcome

- Knowledge on structure, nutritional requirements of plant pathogenic prokaryote.
- Knowledge on management of plant bacterial diseases using modern approaches.
- Student will able to identify plant pathogenic bacteria.

PL PATH 605 PRINCIPLES AND PROCEDURES OF CERTIFICATION 1+0

Objective

To acquaint with certification procedures of seed and planting material.

Outcome

- Knowledge on certification standards and quality control of seed is helpful for students to get a job in different certification agencies and seed industry.
- Knowledge on seed testing will helpful to get jobs in various seed testing laboratories and seed company.
- Knowledge on various international bodies for certification.

PL PATH 606 PLANT BIOSECURITY AND BIOSAFETY 2+0

Objective

To facilitate deeper understanding on plant biosecurity and biosafety issues in agriculture.

Outcome

- Knowledge on biosecurity, quarantine, invasive alien species and emerging of pests and diseases will helpful to get jobs in quarantine stations.
- Understanding various national regulatory mechanism and agreements will helpful for export and import agricultural products.
- Knowledge on Formulation of pest risk analysis models and strategies for combating risk.

PL PATH 607 CELL AND MOLECULAR ASPECTS OF BACTERIAL PLANT PATHOGENS. 2+1

Objective

To study the bacterial associations with plants causing pathogenic changes in plant cells and the genetical analysis of plant pathogenic bacteria.

Outcome

- Knowledge on bacterial and fungal interaction and with environment.
- Knowledge on mechanism of resistance in plant.
- Knowledge on molecular genetics of plant pathogenic bacteria.
- Knowledge on diagnosis of bacterial diseases and identification of plant pathogenic bacteria.

ENT 606 Recent Trends in Biological Control 1+1

Objective To appraise the students with advanced techniques in handling of different bioagents, moder nmethods of biological control and scope in cropping system-based pest management in agroecosystems.

Outcome

- Knowledge on various bio-control agents.
- It will enable students to large scale production of bio-control agents.
- Testing of chemicals on biocontrol agents and natural enemies.

ENT 607 Advance Insecticide Toxicology 3(2+1)

Objective To acquaint the students with the latest advancements in the field of insecticide toxicology, biochemical and physiological target sites of insecticides, and pesticide resistance mechanisms in insects.

Outcome

- Knowledge on various insecticides and mode of action on insects will helpful our students to get jobs in pesticide industries as well as agri clinics.

- Knowledge on Sampling, extraction, clean-up and estimation of insecticide residues by various methods.
- Student will know about biochemical and biological techniques for detection of insecticide resistance in insects.

ENT 608 Advanced Host Plant Resistance 2(1+1)

Objective To familiarize the students with recent advances in resistance of plants to insects and acquaint with the techniques for assessment and evaluation of resistance in crop plants.

Outcome

- Knowledge on host plant resistance against pest.
- Knowledge on incorporation of resistant gene in crop varieties and Marker aided selection will helpful to develop resistant plants.
- Knowledge on techniques , determination and estimation of different categories of plant resistance.
- Student will know about macroculturing, field screening of pest.

ENT 612 Advanced Integrated Pest Management 2(2+0)

Objective To acquaint the students with recent concepts of integrated pest management. Surviellance and data base management. Successful national and international case histories of integrated pest management, non conventional tools in pest management.

Outcome

- Knowledge on surveillance of pest using computer simulation models,
- Knowledge on global trade and risk invasive pests.
- Knowledge on application of IPM in farmers field and management of pesticide resistance.

Supporting Subject

STM-502 Research methodology 2(1+1)

Objective-

To acquaint with various research tools and statistical methods**.**

Outcome

- Knowledge on different types of research, data collection and analysis.
- Knowledge on various statistical methods for analysis will helpful for seeking jobs in various firms.
- Knowledge on writing research paper and research proposal, evaluation of research article will helpful to generate employment in various academic field.

STM-501 Statistical Methods 3(2+1)

Objectives:

I. This course lays the foundation of probability distributions and sampling distributions and their application which forms the basis of Statistical Inference.
II. Together with probability theory, this course is fundamental to the discipline of Statistics.
III. The students are also exposed to correlation and regression, and order statistics and their distributions.
IV. Categorical data analysis is also covered in this course.

Outcomes:

I. Statistical knowledge will expertise students to get proper result on research.
II. Basic field experiment knowledge will help them in job seeking in research firms.
III. Both quantitative and qualitative data analysis will guide them for project formulation.

Pl Path 691 Doctorals seminar 2(2+0)

Objective:

To develop capacity among the student to select research topic on important issue, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the question.

Outcome:

The student can select the topic of research on emerging and important issues and present on power point.

Pl Path-699 Doctoral's Research 45(0+45)

Objective

To expose the student on research methology, selection of researchable issue, preparation of synopsis and execution of program following suitable experimental design.

Outcome:

- Students can select a research topic, prepare synopsis and execute the program as per suitable design.
- Student will undertake research *in vitro* as well as *in vivo* and interpret the findings after proper analysis.
- Student can publish research paper in good journals.

Ph.D. (Agriculture) in Agronomy

Programme Specific Objectives:

1. To acquaint the students on recent advances in crop and soil management under emerging issues following agro-ecological based system apoproch for enhancing factor productivity

2. To provide knowledge on recent developments and new approaches followed in major streams of crop growth and development, integrated weed, water and nutrient management and organic agriculture for sustainable production of crops and soil health.

3. To familarise the students on situtation based reseachable issues and their execution both under on-station and on-farm situations based on farm resources following farmer centric approach

Programme Specific Outcomes:

1. Students will be able to access the crop requirements under varying geo-hydrological and biotic stress situations prevailing in different farming conditions and apply management techniques for optimal growth, productivity of crops on system mode.
2. Students strengthens his knowledge on agronomical, physiological and phenological aspects of crop growth, their relationship with accumulation of photo-synthates and

their translocation to various plant parts under various biotic and abiotic stresses with interpretation skills

3. Students can conceptualize research hypothesis after identifying researchable issues and acquire the skill to formulate research programme following soil plant and atmospheric approach for higher efficiency indices.
4. Students develops skill to analyze the data on various aspect of crop growth and development, soil properties and cop-weather relationship using different advance statistical tools, and is able to establish cause and effect relationship to draw a reasonable conclusion.
5. Students develops knowledge and skill to become an academician to teach agricultural students, a researcher to take up applied and basic research and an extension specialist to impart training as resource person to trainers on the field of specialization.

CURRENT TRENDS IN AGRONOMY

COURSE NO- AGRON 601 **CREDIT hrs.- 3+0**

Objectives:

To acquaint the students about recent advances in crop production and soil management

Outcomes :

1. Students are able to understand recent developments in crop production technology, their principles
2. Students can apply crop production principles to establish cause and effective relationship with different agronomic traits
3. Knowledge is utilised to tune the crop production technologies with soil fertility and productivity for futther research

ADVANCES IN CROP GROWTH AND PRODUCTIVITY

COURSE NO- AGRON 602 **CREDIT hrs.- 3(2+1)**

Objectives :

To understand the physiology of vegetative and reproductive phases, their occurance, pattern and factors affecting it in relation to crop productivity under various environments.

Outcomes :

1. Students understand different growth parameters, occurance of phenophages and can establish their relationship with crop productivity.
2. Students can apply physiological principles to explain the productivity variations under varying biotic and abiotic stresses
3. Students can frame the field experiments involving physiological parameters to understand the effect of agronomic traits on crop growth and yield

ADVANCES IN SOIL FERTILITY MANAGEMENT

COURSE NO- AGRON 603 CREDIT hrs.- (2+1)

Objectives :

To acquaint the students on recent developments in soil fertility, emerging issues and application meausers in maintaining the soil health.

Outcomes :

1. Students are able to understand, explain and answer the question why the soil fertility parameters change with time under different agriculture production system and how to restore the soil health.
2. Students can advise farmers the crop -based fertilizers their forms,dose and application methods in tune with the location and soil test values.
3. Students develops the capabilities to frame the reserch progrmme involving various soil fertility parameters integrating the agronomical aspects.

CROP ECOLOGY

COURSE NO- AGRON 604 CREDIT hrs.- 2+0

Objectives:

To make the students understand about the agricultural systems, agro-ecological regions, farming situations and adaptation of crops to different agro-climatic conditions.

Outcomes :

1. The students are enriched with the knowledge of different agro ecosystems, farming situations, adaptation and adaptability of different crops under varying soil-climate-environment.

2. Develops capability to understand the changes occuring due to changes in crop

growing environment

3. Utilises the knowledge to make ammendments in crop growing environment suiting to crop utilising various production principles

CROP PRODUCTION AND SYSTEM MODELING

COURSE NO- AGRON 605 CREDIT hrs.- 2+1

Objectives:

To familiarize the students about systems approach and to simulate the yield of different crops under varied soil and weather conditions with different management practices and their optimization.

Outcomes :

1. Students can apply, develop and Validate different crop production system models utilizing real time data and assumptions in different crops under different soil environments.
2. Technological packages on optimum planting time, timing and amount of fertilizer, irrigation, plant population and planting geometry can be designed using models
3. Knowledge can be utilized to understand the potential impact of climate change on future crop productivity and helps in adopting Climate smart agriculture, mitigation and adaptation strategies.

IRRIGATION MANAGEMENT

COURSE NO- AGRON 606 CREDIT hrs.- 2+1

Objectives :

To teach students about optimization of irrigation water in different crops under different agro-climatic conditions.

Outcomes :

1. Students develops better understanding of soil-water-plant-atmosphere continuum, their interactions and effectively utilize in managing water meditating crop productivity in sustainable manner different irrigation scheduling criteria, methods to be employed under adequate under limited water

systems involving automation in crops and cropping system based on different geo-hydrological situations.

2. Students will be able to recommend suitable water saving technologies and irrigation methods with an aim to produce more crop per drop.
3. Students can formulate irrigation water management research, both onstation and onfarm using advance techniques for managing irrigation water and rain water coinjointly in different crops for higher irrigation and field efficiency

ADVANCES IN WEED MANAGEMENT

COURSE NO- AGRON 607 CREDIT hrs.- 2+0

Objectives:

To teach students on principles of weed science, weed dynamics, new generation herbicides; their application mode and amount, resistance, toxicity, antidotes and residue management under different cropping systems.

Outcomes :

1. Students are enriched with recent developments in herbicide , their selectivity and mode of action. phyto-toxicity and residual effects with emphasis on weed dynamics in various crops under different agro-ecological systems.
2. Students are able to recommend the weed management approach in integrated manner
3. They can formulate field experiments taking into account the soil type, crop and moisture condition and their impact on environment

SOIL CONSERVATION AND WATERSHED MANAGEMENT

COURSE NO- AGRON 608 2+1

Objectives :

To teach students on different soil moisture conservation technologies for enhancing the agricultural productivity through holistic approach on watershed management

Outcomes :

1. Students develops the knowledge on rainfall pattern, analytical techniques and conservation approaches
2. Students are able to adopt different water conservation techniques(Agronomic &

engineering) to effectively manage the surface runoff and increase the ground water recharge with an aim to increase the cropping intensity.

3. Students can better co-ordinate with line departments for effective formulation of research projects to develop modules for different watersheds

INTEGRATED FARMING SYSTEMS FOR SUSTAINABLE AGRICULTURE

COURSE NO- AGRON 609 CREDIT hrs.- 2+0

Objectives :

To apprise the students on different enterprises involving agriculture and allied fields suitable for different agro climatic conditions for sustained productivity nd income.

Outcomes :

1. Students are acquainted with the concept of farming system and IFS modules based on available resources and category of farmers to generate year round income following farmer first approach.
2. Self employment capability through agro-entrepreneurship development by utilizing the by products from different enterpriss.
3. Students can enhance their knowledge as well as develop eco-friendly farming system models in a sustainable manner through resource recycling.

STRESS CROP PRODUCTIONS

COURSE NO- AGRON 610 CREDIT hrs.- 2+1

Objectives :

To study various types of stresses in crop production and strategies to overcome them.

Outcomes :

1. Students are acquainted with different types of biotic and abiotic stresses, their physiology and effects on crop growth parameters , yield attributes and the final harvest and different techniques to mitigate the adverse effects of stresses.
2. Students are able to use the knowledge in better undestanding of causes affecting crop performance
3. Can formulate aims and objectives to study the effect of biotic and abioti stresses

on multidisciplinary mode.

AGRON 611 CONTINGENT CROP PLANNING 2+0

COURSE NO- AGRON 611 CREDIT hrs.- 2+0

Objectives:

To enrich the knowledge of students on different contingent crop planning suitable for different climatic hazards.

Outcomes:

1. Students knows the importance of contingent planning, its importance and use under different adverse situations
2. Can recommend contigent measures to different crops under different environmental hazards
3. Students can scene out the earlier work for effective implementation, can devdelop sinulation models different abberant weather condition.

EFFICIENT MANAGEMENT OF PROBLEM SOIL

COURSE NO- AGRON 612 CREDIT hrs.- 2+1

Objectives:

To enrich the knowledge of students on different soils not suitable for higher crop productivity, the constraints and imrovement technology

Outcomes:

1. Students can categories different soils based on their physical, chemical & biological properties and find out the cause (s) limiting the crop productivity
2. Students can apply various amelioration measures to improve the soil and make its suitable to achieve higher yield.
3. Can formulate research in collaberation on multidisciplinary mode to develop new tecnhniques for different probem soils with emphasis on locally available materials

Doctoral Seminar- I

COURSE NO- AGRON 691 CREDIT hrs.- 0+1

Objectives:

To develop capacity among the students to select research topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

- The students can select topic of research on emerging and important issues and present on PowerPoint.
- Exposure to preparation of power point presentation of the research work and to discuss their dissertation research and ability to answer.

Doctoral Seminar- II

COURSE NO- AGRON 692 CREDIT hrs.- 0+1

Objectives:

To develop capacity among the students to select research topic on important issues, preparation of power point covering the topic in different subheads, presentation style, eloquence and to develop ability to answer the questions.

Outcomes:

- The students can select topic of research on emerging and important issues and present on PowerPoint.
- Exposure to preparation of power point presentation of the research work and to discuss their dissertation research and ability to answer.

MINOR COURSES

TECHNIQUES IN PLANT PHYSIOLOGY

COURSE NO- PP602 CREDIT hrs.- 1+2

Objective

To impart recent practical training to study various physiological processes in plants.

Outcome

- Experimental knowledge on techniques used to know the physiological performance of a crop even at molecular level.

- Understanding the concepts and its applications, predictions and manipulations which can be projected on food assimilation, Carbon dioxide elevation, water and mineral use efficiency and their quantification.
- Appraisal on use of Radio isotopes in plant biology to understand the physiological processes.

POST HARVEST PHYSIOLOGY

COURSE NO- PP605 **CREDIT hrs.- 2+0**

Objective

To impart knowledge about physiological changes during senescence and ripening.

Outcome

- Students will enhance their knowledge on increasing the post harvest life of flowers, vegetable and seeds by controlled application of ripening hormones
- Knowledge on biotechnological approaches and its modification and inhibition at physiological, biochemical and molecular levels during senescence and ageing.
- Techniques for estimation of ripening related enzyme and hormone activity

WEED PHYSIOLOGY AND HERBICIDE ACTION

COURSE NO- PP607 **CREDIT hrs.- 1+1**

Objective

To apprise students regarding weed and crop competition, and physiological and

molecular aspects of herbicides.

Outcome

- Students will get overall knowledge weed biology, ecology and its physiology during competition with crop by growth and impact of allelochemicals.
- They will get an idea about physiological and molecular mechanisms of herbicides and their role, action, nature and selectivity towards developing resistance and tolerant varieties.

- Practical excellence in determination of various physiological and biochemical processes, pigment levels and enzymatic activities as affected by herbicides.

ADVANCES IN SOIL FERTILITY

COURSE NO- Soils 601 **CREDIT hrs.- 2+0**

Objective

To provide knowledge of modern concepts of soil fertility and nutrient use in crop production.

Outcome

- Knowledge on Students will learn the modern concepts of nutrient availability, nutrient movement in soil, chemistry of submerged soils, nutrient budgeting and efficiency
- Knowledge on soil fertility evaluation and site specific nutrient management (SSNM) for precision agriculture and monitoring physical, chemical and biological changes in soil.
- Techniques for soil fertility investigation, Laboratory pot and field experiments and interpretation of results.

ADVANCES IN SOIL MICROBIOLOGY

COURSE NO- Soils 606 **CREDIT hrs.- 2+1**

Objective

To make students learn the latest trends in soil microbiology like diversity, biological control and bioremediation.

Outcome

- Students will obtain clear concept regarding mechanism of evolution, monitoring, molecular ecology and biodiversity of microorganisms,
- Knowledge on microbial physiology, nutrition, metabolism, growth, biogeochemical cycles and interactions of microorganisms with environment.
- Practical excellence in isolation, characterization and enumeration of different microorganisms important for agriculture

LAND USE PLANNING AND WATERSHED MANAGEMENT

COURSE NO- Soils 608 **CREDIT hrs.- 2+0**

Objective

To teach the better utilization of land for agricultural purposes, and better management of run-off rain-water in the catchment area for agricultural purposes in a watershed.

Outcome

- Students will absorb knowledge about concept, techniques and factors of land use planning methods
- Learning in details about Agro-ecological regions/sub-regions of India for crop production
- Methods of land evaluation and land capability classification as well as soil-site suitability evaluation for different crops
- water harvesting and watershed management under land use planning.

Supportive courses

Statistical Methods

COURSE NO- STM 501 **CREDIT hrs.-2+1**

Objectives:

- This course lays the foundation of probability distributions and sampling distributions and their application which forms the basis of Statistical Inference.
- Together with probability theory, this course is fundamental tothe discipline of Statistics.
- The students are also exposed to correlation and regression, and order statistics and their distributions.
- Categorical data analysis is also covered in this course.

Outcomes:

- Statistical knowledge will expertise students to get proper result on research.
- Basic field experiment knowledge will help them in job seeking in research firms.
- Both quantitative and qualitative data analysis will guide them for project formulation.

Research Methodology

COURSE NO- STM 502 **CREDIT hrs.- 4+0**

Course objective – To describe and express the role and importance of research methodologies in the field of empirical research.

Course Outcome –

- Knowledge on different types of research.
- Knowledge on data collection and analysis.
- Knowledge on various statistical methods.

NON-CREDIT COURSES

LIBRARY AND INFORMATION SERVICES

COURSE No.:- PGS 501 **CREDIT hrs. :- (0+1)**

Objective

To equip the library users with skills to trace information from libraries efficiently, to apprise them of information and knowledge resources, to carry out literature survey, to formulate information search strategies, and to use modern tools (Internet, OPAC, search engines etc.) of information search.

Outcome:

1. Identify library services and availability of resources in order to develop a realistic overall plan for research to achieve a manageable focus appropriate to the assignment criteria, available resources, and evidence needed to support thesis.
2. Identify keywards, synonyms and related terms in order to flexible search information resources including: Internet, electronic library catalogs and print materials.
3. Identify the range of information source types available (such as peer-reviewed journals), newspaper articles, books, reference sources, etc) their distinguishing characteristics and intended audience, in order to select those appropriate based on the information need.
4. Identify the features and content of different research tools (such as database, catalogs and websites) in order to search those most appropriate to the information need.

TECHNICAL WRITING AND COMMUNICATIONS SKILLS

COURSE No.:- PGS 502 CREDIT hrs. :- (0+1)

Objective

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). While the emphasis will be on writing, oral communication of scientific and technical information will form an important component of the course, as well.

Outcomes

By the end of this course students will be able to

- Develop skills that will enable to produce clear and effective scientific and technical documents.
- Use visual items in effectively constructing meaning in communication situations.
- Create clear, concise technical documents that effectively use style and grammar and information structure in ways that create meaning with the reader.
- Collaborate effectively in various writing situations, including planning, creating, and managing, evaluating, editing and revising document production

INTELLECTUAL PROPERTY AND ITS MANAGEMENT IN AGRICULTURE

COURSE No.:- PGS 503 CREDIT hrs. :- (1+0)

Objective:

The main objective of this course is to equip students and stakeholders with knowledge of intellectual property rights (IPR) related protection systems, their significance and use of IPR as a tool for wealth and value creation in a knowledge-based economy.

Outcome:

13) Exposure to various types intellectual property rights.
14) Idea on various acts and agreements related to IPR.
15) Knowledge on protection of plant varieties under UPOV and PPV&FR Act of India, Plant breeders rights, and farmers rights.

BASIC CONCEPTS IN LABORATORY TECHNIQUES

COURSE No.:- PGS 504 CREDIT hrs. :- (0+1)

Objective

To acquaint the students about the basics of commonly used techniques in laboratory.

Outcome

- A brief knowledge on the safety protocols to be followed in a laboratory and handling of various equipments present in the laboratory.
- Knowledge on preparations of several standard solutions, agro-chemical doses, buffers,etc for laboratory and field purposes.
- Testing the seed viability, pollen viability and description of flowering plants.

(e-Course) AGRICULTURAL RESEARCH, RESEARCH ETHICS AND RURAL DEVELOPMENT PROGRAMMES

COURSE No.:- PGS 505 CREDIT hrs. :- (1+0)

Objective

To enlighten the students about the organization and functioning of agricultural research systems at national and international levels, research ethics, and rural development programmes and policies of Government.

Outcomes

- By the end of this course scholars will be sensitize about the basic issues related with agricultural research, ethics in research as well as rural development.
- The scholars will be also educated about principles and philosophy of rural development and various ongoing rural and community development programmes and policies.
- Students will also be motivated towards practising and promoting ethics in research and developmental endeavours.

DISASTER MANAGEMENT

COURSE No.:- PGS 506 CREDIT hrs. :- (1+0)

Objectives

To introduce learners to the key concepts and practices of natural disaster management; to equip them to conduct thorough assessment of hazards, and risks vulnerability; and capacity building.

Outcome

- A brief knowledge on nature and effects of different natural disasters and their management
- Knowledge on different types of man-made disasters and their management
- Appraisal on different organizations involved in disaster management at national and global level

Ph.D. (Agriculture) in Soil Science & Agricultural Chemistry

Programme Specific Objective

- Soil Science and Agricultural Chemistryis an area of learning focuses on the soil analysis, study, and research of nutrient profile of the soil so as to attain enhanced productivity and efficiency from the soil.
- As a sub-domain of agricultural science, it is aligned towards the study of enhancement of agricultural productivity through the mechanism of soil enrichment
- delivering holistic research-based domain specific skill and knowledge to the students so that they can contribute in a sustainable manner.

Programme Specific Outcome

Ph.D in Soil Science and Agriculture Chemistry is a higher-grade academic program in the domain of agricultural sciences with a specialization in soil science and application of chemistry's principle in the agricultural context.

The most important outcomes of Ph.D study are

- knowledge enhancement, communication, problem solving, analytical approach, research skill , entrepreneurship skills, ethics and intellectual property rights(IPR), strengthen of soil and water resources, develop decision support system through modelling and GIS techniques, enhance the efficiency of macro- and micro-nutrients through soil and plant analysis techniques and develop ability to use innovative techniques for improving soil efficiency**.**
- A doctorate degree holder in the area of Soil Sciences and Agriculture Chemistry has a variety of options to choose from in terms of his/her career. He/she can make a start with firms/areas such as soil research centres, Agriculture universities, Animal husbandry, Horticulture, Plant taxonomy etc.

- The students are well-equipped with the knowledge and application of the subject and are thus suitable for undertaking various roles at practical and industrial level.

MAJOR COURSES

Soils 601 ADVANCES IN SOIL FERTILITY 2+0

Objective

To provide knowledge of modern concepts of soil fertility and nutrient use in crop production.

Outcome

• Knowledge on Students will learn the modern concepts of nutrient availability, nutrient movement in soil, chemistry of submerged soils, nutrient budgeting and efficiency

• Knowledge on soil fertility evaluation and site specific nutrient management (SSNM) for precision agriculture and monitoring physical, chemical and biological changes in soil.

• Techniques for soil fertility investigation, Laboratory pot and field experiments and interpretation of results.

Soils 602 SOIL GENESIS AND MICROPEDOLOGY 2+0

Objective

To impart knowledge about the pedogenic processes in soils and to acquaint with the micro-pedological study of soil profile.

Outcome

• The students will be able to understand weathering and pedogenic processes for formation of soil

• Knowledge on micro pedological features of soil

• Assessment of soil profile development

Soils 603 ACID SOIL MANAGEMENT 2+1

Objective

To impart knowledge about distribution of acid soils in India and the modern concepts of acid soils management.

Outcome

• The students will gain knowledge about the genesis, classification as well as chemical properties of acid soils and effects of soil acidity on soil components and plants.

• They will be also able to know about different liming materials requirements and effect of lime on soil properties in acid soils

• Techniques of analysing various soil parameters for determination, characterization and management of soil acidity.

Soils 604 ADVANCES IN SOIL PHYSICS 2+0

Objective

To provide knowledge of modern concepts in soil physics.

Outcome

• Students will acquire knowledge about soil water potential and interactions, fundamental fluid flow, movement of salts in soil and soil thermal properties

• Knowledge on management of soil structure and measurements of solar and terrestrial radiation

• Practical excellence in analysing various physical properties of soil.

Soils 605 PHYSICAL CHEMISTRY OF SOILS 2+0

Objective

To impart knowledge about modern concepts of physical chemistry of soils and clays, with emphasis on understanding the processes involved with practical significance.

Outcome

• Learning in details about the colloidal chemistry, ion exchange and thermodynamics of nutrient transformations in soils.

• Knowledge on adsorption/desorption isotherms, Common solubility equilibria and electrochemical properties of clays

• Practical excellence in analysing various chemical properties of soil.

Soils 606 ADVANCES IN SOIL MICROBIOLOGY 2+1

Objective

To make students learn the latest trends in soil microbiology like diversity, biological control and bioremediation.

Outcome

• Students will obtain clear concept regarding mechanism of evolution, monitoring, molecular ecology and biodiversity of microorganisms,

• Knowledge on microbial physiology, nutrition, metabolism, growth, biogeochemical cycles and interactions of microorganisms with environment.

• Practical excellence in isolation, characterization and enumeration of different microorganisms important for agriculture

Soils 607 BIOCHEMISTRY OF SOIL ORGANIC MATTER 2+0

Objective

To impart knowledge related to chemistry and reactions of organic substances and their significance in soils.

Outcome

Students will study regarding

• organic matter pools , its function and their fate in soils

• Decomposition of organic residues in soils and biochemistry of humus formation

• nutrient transformation and chemistry of clay -OM complexes.

Soils 608 LAND USE PLANNING AND WATERSHED MANAGEMENT 2+0

Objective

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 for agricultural purposes in a watershed.

Outcome

• Students will absorb knowledge about concept, techniques and factors of land use planning methods

• Learning in details about Agro-ecological regions/sub-regions of India for crop production

• Methods of land evaluation and land capability classification as well as soil-site suitability evaluation for different crops

• water harvesting and watershed management under land use planning.

Soils 609 SOIL QUALITY APPRAISAL 1+1

Objective

To introduce the concepts of soil quality and its significance to familiarize students with modern developments in soil quality issues environmental implications as well as economic productivity, seeking to be more holistic in its approach.

Outcome

• The students will know about social issues, soil quality, concepts, indicators, ecosystem, relationship between stability and sustainability

• Appraisal on assessment and management of soil quality as well as various initiatives on maintaining soil health.

• Practical excellence in analysis of plant and soil samples as physical, chemical and biological indicators for evaluating plant health and soil quality

Soils 610 MODELING SOIL PHYSICAL PROCESSES 2+0

Objective

To teach about theoretical models for predicting water and salt transport processes in soils.

Outcome

Students will be able to understand about mathematical tools, random variables, functions, modelling potentials and limitations, numerical approximations, unsaturated flow, mathematical models for miscible displacements and water uptake by roots.• Students will be able to understand about mathematical tools, random variables, functions, modelling potentials, numerical approximationsand their limitations.

• Adequate information on mathematical models for evaluating water movement in soil, water uptake by roots and ion transport to plant system.

• Basic knowledge on use of modelling in assessing salinity stress, erosion studies and contaminant dynamics in soil-water interface.

MINOR COURSES

PP 602 TECHNIQUES IN PLANT PHYSIOLOGY 1+2

Objective

To impart recent practical training to study various physiological processes in plants.

Outcome

• Experimental knowledge on techniques used to know the physiological performance of a crop even at molecular level.

• Understanding the concepts and its applications, predictions and manipulations which can be projected on food assimilation, Carbon dioxide elevation, water and mineral use efficiency and their quantification.

• Appraisal on use of Radio isotopes in plant biology to understand the physiological processes.

AGRON 602 ADVANCES IN CROP GROWTH AND PRODUCTIVITY 2 + 1

Objective

To study the physiology of vegetative and reproductive growth in relation to productivity of different crops in various environments.

Outcome

1. Students undestand different growth parameters, occurance of phenophages and can

establish their relationship with crop productivity.

2. Students can apply phsiological principles to explain the productivity variations under varying biotic and abiotic stresses

3. Students can frame the field experiments involving physiological parameters to understand the effect of agronomic traits on crop growth and yield

PP 605 POST HARVEST PHYSIOLOGY 2+0

Objective

To impart knowledge about physiological changes during senescence and ripening.

Outcome

• Students will enhance their knowledge on increasing the post harvest life of flowers, vegetable and seeds by controlled application of ripening hormones

• Knowledge on biotechnological approaches and its modification and inhibition at physiological, biochemical and molecular levels during senescence and ageing.

• Techniques for estimation of ripening related enzyme and hormone activity

PP 607 WEED PHYSIOLOGY AND HERBICIDE ACTION 1+1

Objective

To apprise students regarding weed and crop competition, and physiological and

molecular aspects of herbicides.

Outcome

• Students will get overall knowledge weed biology, ecology and its physiology during competition with crop by growth and impact of allelochemicals.

• They will get an idea about physiological and molecular mechanisms of herbicides and their role, action, nature and selectivity towards developing resistance and tolerant varieties.

• Practical excellence in determination of various physiological and biochemical processes, pigment levels and enzymatic activities as affected by herbicides.

SUPPORTIVE COURSES

19 PHDCM100 Research methodology 1+1

Objective

To describe and express the role and importance of research methodologies in the field of empirical research.

Outcome

• Knowledge on different types of research.

• Knowledge on data collection and analysis.

• Knowledge on various statistical methods.

STM-501 Statistical method 2+1

Objective

To acquaint students with different statistical tools and analysis

Outcome

• Statistical knowledge will expertise students to get proper result on research.

• Basic field experiment knowledge will help them in job seeking in research firms.

• Both quantitative and qualitative data analysis will guide them for project formulation.