PALLI SIKSHA BHAVANA
(Institute of Agriculture)

Department of Agronomy

AGR111 FundamentalsofAgronomy-I

Objectives:

To impart knowledge on basics of Agronomy – its scope, identification of tillage implements, to understandtheroleofplantnutrients-theirsource,andrate,methodandtimeofapplicationand to identify weed flora, their occurrence and management strategies for major field crops, knowledge on use of herbicides, application methods, herbicide selectivity andresistance.

Learning Outcome

Developing the skill on crop-based plant nutrition, their sources and application schedule, techniques to apply nutrient as foliar spray. Ability in identifying weeds of crop fields and non- cropped areas, their management, herbicide types and their spraying techniques

AGR112 IntroductiontoForestry

Objectives:

To impart fundamental knowledge of tree science and agroforestry

Learning Outcome:

Students will gain fundamental knowledge of forestry as well as agroforestry.

AGR121 FundamentalsofAgronomy-II

Objectives:

To give basic concept of growth, development, soil-water-plant relationship, quality of irrigation water, water logging, irrigation scheduling and method of irrigation

Learning Outcome:

Students learned about basic idea about growth and development, soil-water-plant relationship, quality of irrigation water, irrigation scheduling, different types of irrigation method and acquainted with different instruments related to soil moisture estimation and methodology.

AGR211 Crop Production Technology-I(KharifCrops)

Objectives:

Students will be oriented with the origin, geographic distribution, morphology, classification, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif cereals, pulses, oilseeds, fibre crops, forage crops

OBJECTIVES AND OUTCOMES

Learning Outcome:

Students were oriented with the origin, geographic distribution, morphology, classification, economic importance, soil and climatic requirement, varieties, cultural practices and yield of kharif cereals, pulses, oilseeds, fibre crops, forage crops

AGR221 Crop Production Technology-II(Rabicrops)Objectives:

Students will be oriented with the Origin, geographic distribution, morphology, classification, economicimportance,soilandclimaticrequirement,varieties,culturalpracticesandyieldof Rabi cereals, pulses, oilseeds, fibre crops, forage crops and commercialcrops

Learning Outcome:

Students were oriented with the origin, geographic distribution, morphology, classification, economicimportance,soilandclimaticrequirement,varieties,culturalpracticesandyieldof rabi cereals, pulses, oilseeds, fibre crops, forage crops and commercialcrops

AGR222 Farming System andSustainableAgriculture

Objectives:

To understand the farming system and integrated farming system (IFS)- and its components in different agro-climatic zones, efficient cropping systems and their evaluation, sustainable agriculture and its importance.

Learning Outcome:

Developmentofincreasedknowledgeonfarmingsystem-itscomponents,croppingsystemsand site specific IFS model and sustainable crop managementpractices.

AGR223 Introductory Agrometeorology &ClimateChange

Objectives:

To impart knowledge on weather elements and their role in crop production, climate change – its causes and impact and basics of weather forecasting.

Learning Outcome:

Development of skill on determination, estimation and measurement of different weather parameters and analysis of atmospheric condition in relation to crop production.

OBJECTIVES AND OUTCOMES

AGR 311 Geoinformatics and Nano-technology forPrecisionFarmingObjectives:

To give basic idea to students about Precision agriculture, GIS, Remote sensing concepts and application in agriculture, System Simulation, crop Simulation Models, STCR approach for precision agriculture, Nanotechnology.

Learning Outcome:

Precision agriculture, GIS, Remote sensing concepts and application in agriculture, System Simulation, crop Simulation Models, STCR approach for precision agriculture, Nanotechnology.

AGR312 Principles ofOrganicFarming Objectives:

To give basic concept of organic farming, various organic components, how to control disease and pest through organic inputs, certification of organic products

Learning Outcome:

Student can explain the concepts of organic farming. Use of various organic inputs for crop production, use of non-synthetic agents for crop production, will get some idea about organic certification.

AGR313 Practical Crop Production-I*(Kharif*Crops*)* 2(0+2) Objectives:

Studentswillbeorientedwiththeprinciplesofcropplanningandselectionofcrop;studentswil l be given practical experience on raising of crops in their field with special emphasis on the agronomic management of the crop; students will be familiarized with the calculation of economics of cropcultivation

Learning Outcome:

Students got the knowledge of principles of crop planning and selection of crop; students gathered the field experience on raising of crops in their field with special emphasis on the agronomicmanagementofthecrop;studentswerefamiliarizedwiththecalculationofecono mics of cropcultivation

OBJECTIVES AND OUTCOMES

AGR321 Practical Crop Production-II*(RabiCrops)*

***O*bjectives:**

Studentswillbeorientedwiththeprinciplesofcropplanningandselectionofcrop;studentswil l be given practical experience on raising of crops in their field with special emphasis on the agronomic management of the crop; students will be familiarized with the calculation of economics of cropcultivation

Learning Outcome:

Students got the knowledge of principles of crop planning and selection of crop; students gathered the field experience on raising of crops in their field with special emphasis on the agronomicmanagementofthecrop;studentswerefamiliarizedwiththecalculationofecono mics of cropcultivation.

AGR322 Rainfed Agriculture andWatershedManagement

Objectives:

To impart knowledge on rainfed agriculture and its problems, prospect, soil conditions,drought and its effect, mechanism of crop adaptation, water harvesting, Technologies for efficient precipitation collection, conservation and its utilization, contingent crop planning for aberrant weather conditions, Concept, Objectives, principles and components of watershed management, factors affecting watershedmanagement.

Learning Outcome:

Developing the knowledge about rainfed agriculture, learn about crop production technology under rainfed condition; learn about contingent crop planning for aberrant weather conditions, watershed management.

AGRICULTURAL BIOCHEMISTRY

ACB111 Fundamentals ofPlantBiochemistry

Objectives:

ThemajorObjectivesofbiochemistryisthecompleteunderstanding,atthemolecularlevel,o fall of the chemical processes associated with living cells and organisms. Biochemistry, as the name implies, is the chemistry of living organisms. It has its origin in chemistry and biology. It tries to explainlifeprocessesatmolecularlevel.Livingorganismshavecertainextraordinaryproper ties.
Theycangrow,respondtostimuliandreplicatethemselveswithhighfidelity.Alltheseactiviti es are ultimately interpretable in chemical terms. The lifeless organic molecules with appropriate
complexityandpropertiesmakealivingthing.Thebasicphenomenaofbiochemistryaretoun derstand how the collections of inanimate molecules that constitute living organisms interact with each other to maintain life.

OBJECTIVES AND OUTCOMES

Learning Outcome:

ThestudyofBiochemistryhelpstounderstandthebiomoleculesandactualchemicalconcept sof living cell and organisms. This knowledge helps to understand the functioning of various processesandpathwaysoccurringintheplantatdifferentstagesofthelifeoftheplant.Studen ts will learn the importance of Biochemistry, properties of water and role of water in living organisms, buffers and pH. Students will learn the importance and structure biomolecules, i.e., carbohydrates, lipids, nucleic acids and proteins. Students will also understand the catalytic activity of enzymes and how the enzymes are regulated. Students will also understand how the energy is generated in the living organism from carbohydrates and lipids for the sustenance of the living organisms. Apart from this, students will also learn from the laboratory classes the preparation of standard solutions, preparation of buffers and how the buffer resists the change of pH. Students will learn how to differentiate the carbohydrates and amino acids by qualitative reactions of carbohydrates and amino acids, how to quantitatively estimate the molecules such as glucose, proteins, amino acids and lipids by colorimetry and titrimetry, enzyme activity and factors affecting the enzyme activity, and chromatographic separation of molecules such as sugars and aminoacids.

GENETICS AND PLANT BREEDING

GPB121 FundamentalsofGenetics

Objectives:

This lesson deals with heredity and the reasons behind the variation among individuals of the same species. It also includes diagnostic techniques to find out the bases for types of sex determination,inheritanceofbloodgroupsinhumans,hereditarydisordersandgivesaninsi ght up the human genome asamniocentesis.

Learning Outcome:

Students will understand the basic concepts of the ultrastructure of cell, cell organelles, chromosomes and nucleic acids; apply the principles of inheritance to plant breeding; acquaint with the fundamentals of chromosomal and cytoplasmic inheritance; sex determination, mutations and chromosomal aberrations.

GPB211 Fundamentals ofPlantBreeding

Objectives:

To impart knowledge to the students on the principles and procedures of plant breeding in self and cross pollinated crops to develop the high yielding varieties / hybrids.

OBJECTIVES AND OUTCOMES

Learning Outcome:

Students will learn breeding procedures in self and cross pollinated crops; understand exploitation of heterosis utilizing male sterility and other methods; know about the various population improvement programmes; study about the fundamentals of mutation, polyploidy and wide hybridization and their role in crop improvement.

GPB311 Crop Improvement –I(*Kharif*)
Objectives:

Toimpartknowledgetothestudentsonthebotanicaldescription,origin,distributionandvarious

breeding approaches used for the development of varieties / hybrids in various field and horticultural crops

Learning Outcome:

Students will understand the origin, distribution and different breeding methods to be adopted for the development of varieties / hybrids in various field and horticultural crops; about the plant genetic resources, centres of diversity and breeding for resistance to biotic and abiotic stresses; learn about the influence of Genotype x Environment interaction on yield / performance.

GPB321 Crop Improvement –II(*Rabi*)
Objectives:

Toimpartknowledgetothestudentsonthebotanicaldescription,origin,distributionandvarious

breeding approaches used for the development of varieties / hybrids in various field and horticultural crops

Learning Outcome:

Students will understand the origin, distribution and different breeding methods to be adopted
forthedevelopmentofvarieties/hybridsinvariousfieldandhorticulturalcrops;aboutthepla nt genetic resources, centres of diversity and breeding for resistance to biotic and abiotic stresses; learn about the influence of Genotype x Environment interaction on yield /performance.

GPB322 Principles ofPlantBiotechnology
Objectives:

To impart knowledge to the students on the various techniques of plant tissue culture, principles of plant biotechnology and their role in crop improvement.

OBJECTIVES AND OUTCOMES

Learning Outcome:

Students will understand the various techniques of plant tissue culture; know about the fundamentals of genetic engineering; about molecular markers and Marker Assisted Selection.

SOIL SCIENCE & AGRICULTURAL CHEMISTRY

SSC111 Fundamentals ofSoilScience
Objectives:

The students are expected to gain both theoretical as well as practical knowledge on different aspects of fundamental of soil science like genesis of soil, soil profile, various properties of soil viz.,soiltexture,soilstructure,soildensity,soilcolour,soiltemperature,soilair,soilcolloid,soil organic matter, soil organismsetc.

Learning Outcome:

Students will acquire knowledge on fundamental and basic aspects of soil science.

SSC211 Manures, Fertilizers and SoilFertilityManagement
Objectives:

Thestudentsareexpectedtogainboththeoreticalaswellaspracticalknowledgeonclassification, composition, and properties of N, P and K fertilizers, complex fertilizers, secondary and micro nutrient fertilizers, soil amendments, organic manures, integrated nutrient management, different techniques of soil fertility evaluationetc.

Learning Outcome:

Students will acquire knowledge on manures, fertilizers and soil fertility management.

SSC221 Problematic Soils andtheirmanagement
Objectives:

Thestudentsareexpectedtogainknowledgeondistribution,genesis,characteristics,reclamation and management of various problematic soils like acid soil, saline soil, alkali soil, saline-alkali soil, eroded soil, flooded soil, compact soil etc, irrigation water quality and standard, soil health andquality,pollutedsoils,bioremediationofproblemsoilthroughMPTsofsoils,landcapability classificationetc.

Learning Outcome:

Students will acquire knowledge on knowledge on distribution, genesis, characteristics, reclamation and management of various problematic soils.

AGRICULTURAL ENTOMOLOGY

OBJECTIVES AND OUTCOMES

AEN121 FundamentalsofEntomology

Objectives:

To acquaint the students about classification of insect upto infra-ordeal characteristics and externalmorphologyoftheinsect'sbodyi.e.,head,thoraxandabdomen.Makethemawarea bout different physiological systems of insect and to have a basic concept on InsectEcology.

Learning Outcome:

Outcome:Attheendofthecoursestudentswillacquiretheknowledgeoninsect'sbodystructu re and function. Also they will learn the various interactions in the environment including population dynamics of insect and natural balance oflife.

AEN311 Management ofBeneficialInsects

Objectives:

To familiarize the students with entrepreneurial opportunities in entomology, provide information on productive insects and their products, as well as acquaint them with the mass production techniques and field evaluation of various biological control agents like parasitoids, predators and various entomopathogenic microorganisms.

Learning Outcome:

Upon completion of the course students will acquire the skills through hands on training on sericulture, apiculture and lac culture and develop entrepreneurship. Also they will learn different pest suppression strategies including bioagents.

AEN 321 Pests of Crops and Stored Grains andtheir Management

Objectives:

To familiarize the students about nature of damage and seasonal incidence of insect pests that causes loss to major field & vegetable crops along with their effective management by different methods. To understand the role of stored grain pests and to acquaint with various stored grain pest management techniques Also to impart knowledge on theory and practice of biological control.

Learning Outcome:

Aftercompletionofthecoursestudentswillbeacquaintedwithvariousinsect-pestsofcropstheir damage symptoms and learn the techniques of integrated pest management. Also develop an ideaonstoredgrainpestsandstoragestructure.Theywilldevelopexpertiseinbiologicalcontr ol.

AGRICULTURAL ECONOMICS

AEC121 Fundamentals ofAgriculturalEconomics

OBJECTIVES AND OUTCOMES

Objectives:

To develop the theoretical concept of the subject matter and its' application in the field of agriculture in general.

LearningOutcome:

Studentswillbeabletodeveloptheoreticalconceptsregardingthesubjectmatterandwillbeable to understand the possible application in the field ofagriculture

AEC211 Agricultural FinanceandCo-Operation
Objectives:

To understand the concept, role and importance of Agricultural Finance in India and to develop the knowledge of functioning of different financial organizations and financial policies pertaining to agriculture sector.

Learning Outcome:

On the completion of the course, students will be able to develop knowledge about the financial system prevailing in India and functioning of different financial organization along with developing quantitative ability to judge financial statements.

AEC221 Agricultural Marketing, TradeandPrices
Objectives:

To understand the concept and process of marketing of farm products produced by farmers and of farm inputs and services required by them in the production of these farm products.

Learning Outcome:

Students will develop the theoretical concept of process of marketing of farm products and cultivate the quantitative skills to analyse different marketing functions and efficiency of different markets

AEC321 Farm Management, Production and Resource Economics Objectives:

To develop the understanding of production process and the guiding economic principle for agricultural production; to apply the appropriate economic principle under different production scenario to optimize the production process

Learning Outcome:

Students will be able to acquire necessary theoretical and analytical skills to optimise the agricultural production and analyse the financial health of any farm for possible progress towards maximisation of profit.

AEC322 IntellectualPropertyRights

Objectives:

To understand the concept of Intellectual property rights and its implications.

Learning Outcome:

StudentswillbeabletograsptheconceptofIntellectualPropertyrightsanddifferentactsrelated to IPR issues.

AGRICULTURAL ENGINEERING

AEG121 Introductory Soil and WaterConservationEngineering

Objectives:

To acquaint and equip the students with soil and water conservation techniques, soil erosion problems and control measures, design of irrigation channels, land surveying and levelling.

Leaning Outcome:

This course enables the students to have understanding about the soil degradation and their effects, estimation of soil loss, soil erosion control measures, soil and water conservation technologies, water conveyance systems, land surveying and levelling.

AEG211 Farm MachineryandPower

Objectives:

Toacquaintandequipthestudentswithvariousfarmtools,implementsandmachineryavailable for agricultural operations in the field to reduce drudgery of the farmers ensuring timely farm operations.

Learning Outcome:

The students will know different machines, their operations as well as repair and maintenance. They will have sound knowledge on various engines their power output and cost estimation. It will also support them for selecting suitable equipment for a particular agricultural operation.

AEG212 Principles of Food ScienceandNutrition

Objectives:

To acquaint and equip the students with fundamentals of food science, food microbiology, food processing and preservation, food nutrition, malnutrition, energy metabolism, menu planning and modern trends

OBJECTIVES AND OUTCOMES

Leaning Outcome:

Thiscourseenablesthestudentstohavebasicknowledgeonvariousmethodsoffoodprocessing and preservation, food composition, food chemistry, food microbiology, food nutrition, nutritional disorders, energy metabolism and balanceddiets.

AEG221 Renewable Energy andGreen Technology
Objectives:

To understand and explore various alternatives sources of energy to replace the traditional energy sources, such as: coal or petroleum etc.

Learning Outcome:

Thestudentswillknowledgeonalternativeenergysources,theiradvantagesandlimitations, idea of technology available to produce and utilize renewable energy in agriculture and daily uses, and encourage them to be the ambassador for new energy sources at lowprice.

AEG321 Protected Cultivation andSecondaryAgriculture
Objectives:

To acquaint and equip the students with the greenhouse technology for crop cultivation and its design,materialsandequipmentandpostharvesttechnologyofcereals,pulsesandoilseeds with special emphasis on theirequipments.

Leaning Outcome:

This course enables the students to have basic knowledge on greenhouse construction, greenhouse cooling, heating, micro irrigation, drying systems, properties of biological materials, seed processing, drying, driers, grain storage, parboiling, milling, size reduction.

PLANT PATHOLOGY

PPC121 AgriculturalMicrobiology
Objectives:

To provide basic knowledge about the microorganisms, their importance and role in nature.

Learning Outcome:

Helpthelearnersforidentifythemicroorganisms,theirroleineco-systemand bio

- diversity.

OBJECTIVES AND OUTCOMES

PPC211 Fundamentals ofPlantPathology
Objectives:

To provide basic knowledge about the pathogens their ecology, reproduction and concept of management of pathogens.

Learning Outcome:

Help the learners for identify the pathogen, behaviour and their inter relationship with crop plants.

PPC311 Diseases of Field & Horticultural Crops &theirManagement-I
Objectives:

To generate overall knowledge about the diseases of kharif cereals and horticultural crops.

Learning Outcome:

Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.

PPC 321 Diseases of Field & Horticultural Crops &theirManagement-II)

Objectives:

To generate overall knowledge about the diseases of winter cereals and horticultural crops.

Learning Outcome:

Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.

PPT311 Principles of Integrated Pest andDiseaseManagement
Objectives:

To generate knowledge about IDM and IPM

Learning Outcome:

Acquired knowledge may help the students for developing IPM and IDM modules.

HORTICULTURE

HOR111 FundamentalsofHorticulture
Objectives:

The students are expected to gain knowledge on concept of horticulture along with different branches of horticulture, classification of horticultural crops, soil and climate, training pruning,

kitchengarden,gardentypes,lawn,medicinalandaromaticplants,spicesandcondiments,plant bio-regulators and application of irrigation andfertilizer.

Learning Outcome:

Students will acquire knowledge on fundamentals of horticulture

HOR211 Production Technology for VegetableandSpices Objectives:

To gain knowledge on production technology of vegetable and spice crops production technology.

Learning Outcome:

This is expected that the students will acquire basic knowledge on different vegetable and spice crops.Theyareexpectedtogainskillonfieldmanagementofdifferentvegetableandspicecrops.

HOR 221 Production Technology for Ornamental Crops, MAPs and Landscaping

Objectives:

The students are expected to gain knowledge on production technology of ornamental crops, aromatic and medicinal plants, their importance and uses.

Learning Outcome:

Students will acquire knowledge on production technology and processing of ornamental crops, aromatic and medicinal plants, their importance and uses.

HOR 222 Production Technology for Fruit andPlantationCrops 2(1+1)

Objectives:

Thestudentsareexpectedtogainknowledgeonfruitandplantationcropindustry inIndiaalong with the production technology of some important fruits and plantationcrops.

Learning Outcome:

Students will acquire knowledge on production technologies of important fruits and plantation crops grown in India

HOR 321 Post-harvest Management and Value Addition of Fruits and Vegetables Objectives:

The students are expected to gain knowledge on various management technologies on pre- harvest and post harvest of fruits and vegetables. Students are also expected to gain knowledge on conventional and modern packaging methods; principles of preservation and methods of preservation.

OBJECTIVES AND OUTCOMES

Learning Outcome:

Studentswillacquireknowledgeonmaturityindicesandphysiologyofripeningofhorticultural crops,preandpostharvestmanagementpractices,methodsofharvestingdiseasesanddisorders, novel packaging and modern storage techniques, value addition and preservation of fruits and vegetables and ornamentalcrops.

OBJECTIVES AND OUTCOMES

AGRICULTURAL EXTENSION AND COMMUNICATION

AEX111 Comprehension and Communication SkillsinEnglish
Objectives:

To make the students knowledgeable about functional and corporate English as well as to enhance their skill in English communication in profession and academics.

Learning Outcome:

Students are expected to have sufficient knowledge and skill in English communication in corporate and professional field.

AEX112 Rural Sociology &EducationalPsychology
Objectives:

To orient the students regarding different concepts and issues of rural sociology and educational psychology.

Learning Outcome:

Thelearnersareexpectedtodevelopexpertiseondifferentconceptsandissuesofruralsociology and educationalpsychology.

AEX 121 Fundamentals of AgriculturalExtensionEducation)
Objectives:

To orient the students regarding fundamental concept of agricultural education, extension programme planning, rural development programmes, rural leadership, extension administration, extension journalism, extension teaching methods, adoption and diffusion of innovation, monitoring and evaluation.

Learning outcome:

The students are expected to develop concept and skills on the following aspects of extension education: fundamental concept of agricultural education; extension programme planning;rural development programmes; rural leadership; extension administration; extension journalism; extension teaching methods; adoption and diffusion of innovation; monitoring andevaluation

AEX122 Communication Skills andPersonalityDevelopment
Objectives:

Personality development is an indispensable tool that helps the student community to flourish personal and professional skill. Good communication is vital to any institution's successful operationandequallyimperativeforpersonalitydevelopment.Thiscourseisathoroughattempt to present the aforesaid concepts to the students to gaze the difficult situations and handle them appropriately.

OBJECTIVES AND OUTCOMES

Learning Outcome:

A student community that think positively and masterfully with confidence and faith, and life becomes more secure, more fraught with activity, richer in achievement and experience.

AEX 311 Entrepreneurship Development andBusinessCommunication

Objectives:

To orient the students regarding genesis, concept, types and importance of entrepreneurship. To provide understanding of the functioning and management aspects of entrepreneurship and associated policies, programmes, approaches and business communication; to develop knowledge and skills in analyses of entrepreneurial motivation, SWOT, management of entrepreneurship.

Learning Outcome:

Understandingoftheconceptandfeaturesofentrepreneursandentrepreneurshipandthere lated management and communicationalaspects Learning of different tools and techniques for analyses of entrepreneurial activities and entrepreneurship including development, implementation, management, monitoring and evaluation of the entrepreneurship/ enterprise.

CROP PHYSIOLOGY

CPH 211 Fundamentals ofCropPhysiology

Objectives:

To give students a greater understanding of the crop physiological processes such as water metabolism,mineralnutrition,photosynthesis,respiration,fattyacidmetabolism,flowerin gand plant growth regulators; to stimulate their learning of basic concepts in crop growth, development and factors affecting growth and productivity of crops; to make the students familiarwithrecentadvancesincropphysiologicalresearch;tointegratetheirknowledgeofc rop physiology in research of other disciplines ofagriculture

Learning Outcome:

Students will understand about different aspects of crop physiological processes and their applications in agricultural research; students will understand the physiological basis of yield variationincropplants;theknowledgeincropphysiologyacquiredbythestudentswillbeusef ul for achieving higher productivity ofcrops.

CPH 221 Principles ofSeedTechnology

Objectives:

To give students a greater understanding about various aspects of seed science and technology includingseedsofgeneticallymodifiedcrops;todevelopawarenessamongthestudentsonseed laws and regulations; to train the students in research on seed production, certification,testing,drying, processing, storage, marketing; to strengthen human resources in the seed production technology of field crops and vegetables

Learning Outcome:

The students will understand various aspects of seed technology such as quality, production, multiplication,certification,testing,processing,storageandmarketing;thestudentswillbecome aware of different legislative measures which regulate production and sale of seeds in India; the knowledge in seed production technology and marketing will be useful for developing entrepreneurships amongstudents

COMPUTER APPLICATION

AIN211 AgriculturalInformatics

Objectives:

To understand the basic function of a computer and the computing process; to understand the operationofdifferenthardwareandsoftwareusedincomputer;tohavefirsthandknowledgein using different mobile applications; to develop the knowledge of different application software and use theinternet

Learning Outcome:

Students will excel in using modern day computing techniques and will effectively amalgamate the knowledge to different uses in everyday life

STATISTICS

AST311 StatisticalMethods

Objectives:

This course is meant for students who do not have any background knowledge of Statistics. Students would be exposed to various concepts of descriptive statistical methods and statistical inferential procedures what would help them in understanding the importance of statistics in drawing valid conclusions in every walk of their life. It would also help them in understanding theconceptsinvolvedindatapresentation,theiranalysisandinterpretation.Thestudentswould also get to know about how to describe and present data, various descriptive

measures, probability distributions, procedures of parameter estimation, test of significance, concepts of correlation and regression, concept of drawing a good sample and designing fieldexperiments.

Learning Outcome:

Itisexpectedthatthestudentswillbeequippedwithbasicstatisticaltoolsusedforanalysingdata sets and will be able to draw valid conclusion supported by statisticalmechanism.

ANIMAL PRODUCTION

ANS111 Livestock &Poultry Management

Objectives:

To give basic idea to students about the livestock, live stock management, livestock and poultry diseases.

Learning outcome:

Students will get knowledge about the livestock, live stock management, livestock and poultry diseases.

ELECTIVE COURSES

AGR224 WaterManagement

Objectives:

To make the students knowledge about water management in principles crops and to enrich their views and ideas related to water resources, water movement in soil and plant, irrigation situation in India, method of irrigation, irrigation scheduling and excess water and its management.

Learning outcome:

Students will be expected to develop expertise on different aspects and issues of irrigation water management; students will be known about method of irrigation, irrigation scheduling and excess water and its management.

AGR314 Advances in CropProduction

Objectives:

To give basic idea to students about the crop plants in relation to environments and climate resilient agriculture; to give the knowledge of crop growth and development; concept of growth analysis,Agro-biologicalprinciples,Cropgrowthmodeling,cropproductionunderproblemsoil, principles of conservationagriculture.

Learning Outcome:

Students will get basic idea about crop plants in relation to environments and climate resilient agriculture; to will get the knowledge of crop growth and development; concept of growth analysis,Agro-biologicalprinciples,Cropgrowthmodeling,cropproductionunderproblemsoil, principles of conservationagriculture.

AGR323 WeedManagement

Objectives:

To impart basic ideas about weeds, their characteristics, importance, weed ecology and biology, principlesandpracticesofweedmanagement,herbicide-selectivityandmodeofactionandtheir judicious and safe use in different crops and croppingsystems.

Learningoutcome:

Students will be able to develop comprehensive ideas about weeds, their ecology and biology, principles and practices of weed management in different crops and cropping systems, recent development of herbicides- their selectivity, mode of action,develop knowledge on selection of cropspecificherbicides-theirapplicationwithproperdosetimeandsafehandlingandintegrated weedmanagement.

ACB321 FoodSafetyIssues)

Objectives:

The major Objectives of this course is to have basic understanding of the importance and management of food safety. It teaches the importance, factors affecting the food safety, hazards and their management, food storage, sanitation and packaging, food safety management and food laws and standards.

Learning outcome:

The study of Food Safety Issues helps to understand the importance and management of food safety. Students will learn the importance, factors affecting the food safety, hazards and their management, food storage, sanitation and packaging, food safety management and food laws and standards. Students will also learn practical experience in preparation of microbial culture media, physico-chemical and microbial analysis of water and food materials, microbiological examinationoffoodsamples.Withthistheoreticalandpracticallearning,thestudentwillgett he comprehensive knowledge and experience in the area of foodsafety.

OBJECTIVES AND OUTCOMES

AEC222 Agri-businessManagement

Objectives:

To learn the managerial aspects in the field of agribusiness.

Learning Outcome:

Student will be acquainted with managerial concepts and aspects of Agribusiness.

AEC 311 Emerging Issues inAgriculturalEconomics

Objectives:

To learn the novel initiatives and recent development in the field of agricultural economics.

Learning Outcome:

Student will be acquainted with new concepts in the field of agricultural economics.

AEG222 Agricultural WasteManagement

Objectives:

The major Objectivess of the course to not only reduce issue of agricultural waste disposal but also makes new value added products from them. The course will explore and train various available technologies to reuse agricultural waste.

Learning Outcome:

Understand the sources of agricultural waste and techniques to manage them; carry out various hands on techniques to measurement of agricultural waste properties and explore means to dispose or recycle them; learn technique to produce compost, biofuel and biogas etc. from agricultural waste.

AST312 StatisticalTechnique

Objectives:

This course is meant for students who have some knowledge of Statistics. It would help them in understanding the concepts involved in data presentation, their analysis and interpretation. The students would also get to know about how to describe and present data, various probability distributions, concept of drawing a good sample from the population.

Learning Outcome:

It is expected that the students will be equipped with basic statistical tools used for analysing data sets and will be able to draw valid conclusion supported by statistical mechanism.

OBJECTIVES AND OUTCOMES

AST321 Design inAgriculturalExperiment

Objectives:

This course is designed to give a comprehensive knowledge on how to design a study or experiment so that the results of the experiments are free from errors or biases, and then how to draw a valid conclusion using the results so obtained. In this context, laying out of different agricultural field experiments will also be covered. Designing an experiment is an integrated component of research in almost all sciences.

Learning Outcome:

The students would be exposed to various concepts of designing an experiments so as to enable themunderstandthescienceinvolvedinplanning,designingtheirresearchexperimentsand how to make analysis of different experimentaldata.

CPH 311 MicropropagationTechnologies

Objectives:

Micropropagation is the practice of rapidly multiplying stock plant material to produce many progeny plants, using modern plant tissue culture methods. Micropropagation is used to multiply plants such as those that have been genetically modified or bred through conventional plant breeding methods.

Learning Outcome:

It's a basically practical oriented course for students; they can learn in this course are as follows: howtoproducelargenumberofplantletsfromasmallexplants?studentshaveawideknowledge about the production of microbes free plantlets; how to save the endangered plants species by regenerating plantlets from small explants? with the help of micropropagation students can generate new variety of agriculturally important with short time span and space than the conventional breeding method. with these points kept in mind this course is important for students which give not only a theoretical knowledge to them but also give an opportunity of hands ontraining.

HOR223 Landscaping

Objectives:

Students are expected to gain the knowledge on styles, types, features and components of gardening and landscaping including modern aspects of landscaping.

Learning Outcome:

Students will gather theoretical and practical knowledge of styles, types, features and components of gardening including modern aspects of landscaping.

HOR311 ProtectedCultivation

Objectives:

Students are expected to gather the insights of structural details of protected structures and technical details and cultivation technologies of various types of horticultural crops.

LearningOutcome:

Students will acquire the knowledge on types, structural details, management of protected structures and technical details of protected horticultural crop cultivation.

HOR322 Hi-tech.Horticulture

Objectives:

Students are expected to know about the advanced technologies and their applications in horticulture like micro propagation techniques, precision farming high density orcharding etc.

Learning Outcome:

Students will gather details knowledge on modern advanced technologies and their application in horticulture like micro propagation, precision farming, high density orchard etc.

GPB221 CommercialPlantBreeding

Objectives:

This lesson deals with heredity and the reasons behind the variation among individuals of the same species. To impart knowledge to the students on the principles and procedures of plant breeding in self and cross pollinated crops to develop the high yielding varieties / hybrids.

Learning Outcome:

Students will understand the basic concepts of the ultrastructure of cell, cell organelles, chromosomes and nucleic acids; apply the principles of inheritance to plant breeding; acquaint with the fundamentals of chromosomal and cytoplasmic inheritance, sex determination, mutations and chromosomal aberrations; learn breeding procedures in self and cross pollinated crops; understand exploitation of heterosis utilizing male sterility and other methods; know about the various population improvement programmes; about the fundamentals of mutation, polyploidy and wide hybridization and their role in crop improvement

GPB312 Breeding for Biotic andAbioticStresses

Objectives:

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

Learning Outcome:

Students will understand the genetic mechanisms of biotic and abiotic stresses; phenotyping screening methods for major pest and diseases; learn about the source of resistance.

GPB323 Bioinformatics

Objectives:

Theory: The basic Objectives is to give students an introduction to the basic practical techniques of bioinformatics. Emphasis will be given to the application of bioinformatics and biological databases to problem solving in real research problems. The students will become familiar with the use of a wide variety of internet applications, biological database and will be able to apply these methods to research problems.

Practical: The aim is to provide practical training in bioinformatics methods including accessing the major publicsequencedatabases,useofthedifferentcomputationaltoolstofindsequences,analysisof protein and nucleic acid sequences by various software packages. It also provides a step by step, theoretical and practical introduction to the development of useful tools for automation of complex computer jobs, and making these tools accessible on the network from a Webbrowser.

Learning Outcome:

Students will learn the contents and properties of the most important bioinformatics databases, perform text- and sequence-based searches, and analyze and discuss the results in light of molecularbiologicalknowledge;explainthemajorstepsinmultiplesequencealignment,finding ORF and conserved domains; to design PCR primers and do molecular phylogenyanalysis.

SSC222 Agrochemicals
Objectives:

The students are expected to gain both theoretical as well as practical knowledge on agrochemicals-theirtypeandroleinagriculture,effectonenvironment,soil,humanandanimal health; management of agrochemicals for sustainable agriculture; major classes, properties of important herbicides; fate of herbicides; classification, fates of fungicides and classification of insecticides;manufacturingprocessesandpropertiesofN,PandKfertilizers,complexfertilizers, secondaryandmicronutrientfertilizers;fertilizercontrolorder;fertilizerlogisticsandmarketing; plant bio-pesticides for ecological agriculture; bio-insect repellentetc.

Learning Outcome:

Students will acquire knowledge on various types of agrochemicals and their role inagriculture, fatesinsoil,effectonenvironment,soil,humanandanimalhealthandtheirefficientmanagement for sustainableagriculture.

SSC311 Soil, Plant, Water andSeedTesting

Objectives:

The students are expected to gain both theoretical as well as practical knowledge on working principlesofvariousinstrumentslikepHmeter,ECmeter,spectrophotometer,flamephotometer and AAS; principles and procedure of determination of different properties of soil andplant; interpretation of results; quality criteria of irrigation water; seed germination, viability, vigor and storage etc.

Learning Outcome:

Students will acquire practical and theoretical knowledge on various soil parameters, plant nutrient contents, water quality parameters as well as seed quality testing parameters.

SSC321 BiofertilizersTechnology

Objectives:

Thestudentsareexpectedtogainboththeoreticalaswellaspracticalknowledgeonvarioustypes of biofertilizers, their characteristics, application technology, quality control, mechanism of solubilization of nutrients in soil; productions technology; constraints in production of biofertilizers;factorsinfluencingtheefficacyofbiofertilizers;costandavailabilityofbiofertilizers etc.

Learning Outcome:

Students will acquire practical and theoretical knowledge on various types of biofertilizers as a whole.

AEX 312 - Communication andInformationManagement

Objectives:

To make the students aware and knowledgeable different aspects of communication and information management like, communication process, types of communication, development communication,digitalplatformforcommunicationandinformationmanagementet.Aswellas to build up capacity of the students for effective communication, preparation of communication material and informationmanagement.

Learning Outcome:

Through this course, students are expected to be knowledgeable about different aspects of communication and information management as well as they will be capable for preparation of communication material and will be able to communicate effectively.

AEX321 Emerging Trends inAgriculturalExtension

Objectives:

Toorientthestudentsregardingchangingscenarioof AgriculturalExtension,theemergingareas andapproachesofextensioninagriculture;toprovideexposureonanalysesofdifferentextension approaches applying different tools and techniques and visits to thestakeholders

Learning Outcome:

Understanding of the emerging areas of agricultural extension, their features and effectiveness; learning of different tools and techniques of analyses of extension reforms and programmes, feedback of stakeholders.

PPT:221 Bio-pesticidesandBio-control

Objectives:

Togenerateknowledgeaboutbiologicalcontrolagentsincludingbotanicals,theirproductionand application in diseasemanagement.

Learning Outcome:

Eco-friendly management of diseases through Biological controlling agents

NON-GRADIAL COURSES

PED 111 NSS/NCC/Physical Education &YogaPractices

Objectives:

Course aims at evoking social consciousness among students through various activities viz., working together, constructive and creative social work, to be skilful in executing democratic leadership,developingskillinprogrammedevelopmenttobeableforselfemployment,reducing gap between educated and uneducated, increasing awareness and desire to help sections of society.

Learning Outcome:

The students will learn basic components of NSS; understand youth ; community mobilization; social harmony and national integration; volunteerism and shramdan; citizenship, constitution andhumanrights;familyandsociety;importanceandroleofyouthleadership;lifecompetencies; health, hygiene, sanitation, HIV AIDS and first aid; issues related environment; disaster management; entrepreneurship development;; resource mobilization and activities directed by the Central and StateGovernment

M.SC(AG.): PALLI SIKSHA BHAVANA

DEPARTMENT OFAGRONOMY

AGR 501 : Modern concepts incropproduction 3 +0

Objectives:

To teach the basic concepts of soil management and crop production

Learning Outcome:

Students will get basic idea about crop growth analysis, principles and modern concepts of crop production.

AGR 502: Principles and practices of soil fertility and nutrient management 2+1

Objectives:

To impart knowledge of fertilizers and manures as sources of plant nutrients and to appraise integrated approach of plant nutrition and sustainability of soil fertility.

Learning Outcome:

Students will get basic idea about importance of essential elements, nutrient use efficiency and methods of soil nutrient management

AGR 503: Principles and practices ofweedmanagement 2+1

Objectives:

To familiarize the students about the weeds, herbicides and methods of weed management.

Learning Outcome:

Students will get basic idea about weeds, herbicides and methods of management

AGR 504 : Principles and practices ofwatermanagement 2+1

Objectives:

The course fulfils the comprehensive knowledge on irrigation water management; the course brings out different aspects of irrigation, drainage, and quality of irrigation water.

Learning Outcome:

Students will be benefitted by this course for deciding irrigation scheduling for crops, crop planning according to the availability of water sources; the course will help the students by handling different instruments of irrigation water management; it will be helpful to ameliorate the problem soil and water for raising crops; students can gather knowledge to check soil and water losses.

AGR 505 : Agrometeorology and cropweatherforecasting 2+1

Objectives:

To impart knowledge about agro-meteorology and crop weather forecasting to meet the

challenges of aberrant weather conditions.

Learning Outcome:

Studentswillgetbasicideaaboutagro-meteorologyandcropweatherforecastingtomeetthe challenges of aberrant weatherconditions.

AGR 506 : Crop growth analysis andproductivitymodelling 1+1

Objectives:

To teach students regarding system approach through growth analysis of crop plants for achieving higher yield.

Learning Outcome:

Students will get basic idea about how to measure growth analysis of crop and crop ideotype.

AGR507 : Agronomy ofmajorcereals 2+1

Objectives:

To teach the crop husbandry of cereals.

Learning Outcome:

Students will get basic idea about crop husbandry of cereals

AGR508 : Agronomy ofpulsecrops 2+1

Objectives:

To teach the crop husbandry of pulse crops.

Learning Outcome:

Students will be enriched with the knowledge of pulse crops cultivation; course will be supported to aware about the importance of pulse crop in sustainable crop production.

AGR509 : Agronomy ofoilseedcrops 2+1

Objectives:

To teach the production technology of oilseed crops.

Determination of oil content in oilseeds and computation of oil yield; Formulation of cropping schemes.

Learning Outcome:

Students will get basic idea about crop husbandry of oilseeds

AGR510: Agronomy of fibre, sugar andtubercrops 2+1

Objectives:

To teach the crop husbandry of fibre and sugar crops.

Learning Outcome:

Students will get basic idea about crop husbandry of fibre, sugar and tuber crops

OBJECTIVES AND OUTCOMES

AGR511 : Agronomy of medicinal, aromatic andunder-utilizedcrops 2+1
Objectives:

To apprise students about different medicinal, aromatic and under-utilized crops, their package of practices and processing.

Learning Outcome:

Students will get basic idea about crop husbandry of medicinal, aromatic and under-utilized crops

AGR512 : Agronomy of fodder andforage crops 2+1
Objectives:

To teach the crop husbandry of different fodder and forage crops along with their processing.

Learning Outcome:

Students will get basic idea about crop husbandry of fodder and forage crops

AGR513 : Agrostologyandagro-forestry 2+1
Objectives:

To teach crop husbandry of different fodder, forage and agroforestry crops/trees along with their proceedings.

Learning Outcome:

Students will get basic idea about agrostology and agro-forestry

AGR514 : Cropping systems andsustainableagriculture 2+0
Objectives:

To apprise about different enterprises suitable for different agroclimatic conditions for sustainable agriculture.

Learning Outcome:

Students will get basic idea about sustainability and cropping system

AGR515 : Dryland farming andwatershedmanagement 2+1
Objectives:

To teach the concept of dryland farming, how to harvesting of rain water and its proper utilization for crop production. To give idea about contingency crop planning, water shed management, mulching and use

Learning Outcome:

Students will be highlighted about the crop production under dry land situation; students will be given idea about rainfall pattern, importance of rain water harvesting and run off water storage etc; it will be helpful to prepare crop planning under rainfed, dryland condition.

AGR516 : Principles and practices oforganicfarming 1+1
Objectives:

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

Learning Outcome:

Students will get basic idea about organic farming

AGR517: Crop ecologyandgeography 2+0

Objectives:

To acquaint the students about the agricultural systems, agro-ecological regions, and adaptation of crops to different agro-climatic conditions.

Learning Outcome:

To get basic knowledge about crop ecology, ecosystem, magro-ecological regions, and adaptation of crops to different agro-climatic conditions.

SYLLABUS: DEPARTMENT OF SOIL SCIENCE AND AGRICULTURAL CHEMISTRY

SSC-501 Soilphysics (2+1)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on different aspects of soil physics like soil textural classes, particle size distribution analysis, specific surface, soil consistence; dispersion, soil compaction, soil strength, swelling, soil structure, soil aggregation, soil crusting, soil conditioners, soil water potential, soil water retention,

movement,hydraulicconductivity,hydrologiccycle,fieldwaterbalance,soilair,soilthermal propertiesetc.

Learning Outcome:

Students will acquire both theoretical and practical knowledge on various soil physical properties, their influence on plant growth, their management etc.

SSC-502 Soil fertility andfertilizeruse (3+1)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on different aspects of soil fertility and fertilizer use like essential nutrient elements, chemistry and transformation of nutrient elements and their management, soil test methods and fertilizer recommendations, soil test crop response correlations and response functions, fertilizer use efficiency, site-specific nutrient management, plant need based nutrient management; integrated nutrient management, soil fertility evaluation techniques, soil quality etc.

Learning Outcome:

Students will acquire both theoretical and practical knowledge on various aspects of soil fertility, soil fertility management and fertilizer use.

SSC-503 Soilchemistry (2+1)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on different

aspects of soil chemistry like soil water chemistry; dynamic nature of soil; thermodynamics, chemical equilibria, electrochemistry and chemical kinetics, soil colloids, surface charge characteristics of soils; fractionation of soil organic matter, clay-organic interactions, ion

exchangeprocessesinsoil,cation,anionandligandexchange,sorption-desorption,chemistry of acid soils, salt affected soils and their management, chemistry and electrochemistry of submerged soilsetc.

Learning Outcome:

Studentswillacquiretheoreticalandpracticalknowledgeonvariousaspectsofsoilchemistry or different soil chemicalproperties.

SSC-504 Soil mineralogy, genesis, classificationandsurvey (2+1)
Objectives:

The students are expected to gain theoretical as well as practical knowledge on soil mineralogical properties, soil forming processes; weathering of rocks and mineral transformations; modern systems of soil classification, soil taxonomy; soil classification, soil survey techniques soil mapping, land capability classification etc.

Learning Outcome:

Students will acquire theoretical and practical knowledge on genesis of soil, mineralogy of soil, classification of soil and soil survey techniques.

SSC-505 Soil biologyandbiochemistry (3+1)
Objectives:

The students are expected to gain theoretical as well as practical knowledge on various aspects of soil biology and soil biochemistry like soil microbial ecology; soil microbial biomass; microbial interactions; phyllosphere; soil enzymes, biochemical composition and biodegradation of soil organic matter; humus formation, biogas and manures production using organic wastes, preparation and preservation of farmyard manure, animal manures, compost, vermicompost., biofertilizers etc.

Learning Outcome:

Students will acquire theoretical and practical knowledge on various aspects of soil biology and soil chemical properties.

SSC-506 Soil erosionandconservation (2+1)
Objectives:

The students are expected to gain theoretical as well as practical knowledge on soil erosion problems in India, forms/types, factors and effect of soil erosion; factors affecting water erosion; estimation of water erosion; types, mechanism and factors affecting wind erosion; variouserosioncontrolmeasures,soilconservationplanning,watershedmanagement,useof remote sensing in assessment and planning of watershedsetc.

Learning Outcome:

Students will acquire theoretical and practical knowledge on factors affecting soil erosion, types and mechanism of soil erosion, effect of soil erosion on plant growth and soil erosion control measures or techniques.

SSC-507 Radioisotopes in soil andplantstudies (1+0)

Objectives:

The students are expected to gain knowledge on nature, properties and decay principles of radioisotopes and nuclear radiations; radiation monitoring, neutron moisture meter, mass spectrometry, auto radiography, isotopic dilution techniques for soil and plant research; use of stable isotopes etc.

Learning Outcome:

Students will acquire knowledge on nature, properties and decay principles of radioisotopes and their use in soil, plant studies.

SSC-508 Soil, water andairpollution (2+1)

Objectives:

The students are expected to gain knowledge on nature, sources, extent of soil, water and air pollution; their effects on soil nutrients availability, plant and human health and their remediation/amelioration.

Learning Outcome:

Studentswillacquireknowledgeon soil,waterandairpollution;theireffectsonsoilnutrients availability, plant and human health and theirremediation/amelioration.

SSC-509 Analytical techniques and instrumental methods in soil and plantanalysis

(1+2)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on analytical techniques and instrumental methods used soil and plant analysis.

Learning Outcome:

Students will acquire knowledge on analytical techniques and instrumental methods used soil and plant analysis.

SSC-510 Chemistryofpesticides (1+1)

Objectives:

Thestudentsareexpectedtogaintheoreticalaswellaspracticalknowledgeonvarioustypes of pesticides, their fate and behaviour in soil, plant and water bodies, impact of pesticide residues on environment, pesticide contamination of food, biodegradation of pesticides, effect of pesticides on microbial activity and soon.

Learning Outcome:

Students will acquire knowledge on chemistry of pesticides, their impact on environment, pesticide contamination of food, biodegradation of pesticides etc.

SSC-511. Management ofproblemsoils (2+1)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on area, distribution,characteristic,impactonplantgrowthandreclamation/managementofvarious problem soils like saline, sodic, saline-sodic, acid soil andothers.

Learning Outcome:

Students will acquire knowledge on various problem soils and their reclamation and management.

SSC-512 Fertilizertechnology (1+1)

Objectives:

The students are expected to gain theoretical as well as practical knowledge on manufacturing process for different fertilizers, secondary and micronutrient fertilizers, quality control of fertilizers, production of slow release fertilizers, super granules fertilizers, fertilizer control order etc.

Learning Outcome:

Students will acquire knowledge on manufacture, nutrient content and use of various fertilizers, slow release fertilizers, fertilizer control order etc.

SSC-513 Land degradationandrestoration (1+0)

Objectives:

The students are expected to gain knowledge on different type, factors and processes of land degradation, its impact on soil productivity and restoration of land degradation.

Learning Outcome:

Students will acquire knowledge on land degradation processes, factors, its impact and its restoration.

DEPARTMENT OF AGRICULTURAL EXTENSION

EXT501 Genesis and evolution ofextensionconcept 1+0

Objectives:

The course is intended to orient students on the genesis and evolution of extension system, various extension approaches tried worldwide. It also aims to expose them to extension systems of various countries worldwide. The students learn about problems, future needs and strategies of agricultural extension.

Learning Outcome:

The students will be able to know the evolution of extension system in different countries with their organisational structure, salient features and functioning. The y will gain knowledge about the important programmes that influenced the agricultural scenario and draw the lessons from those experiences.

EXT 502 Development perspectives ofextensioneducation 1+1

Objectives:

To impart knowledge to the students on concept, Objectivess, philosophy and principles of extension education as well as pioneering extension efforts and analysis of extension system of ICAR and SAU. Course also gives exposure to the student on current approaches in extension as well as various development programmes.

Learning Outcome:

A student community with well-balanced cognitive, affective and psychomotor aspects.

EXT503 Development communication andinformationmanagement 2+0

Objectives:

To make the students aware and knowledgeable about the different aspects of communicationwithparticularreferencetodevelopment.Besides,tobuildupcapacityofthe students to plan and execute development communicationmaterials.

Learning Outcome:

After having this course students are expected to gain knowledge about the role of communication in development and at the same time students will be capable to prepare communication materials for different types of development.

EXT504 Educational technologyinextension 1+1

Objectives:

To orient the students regarding various concepts and issues of educational technology in extension

Learning outcome:

Thelearnersareexpectedtodevelopexpertiseondifferentconceptsandissuesofeducational technology in extension

EXT 505 Concept of sociology, social and educational psychology relevant in extension 2+1

Objectives:

To orient the students regarding different concepts and issues of rural sociology and educational psychology.

Learning Outcome:

The learners are expected to develop expertise on different concepts and issues of rural sociology and educational psychology.

EXT506 Diffusion and adoptionofinnovations 1+1

Objectives:

To make the students aware and knowledgeable about the science behind the process of diffusion and innovation decision as well as different factors that influences the process of diffusion and innovation of innovation. Besides, to build up capacity of students to plan for diffusion and adoption of different farm innovation.

Learning Outcome:

Studentsareexpectedtobeknowledgeableaboutdifferentaspectsofdiffusionandadoption of innovation as well as they will be capable to trace the adoption process in the community and plan for thesame.

EXT507 Research methods inbehaviouralscience 2+1

Objectives:

To impart knowledge to the students on various extension research methodologies, tools and techniques of behavioural research and to develop skills in preparing research reports.

Learning Outcome:

A student community that think positively on cause-effect relationship and whose mental attitude is based on how to think instead of what to think.

EXT508 Gender studies inagriculturaldevelopment 1+1

Objectives:

To orient the students regarding various concepts, issues, dimensions and polices of Gender Studies in Agricultural Development

Learning Outcome:

The learners are expected to develop expertise knowledge and skills on Gender Studies in Agricultural Development

EXT509 Distance education asextensionintervention 1+1

Objectives:

To orient the students regarding various concepts, forms, systems and issues of Distance Education as Extension Intervention.

Learning Outcome:

The learners are expected to develop expertise knowledge and skills on different aspects of Distance Education as Extension Intervention.

EXT510 Trainingandnetworking 1+1

Objectives:

To impart learning on concepts and issues of extension training and networking.

Learning Outcome:

To develop expertise skills on various aspects of extension training and networking

EXT511 E-Extension 1+1

Objectives:

To orient the students regarding various concepts, tools, applications, approaches projects and issues of ICT in extension

Learning Outcome:

The learners are expected to develop expertise knowledge and skills on ICT tools, applications, approaches projects and issues in extension.

EXT 512 Entrepreneurship development and managementinextension 1+1

Objectives:

The first part of this course is intended to provide an overall picture of planning and development of entrepreneurship to promote sustainable livelihoods for rural people. The secondpartisstructuredtohelpstudentsgainknowledgeandskillsindifferentconceptsand techniques of management in extension organizations**.**

Learning Outcome:

Studentswillgainunderstandingoftheentrepreneurshipdevelopmentprocess,formulation of the entrepreneurship development project and management of enterprise. Students will get orientation on policies, programmes, institutional framework and market for entrepreneurship development in India. The exposure to managerial functions pertaining to extension management would develop the knowledge and skills of thestudents.

EXT513Conceptsoforganizational,humanresourceandmarketingmanagementrelevant to extension 2+1

Objectives:

To impart knowledge to the student about the concepts, methods and various techniques of HRD, HRM & HRA and also develop knowledge about agribusiness management.

Learning Outcome:

The Couse will help the students to become a good HRD practitioners.

EXT 514 Project management – principlesandtechniques 1+1

Objectives:

To make the students knowledgeable about S & T inputs of project management as well as to build up their capacity for managing developmental project.

Learning Outcome:

Throughthiscoursestudentsareexpectedtohavecomprehensiveknowledgeaboutdifferent aspects of developmental project management as well as will be capable to manage developmental projectindependently.

EXT 515 Participatory methods for technology developmentandtransfer 1+1

Objectives:

To orient the students regarding various concepts and issues of participatory methods for technology development and transfer.

Learning Outcome:

To develop expertise skills in various concepts and issues of participatory methods for technology development and transfer.

EXT516 Visualcommunication 1+1

Objectives:

To orient the students regarding various concept, role and issues of visuals and graphics in Communication.

Learning Outcome:

The learners are expected to develop expertise knowledge and skills on various aspects of visuals and graphics in Communication

EXT517 Market ledextensionmanagement 1+1

Objectives:

Toorientthestudentsregardingvariousconcepts,scenario,perspectivesandissuesofMarket LedExtension

Learning Outcome:

The learners are expected to develop expertise knowledge and skills on various concepts, scenario, perspectives and issues of Market Led Extension

EXT 518 Group DynamicsandLeadership 2+1

Objectives:

This course emphasises the various aspects of group dynamics, functioning of micro-finance and self-help group (SHG). It also provides the students an understanding of leadership including roles, types and characteristics of leaders with an exposure to different leadership theories. It inculcates the skills in applying small group techniques and identifying the leaders.

Learning Outcome:

Students will get exposure on different aspects of group dynamics, SHG, micro finance and leadership.Theywilllearnvarioussmallgrouptechniquesandmethodstoidentifyingvillage leaders.

DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

AEN501 Insectmorphology (1+1)

Objectives:

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.

Learning Outcome:

After completion of the course students will be proficient enough to construct population model and economic use of pesticide model. Also able to take decision based on ETL estimation as well as to make the venture cost effective one.

AEN502 Insect anatomy, physiology&nutrition (2+1)

Objectives:

To impart knowledge to the students on basic aspects of anatomy of different systems, elementary physiology, nutritional physiology and their application in entomology.

Learning Outcome:

Aftercompletionofthecoursestudentswillacquiretheknowledgeonvariousphysiological systems of insect. Also they will develop expertise in preparation of permanentslides.

AEN-503 Insecttaxonomy (1+1)

Objectives:

To sensitize the students on theory and practice of classifying organisms. Also acquainted with the rules of governing the same.

Learning Outcome:

At the end of the course students will acquire the knowledge of correct identification of an unknown insect up to family level.

AEN504 Insectecology (1+1)

Objectives:

To teach the students about the concepts of ecology, basic principles, distribution and abundance of organisms and their causes. To impart an idea of life tables, organization of communities and diversity indicies. Also to train the students in sampling methodology, calculation of diversity indicies, constructing life tables, relating insect population fluctuations to biotic and/or abiotic causes.

Learning Outcome:

After completion of the course students will be acquainted with the basic principles of ecology.Alsotheywilllearnthevarioustypesofinteractionsintheenvironment,population dynamics of insect. Lastly they develop expertise in construction of age specific Life Table of an insect.

AEN505 Pest of field crops andtheirmanagement (2+1)

Objectives:

Tofamiliarizethestudentsaboutnatureofdamageandseasonalincidenceofinsectpeststhat cause loss to major field crops and their effective management by differentmethods.

Learning Outcome:

After completion of the course students will be acquainted with various insect-pests of field crops their damage symptoms and learn the techniques of AESA based pest management.

AEN-506 Pest of horticultural crops andtheirmanagement (2+1)

Objectives:

To impart knowledge on major pests of horticultural and plantation crops regarding the extent and nature of loss, seasonal history and their integrated management.

Learning Outcome:

After completion of the course students will be acquainted with various insect-pests of horticultural crops their damage symptoms and learn the techniques of AESA based pest management.

AEN-507 Biological control of crop pestsandweeds (1+1)

Objectives:

To train the students with theory and practice of biological control, mass production techniquesandfieldevaluationofvariousbiologicalcontrolagentslikeparasitoids,predators and various entomopathogenic &microorganisms.

Learning Outcome:

Upon completion of the course students will able to identify the common natural enemies of crop pests. They acquire the knowledge of mass production of egg, common predators, microbes and their laboratory hosts.

AEN508 Toxicologyofinsecticides (2+1)

Objectives:

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.

Learning Outcome:

After completion of the course students will be acquainted with toxico-dynamics of newer molecules.Alsotheywilldevelopskillsonthebioassaytechniquesalsoabletoworkoutjoint toxicity.

AEN509 Generalacarology (1+1)

Objectives:

To acquaint the students with external morphology of different groups of mites, train in identification of commonly occurring families of plant associated mites, provide information about important mite pests of crops and their management.

Learning Outcome:

After completion of the course the students will be acquainted with different groups of mite and their phytophagous nature to different crops. They will also develop skills on the identification of different groups of mite, their host range, management and mass culturing of phytophagous and predatory mites.

AEN-510 Insect embryology andpost-embryonicdevelopment (1+1)

Objectives:

To acquaint the students with the embryonic & post-embryonic development of insects, types of metamorphosis. Focus will also be given to the different modes of reproduction, hatching, development of different organs and types of larva andpupa.

Learning Outcome:

After completion of the course the students will be acquainted with the different types of metamorphosis, larva and pupa found in insects. They will also learn about fertilization, development of oocyte, blastoderm formation blastokinesis and organogenesis. They will also have a knowledge about the different types of reproduction in insects, hatcing and shedding of embryonic cuticle.

AEN511 Storage entomology &vertebratepest (1+1)

Objectives:

To focus on requirement and importance of grain and grain storage, to understand the role ofstoredgrainpestsandtoacquaintwithvariousstoredgrainpestmanagementtechniques foravoidinglossesinstorage.Aswellastoimpart knowledgeonvertebratepestslikebirds, rodents, mammalsetc.,

Learning Outcome:

Aftercompletionofthecoursethestudentswillbeacquaintedwiththedifferentstoragepests of agricultural produce, their identification, nature of damage, measurement of loss caused by them and their management by non-chemical and chemical means. The students will also learn about the rodent pests of stored products and theirmanagement.

AEN-512 Commercialentomology (1+1)

Objectives:

To familiarize the students with entrepreneurial opportunities in entomology, provide

informationonproductiveinsectsandtheirproducts,aswellasinsectpestsofpublichealth and veterinary importance and their management of different crops, their biology, damage they cause and managementstrategies.

Learning Outcome:

After completion of the course the students will be acquainted with apiculture - honey bees species,theiridentification,behaviorandartificialrearingandcare.Thestudentswillalsobe aquainted with Sericulture – different species of silkworm, their identification behavior and artificial rearing and care. The students will learn about moriculture also. Apart from these the students will learn about Lacculture, their different strains, life cycle inoculation and harvesting.

AEN513 Chemicalpestcontrol (1+1)

Objectives:

To familiarize the students with management of insect-pests with respect to behavioural

control (attractants, pheromones and repellants); antifeedants; chemosterilants and insecticidal control (different groups of insecticides their field properties) and their application techniques.

Learning Outcome:

Afterthecompletionofthecoursethestudentswillbeaquaintedwiththedifferentmeansof insect-pest management in agricultural crops. They will also learn about the different application techniques of insecticides, their dosages, different types of chemical imposition appliances etc. under fieldcondition.

AEN514 Insect-vectors of plant pathogens &theirrelationships (1+1)

Objectives:

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

Learning Outcome:

After the completion of the course the students will be acquainted with the different vectors of plant pathogens, their characteristics and process of transmission of plant viruses and fungalpathogens.Thestudentswillalsolearnaboutthemanagementtechniquesofdifferent vectors.

AEN515 Principles of integratedpestmanagement (2+1)

Objectives:

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.

Learning Outcome:

After completion of the course students will be proficient enough to construct population model and economic use of pesticide model. Also able to take decision based on ETL estimation as well as to make the venture cost effective one.

AEN516 Host plant resistancetoinsects

Objectives:

Tofamiliarizethestudentswithtypes,basis,mechanismsandgeneticsofresistanceinplants to insects and role of plant resistance in pest management of agriculturalcrops.

Learning Outcome:

After the completion of the course the students will be acquainted with insect-host plant relationship, bases of host plant resistance to insects, and different factors influencing feeding of plants by insects. The students will also learn about the role of biotechnology in insect-pest management.

DEPARTMENT OF PLANT PATHOLOGY

PPC- 501 Principles ofplantpathology
2+0

Objectives:

To provide basic knowledge about the pathogens their ecology and host pathogen interactions.

Learning Outcome:

Help the learners for proper understating of pathogen behaviour, their interaction with host which in turn allow them for developed resistant cultivars.

PPC- 502 Mycology
2+1

Objectives:

To provide basic knowledge about the fungi, their taxonomy, growth, reproduction and role innature.

LearningOutcome:

Detailed knowledge about fungi and their biology would help the learners for research in the field of host pathogen interaction and management.

PPC– 503 **Plantbacteriology**
2+1

Objectives:

To provide detailed knowledge about bacteria and mollicutes, their taxonomy, growth, reproduction and role in nature.

Learning Outcome:

Detailed knowledge about bacteria and mollicutes would help the learners for research in the field of host pathogen interaction and management.

PPC-504 **Plantvirology**
2+1

Objectives:

To provide detailed knowledge about virus and sub-viral particles, their taxonomy, growth, reproduction and role in nature.

Learning Outcome:

Detailed knowledge about virus and sub-viral particles would help the learners for research in the field of host pathogen interaction and management.

PPC-505 **Diseases of field crops andtheirmanagement**
2+1

Objectives:

To generate overall knowledge about the cereals diseases and their management.

Learning Outcome:

Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.

PPC-506: Diseases of horticultural crops andtheirmanagements**
2+1

Objectives:

To generate overall knowledge about the diseases of horticultural crops and their management.

Learning Outcome:

Help the learners for identify the diseases through symptoms in field, their proper management as well as identification of causal agents by microscopic study.

PPC-507 Molecularplantpathology* 2+1

Objectives:

TogenerateknowledgeabouttheHostpathogeninteractionsatmolecularlevel,developedidea about the recent molecular technologies related to plantpathology.

Syllabus:

Theory

Genesis, importance and scope of molecular plant pathology. Study of basic techniques like Electrophoresis, Immunoassay, Nucleic acid sequencing & hybridization, PCR, RAPD, RFLP, HPLC,MS.Studyofbasicandadvancedserologicaltechniques;productionofmonoclonal and polyclonal antibodies. Instrumentation and maintenance of molecular plant pathology laboratory. Detection and diagnosis of plant pathogens by various immuno- and molecular techniques. Molecular techniques in understanding of pathogenesis. Molecular techniques to traceoriginandevolutionofdifferentgroupsofpathogens,andunderstandingofphylogenetic relationship, co-evolution. Tissue culture and biotechnological advancements relevant to molecular plant pathology; Gnotobiotic culture. Molecular techniques in epidemiology, food safety etc. Bioinformatics and advanced computations in molecular techniques. Nanotechnology in PlantPathology.

Practical

Instrumentation of Molecular Plant Pathology Lab. Use of different equipment. Tissue culture. Detection of Plant pathogens in Plants and Plant Parts.

Learning Outcome:

Acquired knowledge helps in the research of genomics, proteomics and genetic engineering. It also helps them in resistance breeding.

PPC-508 Epidemiology ofplantdiseases 2+1

Objectives:

To provide basic knowledge about the epdemilogy,crop loss and modulation of epidemics

Learning Outcome:

Help the learners for proper understating of crop losses, environmental factor and disease relationship which may help in disease forecasting and formation of forecasting models.

PPC– 509 SeedPathology 2+1

Objectives:

To provide knowledge about various seed borne pathogens, ecology, spread, survival etc. and related seed born diseases

Learning Outcome:
Detailed knowledge seed borne pathogens, ecology etc. help the learners for proper management of seed bornediseases

PPC-510 Rootpathology
2+1

Objectives:
To provide knowledge about various root pathogens, ecology, spread , survival etc. and various soil born diseases they cause.

Learning Outcome:
Detailedknowledgeaboutrootpathogens,ecologyetc.helpthelearnersforpropermanagement of root and other soil bornediseases

PPC-511 Post-harvestpathology
2+1

Objectives:
To provide knowledge about the post harvest pathogens, ecology, spread , survival etc. and various diseases they incite.

Learning Outcome:
Detailed knowledge about post harvest pathogens, ecology etc. help the learners for proper post harvest disease management.

PPC-512 Mushroomcultivation 1+2

Objectives:

To generate knowledge about edible and cultivatedmushroom, their cultivation and entrepreneurship development.

Learning Outcome:
Student can start their own entrepreneurship by acquiring the knowledge and **s**kills about mushroom cultivation

PPC- 513 Ecology ofplantpathogens 1 +1

Objective:

To provide basic knowledge about the pathogen ecology , spread , survival etc.

Learning Outcome: Detailed knowledge about pathogen ecology help the learners for proper understanding survival of the pathogens which help for developing forecasting modules and disease management.

PPC514 Virus–vectorrelationship 1+1

Objectives:

Toprovidedetailedknowledgeaboutvirusestheirvectorsandtheirinterrelationshipindifferent ecosystem.

Learning Outcome:

Detailed knowledge about viruses, vectors and their interrelationship help the learners for proper understanding of virus spread and their multiplication which help for developing forecasting modules and disease management.

PPC- 515 Principles of plantdiseasemanagement 2+1

Objectives:

To generate knowledge about crop loss, risk management,IDM

Learning Outcome:

Acquired knowledge may help the students for predicting crop loss and disease management through various approaches.

PPC-516 Plantnematology 1+1

Objectives:

To provide basic knowledge about the nematodes, their taxonomy, biology growth, importance

and various symptoms they produced and their managements.

Learning Outcome:

Detailed knowledge about Plant Parasitic nematode, their biology and other aspects would help the learners for research in the field of Phytonematology.

PPC-517 Phytopathologicaltechniques 0+2

Objectives:

To generate knowledge about the basic techniques related to plant pathology and microbiological

research.

Learning Outcome:

Acquired knowledge may help the students for isolation, inoculation, culturing, preservation, maintenance of microorganisms and handling of different instruments.

DEPARTMENT OF GENETICS AND PLANT BREEDING

GPB501 Principlesofgenetics 2+1

Objectives:

Thiscourseisaimedatunderstandingthebasicconceptsofgenetics,helpingstudentstodevelop their analytical, quantitative and problem- solving skills from classical to moleculargenetics.

Learning Outcome:

Understand the basic concepts of the ultrastructure of cell, cell organelles, chromosomes and nucleicacids; Apply the principles of inheritance to plantbreeding, acquaint with the fundamentals of chromosomal and cytoplasmic inheritance,sex determination, mutations and chromosomalaberrations, learn molecular genetics.

GPB502 Principlesofcytogenetics 2+1 Objectives:

To provide insight into structure and functions of chromosomes, chromosome mapping, polyploidy and cytogenetic aspects of crop evolution.

Learning Outcome:

Understand the basic concepts of chromosome and itsstructures; To learn chromosomeaberrations.

acquaint with the fundamentals of chromosomal and cytoplasmicinheritance; Idea about genome mapping in polyploids , gene transfer, chromosomemanipulation.

GPB503 Principles ofplantbreeding 2+1

Objectives:

To impart theoretical knowledge and practical skills about plant breeding objectives, modes of reproduction and genetic consequences, breeding methods for crop improvement.

Learning Outcome:

Learn breeding procedures in self and cross pollinated crops; Understand exploitation of heterosis utilizing male sterility and othermethods; Know about the various population improvementprogrammes; Learn about hybridbreeding learn about floralbiology; Study about the fundamentals of mutation, polyploidy and wide hybridization and their role in cropimprovement

GPB504 Principles ofquantitativegenetics 2+1

Objective

To impart theoretical knowledge and computation skills regarding component of variation and variances, scales, mating designs and gene effects.

Learning Outcome:

Learn about nature of quantitative traits and its inheritance; understand genetic diversity analysis, Selection indices; know about the various population improvementprogrammes; learn about different Matingdesigns

GPB505 Mutagenesis andmutationbreeding 1+1

Objective

To impart the knowledge about general principles of radiation and various tests/methods for detection of radiation effects on the living cells, genetic risks involved and perspectives of advances made.

Learning Outcome:

Learn about nature and classification of mutations; Understand effect of mutations on DNA; Know about the *In vitro*mutagenesis; Learn about allele mining,TILLING.

GPB506 Populationgenetics 2+1

Objective

To impart knowledge on structure, properties and their breeding values of different population.

Learning Outcome:

Learn about Mendelian population, Hardy-Weinberg equilibrium;Understand effect of estimation of selection; Know about the Breedingvalue; Learn about Estimation of gene frequencies, Geneticdivergence.

GPB507 Heterosisbreeding 2+1

Objective

To provide understanding about mechanisms of heterosis and its exploitation for yield improvement through conventional and biotechnological approaches.

Learning Outcome:

Learn about mechanisms of heterosis; Understand Divergence and Genetic Distanceanalyses.

Development of inbreds and parentallines; Learn about hybrid seedproduction.

GPB508 Cell biology andmoleculargenetics 3+0

Objective

To impart knowledge in theory and practice about cell structure, organelles and their functions, molecules like proteins and nucleic acids.

Learning Outcome:

Learn about Ultrastructure of the cell, Cellular Organelles; Understand Structure and properties of nucleicacid; Proteomics and protein-proteininteraction; Learn about Cancer and cellaging.

GPB509 Biotechnology forcropimprovement 2+1

Objective:

To impart knowledge and practical skills to use biotechnological tools in crop improvement.

Learning Outcome:

Understand the various techniques of plant tissueculture; Know about the fundamentals of geneticengineering; Study about molecular markers, Quantitative Trait Loci (QTL) mapping and Marker AssistedSelection.

GPB510 Breeding for biotic and abioticstressresistance 2+1

Objective:

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

Learning outcomes:

Understand the genetic mechanisms of biotic and abioticstresses; Phenotyping screening methods for major pest anddiseases; Learn about the source ofresistance.

GPB511 Breeding cereals, foragesandsugarcane 2+1

Objective:

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

Learning Outcome:

Understand the origin, distribution and different breeding methods to be adopted for the development of varieties / hybrids in various cereals, forages andsugarcane; Study about the plant genetic resources, centres of diversity and breeding for resistance to biotic and abioticstresses; Llearn about the influence of Genotype x Environment interaction on yield /performance

GPB512 Breeding legumes, oilseeds andfibrecrops 2+1

Objective:

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

Learning Outcome:

Understand the origin, distribution and different breeding methods to be adopted for the development of varieties / hybrids in various legumes, oilseeds and fibrecrops; Study about the plant genetic resources, centres of diversity and breeding for resistance to biotic and abioticstresses; Learn about the influence of Genotype x Environment interaction on yield /performance

GPB513 Breeding forqualitytraits 2+1

Objective:

Toprovideinsightintorecentadvancesinimprovementofqualitytraitsinrice,millets,legumes, oilseeds and forage crops and for physiological efficiency using conventional and modern biotechnologicalapproaches.

Learning Outcome:

Learn about improvement of quality traits in rice, millets, legumes, oilseeds and foragecrops; Molecular and cytogenetic manipulation for qualityimprovement; Genetic engineering protocols for qualityimprovement

GPB514 Gene regulationandexpression 2+0

Objective:

To provide insight into recent advances in the phenomenon of gene regulation and mechanisms by which plants and microbes express different traits and how these are modified during different stages.

Learning Outcome:

Learn about Generegulation; Gene expression, Genetraps; Understanding of visible markers

GPB 515 Maintenance breeding and concepts of variety release andseedproduction 1+1

Objective

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

Learning Outcome:

Learn about Development and Maintenance ofvariety; DUStesting; Principles of seedproduction; Hybrid seed productiontechnology

GPB516 Germplasm collection, exchangeandquarantine 2+1

Objectives:

Toprovideinformationaboutcollection,germplasmexchange,quarantine,maintenanceandus e of plant genetic resources including genetically modifiedplants.

Learning Outcome:

Learn about information about collection, germplasm exchange, quarantine,maintenance; Uuse of plant genetic resources including genetically modifiedplants; Identification of wild relatives of cropplants; Seed treatment and other prophylactictreatments.

GPB517 Data base management, evaluation and UtilizationofPGR 2+1

Objective

To train the students in germplasm data base management using modern tools and softwares.

Learning Outcome:

Learn about germplasm data base management using modern tools andsoftwares; Gene markers and their use in PGRmanagement; Evaluation procedure and experimental protocols (designs and theiranalysis)

DEPARTMENT OF HORTICULTURE

HOR 501 Growth and development of fruit, vegetable andornamentalcrops2+1

Objectives:

The students are expected to gain knowledge on brief outline of the physiology of horticultural crops, concept of different plant growth regulators and their uses, seed dormancy and germination and biotic and abiotic stresses on crop plants.

Learning Outcome:

Students will acquire theoretical and practical knowledge on physiology of horticultural crops, PGR and their functions uses and biotic and abiotic stresses.

HOR502 Fundamentals of fruit, vegetable andornamentalcrops 2+1

Objectives:

Thestudentsareexpectedtogainthefundamentalknowledgeonimportance,branchesandarea specific different types of horticultural crops and their classification, techniques of orchard and garden establishment.

Learning Outcome:

Students will acquire theoretical and practical knowledge on horticultural crops and their classification, establishment of orchard, vegetables cultivation and landscaping.

HOR503 Basics of plantation, spices, medicinal &aromaticcrops 2+0

Objectives:

The students are expected to gain the basic knowledge on importance and propagation techniques, varieties and cultivation practices and processing techniques of different types of plantation, spices, medicinal and aromatic crops.

Learning Outcome:

Students will acquire theoretical and practical knowledge on of different types of plantation, spices, medicinal and aromatic crops, their processing and use.

HOR 504 Post harvest technologies of fruit, vegetable andornamentalcrops 2 +1

Objectives:

The students will gain the knowledge on pre and post-harvest physiology and management technologies of fruits and vegetables. Students are also expected to gain knowledge on conventional and modern packaging and preservation technology of fruits, vegetables and ornamental crops.

Learning Outcome:

Students will acquire knowledge on maturity and physiology of ripening, pre and post harvest management techniques, storage and modern packaging and preservation techniques and value addition of fruits, vegetables and ornamental crops.

HOR 505 Technological advancement of fruit, vegetable andornamentalcrops2+0

Objectives:

Students are expected to know about the recent advancement in horticulture and advanced technology like organic horticulture, protected cultivation, biotechnological tools,micropropagation techniques and their application in the field of fruits, vegetables and ornamental crops.

Learning Outcome:

Studentswillgatherdetailsknowledgeonmodernadvancedtechnologylikemicropropagation, precision farming, biotechnological tools, establishment and management of high density orchard etc and their application inhorticulture.

HOR 511 Propagation and nursery management inhorticulturalcrops 1+1

Objectives:

Students are expected to gain the knowledge on different aspects of seed propagation and vegetative propagation like cutting, budding, grafting, layering, micro-propagation as well as nursery management.

Learning Outcome:

Students will gather theoretical and practical knowledge of different types of sexual and asexual methods of propagation, aspects of micro-propagation and nursery management.

HOR 512 Tropical and dry landfruitproduction2+1

Objectives:

Students are expected to know the details of national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, advancedproduction system, maturity indices, harvesting, physiological disorders of major tropical and dry land fruits.

Learning Outcome:

Students will gather theoretical and practical knowledge of advanced production technology of different tropical fruits like mango, banana, citrus, papaya, guva, sapota etc. and dry land fruits like aonla, pomegranate, ber, pineapple, annona etc.

HOR513 Subtropical and temperatefruitproduction 2+1

Objectives:

Students are expected to gather the details knowledge of national and international importance, ecophysiological requirements, recent trends in propagation, rootstock influence, advanced production system, maturity indices, harvesting, physiological disorders of major subtropical and temperate fruits.

Learning Outcome:

Students will gather theoretical and practical knowledge of advanced production technology of different subtropical fruits like grapes, litchi, loquat, carambola, bael, rambutan etc. and temperate fruits like apple, pear, peach, cherry, strawberry etc.

HOR514 Breeding offruitcrops 1+1

Objectives:

Students are expected to know the detail of different basic aspects of fruit breeding like introduction,selection,hybridization,mutationbreeding,polyploidbreeding,rootstockbreeding etc. as well as breeding techniques , breeding achievements of different major fruitcrops.

Learning Outcome:

Students will gather basic knowledge on different aspects of fruit breeding and breeding of different fruits like mango, banana, citrus, grapes, guava, apple, pear, plums etc.

HOR515 Biodiversity and conservation offruitcrops 2+1

Objectives:

Students are expected to gain the knowledge on evolution, centre of origin, centre of diversity, genetic diversity, utilization and conservation strategies of different germplasm of fruit crops.

Learning Outcome:

Students will gather the advanced knowledge on evolution, centre of origin, centre of diversity, genetic diversity, and utilization and conservation strategies of different fruit crops.

HOR 516 Canopy management infruitcrops

1+1

Objectives:

Students are expected to gather the details knowledge of importance, advantages, factors affecting canopy management, canopy structures, light interception in canopy and different methods of canopy management.

Learning Outcome:

Studentswillgathertheoreticalandpracticalknowledgeoffactorsaffectingcanopymanagement, canopy structures, light interception in canopy and different methods of canopy management and specific canopy management techniques of major fruitcrops.

HOR517 Biotechnology ofhorticulturalcrops 2+1

Objectives:

Students are expected to know the details about tissue culture, bioreactor and secondary metabolite production, somatic hybridization, somaclonal variation, invitro mutgenesis, uses of molecular markers etc.

Learning Outcome:

Students will gather theoretical and practical knowledge of tissue culture, bioreactor and secondary metabolite production, somatic hybridization, selection against biotic stress, invitro mutgenesis, uses of molecular markers etc.

HOR518 Organichorticulture 1+1

Objectives:

Students are expected to gain the knowledge on components of organic horticulture system, organicinputs,sustainablenaturalresourcemanagement,organicdiseaseandpestmanagement, standard management and organic certification etc.

Learning Outcome:

Students will gather the advanced knowledge on components of organic horticulture system, organicinputs,sustainablenaturalresourcemanagement,organicdiseaseandpestmanagement, standard management and organic certification etc.

HOR521 Production technology of cool seasonvegetablecrops 2+1

Objectives:

To educate production technology of cool season vegetables.

Learning Outcome:

Students will acquire theoretical knowledge and practical skill on production of cool season vegetable crops.

HOR522 Production technology of warm seasonvegetablecrops 2+1

Objectives:

To educate production technology of warm season vegetables.

Learning Outcome:

Students will acquire theoretical knowledge and practical skill on production of warm season vegetable crops.

HOR523 Breeding ofvegetablecrops 2+1

Objectives:

To educate principles and practices adopted for breeding of vegetable crops.

LearningOutcome:

Students will acquire theoretical knowledge on breeding principles, understand vegetable breeding methods and developed the required practical skills on vegetable germplasm handling and breedingwork.

HOR524 Seed production technology ofvegetablecrops 2+1

Objectives:

To impart a comprehensive knowledge of seed and planting material production in vegetable crops with adequate practical training.

Learning Outcome:

Students will acquire adequate theoretical knowledge and practical skills on vegetable seed and planting material production.

HOR525 Systematics ofvegetablecrops 1+1

Objectives:

To teach morphological, cytological and molecular taxonomy of vegetable crops.

Learning Outcome:

Students will acquire theoretical knowledge and practical skills on taxonomy of vegetable crops.

HOR526 Production technology of underexploitedvegetablecrops 2+1 Objectives:

To educate production technology of underutilized vegetable crops.

Learning Outcome:

Students will acquire theoretical knowledge and practical skill on production of underexploited vegetable crops.

HOR 527 Organic vegetableproductiontechnology1+1

Objectives:

To educate principles, concepts and production of organic farming in vegetable crops.

Learning Outcome:

Students will acquire theoretical knowledge on organic farming concepts and principles. They will also develop the practical skills for organic vegetable production.

HOR528 Fundamentals of processingofvegetables 2+1

Objectives:

To educate principles and practices of processing of vegetable crops.

Learning Outcome:

Students will acquire theoretical knowledge on principles and methods of processing. They will also develop the practical skills for vegetable processing.

HOR531 Fundamentals of floriculture andlandscapearchitecture 2+1

Objectives:

Students will get acquainted with fundamentals of floriculture, flower production and its trade. A brief outline of production technology of selected ornamental plants and value addition of flowers. Landscaping and fundamental knowledge about the types and styles of garden and its components along with use of various plants.

Learning Outcome:

Thestudentsareexpectedtolearnaboutidentificationofplantsandgardentools,propagationof plantsandvalueaddedflowerproducts.Visittocommercialflowergrowingareas,nurseriesand preparation of layout and schemes for gardens are necessary for understanding of landscaping at field level.

HOR532 Production technology ofcutflowers 2+1

Objectives:

Acquaintance with scope of global trade of cut flower under available varietal wealth and diversityisnecessaryforundertakingopenandprotectedcultivationofdifferentcutflowersand its related problems. Understanding of various grades of cut flower and post-harvest handling, packing, storage and transportation are necessary to get idea about its marketing andexport.

Learning Outcome:

Above mentioned theoretical part should be supported with learning of identification of species and varieties, propagation and cultural techniques for growing and post-harvest handling of cut flowers reinforced with visit to commercial cut flower units.

HOR533 Production technology oflooseflowers 2+1

Objectives

To impart theoretical information about scope, significance and production of loose flowers and its trade in domestic market and for export with available varietal wealth and diversity. This is supplemented with flower forcing, post-harvest handling, packing storage, value addition, transportation and marketting.

Learning Outcome:

The students should get practical experience about identification of species and varieties, propagation and cultural techniques for growing and post-harvest handling of loose flowers reinforced with field visit and markets.

HOR534 Breeding of flower crops andornamentalplants 2+1

Objectives:

Toimparttheoreticalknowledgeaboutorigin,distribution,geneticresources,geneticdivergence of various flower crops, genetic inheritance of various characters, breeding methods, their constraints and achievements made in different ornamentalplants.

Learning Outcome:

Toimpartpracticalexperienceonidentificationanddescriptionofbotanicalfeaturesofcultivars, varietiesandspeciesinflowers,floralbiology;selfingandcrossingtechnique,inductionof mutants through physical and chemical mutagens, screening of plants for biotic, abiotic stresses etc.

HOR535 Landscaping andornamentalgardening 2+1

Objectives:

Students are expected to know the types of garden, types of landscaping, garden components, special gardens etc.

Learning Outcome:

Studentswillgatherthedetailknowledgeofdifferenttypesofgarden,classificationandfeatures of landscaping, components of garden as well as landscapingetc.

HOR536 Protectedfloriculture 2+1

Objectives:

Students are expected to gain the knowledge on types and features of different protective structures suitable for flower crop cultivation, environmental manipulation inside protective structures, growing media, crop regulation etc.

Learning Outcome:

Students will gather theoretical and practical knowledge on types, layout, features of different protective structures suitable for flower crop cultivation, environmental

manipulation inside protective structures, growing media, crop regulation, harvesting and postharvest handling etc.

HOR537 Value additioninflowers 2+1

Objective:

Students are expected to gain the knowledge on types of value added floral products, aspects ofdry flowers, floral arrangement, extraction of essential oil and pigments.

Learning Outcome:

Students will gather the advanced knowledge on various types of value added floral products, aspects and methods of dry flowers preparation, floral arrangement and its types, extraction of essential oil and types of pigments and their extraction.

HOR538 Turfing andturfmanagement 2+1

Objectives:

Students are expected to know the properties of soil for turfing, types of turf grasses, turf establishment methods, management of turf, establishment and management of turf for play grounds etc.

Learning Outcome:

Students will gather the detail knowledge on physical and biological properties of soil for turfing, different types and characters of turf grasses, turf establishment methods, management of turf, establishment and management of turf for play grounds etc.

HOR539 CAD for outdoor andindoorscaping 2+1

Objectives:

Students are expected to know the detail about application of CAD in 2D and 3D garden plantand non plant gardening component design using AUTOCAD, ARCHICAD, operation of AUTOCAD for 2D, basics and operation of ARCHICAD for 3D design etc.

Learning Outcome:

Students will gather theoretical and practical knowledge of application of CAD in 2D and 3D garden plant and non plant gardening component design using AUTOCAD, ARCHICAD, operation of AUTOCAD for 2D, basics and operation of ARCHICAD for 3D design etc.

DEPARTMENT OF AGRICULTURAL ECONOMICS

AEC501 Agriculturalproductioneconomics 2+1

Objectives:

To develop the understanding of production process and the guiding economic principle for agricultural production; to apply the appropriate economic principle under different production scenario to optimize the production process

Learning Outcome:

Students will be able to acquire necessary theoretical and analytical skills to optimise the agricultural production and analyse the financial health of any farm for possible progress towards maximisation of profit.

AEC502 Agricultural marketing andpriceanalysis 2+1

Objectives:

Agricultural marketing in a broader sense is concerned with the marketing of farm products producedbyfarmersandoffarminputsandservicesrequiredbythemintheproductionofthese farm products. Thus, the learning Objectives of agricultural marketing is to study both product marketing as well as inputmarketing.

Learning Outcome:

After studying this course, students will have an understanding on structure of Agriculture marketing in India, agriculture cooperatives, future trading, critical appraisal of agriculture marketing, major Objectivess and instruments of agriculture price policy, buffer stock, appraisal of agriculture pricing policy.

AEC503 Agricultural finance andprojectmanagement 2+1

Objectives:

To understand the role of agriculture in the economic development of India, to assess theimpact of agriculture on the macroeconomic indicators, Nature and scope of financial management in agri-business, to understand the functions of agricultural lending products, to assess investment analysis and projections, to understand the level and type of risk nalysis a bank must perform while evaluating agri-business financing, to understand agri-value chain finance, to understand the factors a bank must keep in mind

when marketing agricultural banking products, to understand the role of the regulator in agriculturalfinancing.

Learning Outcome:

Onthecompletionofthecourse,studentswillbeabletolearnsourcesofagriculturalmicro-macro financing and credit systems, understand the history of financing agriculture in India, significance and limitations of crop insurance, significance of farming cooperatives, acquire knowledge of successful cooperative systems in India and newly launched crop insurance schemes, estimation of credit requirement of farm business, preparation and analysis of project reports and balance sheet, analysis and performance of commercial banks, cooperative banks to acquire first-hand knowledge of their management, schemes andprocedures.

AEC504 Globalization andagriculturalpolicy 2+1

Objectives:

To understand the concept of globalization and agricultural policy and their implication on the society as a whole.

Learning Outcome:

Studentswillunderstandtheconceptofglobalisationandagriculturalpolicyandwillbeenabled with necessary skills to analyse the impacts of changing agricultural policies and international trade.

AEC505: Benefit-costanalysis2+1

Objectives:

The learning Objectives of Benefit-Cost Analysis is to provide decision-makers with information aboutthesocialvalueofgovernment-sponsoredprograms,projectsandpolicies,sothattheycan allocate resources in a way that improves the well-being of society as a whole. The coursecovers thekeyconceptsandtoolsthatareessentialfortheevaluationofgovernmentactivitybyapplying cost-benefit techniques, including under conditions of uncertainty. Case studies are employed to give students the confidence and insights required to undertake their individual assignment. Alternative decision-making approaches will also be presented to provide a perspective on the advantages and disadvantages of cost-benefitanalysis.

Learning Outcome:

Upon successful completion, students will have the knowledge and skills to a solid understanding of the basic rationale and techniques for applying cost-benefit analysis to government-sponsoredprograms,policiesandprojects,theabilitytoplanandimplementacost-benefitstudyandtheabilitytounderstandandcritiqueacost-benefitstudypreparedbysomeone else.

DEPARTMENT OF AGRICULTURAL STATISTICS

STAT 550 Statistical methods forappliedsciences3+1

Objectives:

This course is meant for students who have some knowledge on basic statistical tools and techniques. The students would be exposed to those concepts of statistics that deal with modelling observed data using different probability models, how to draw a good sample from a populationinordertomakesomevalidconclusionaboutthepopulationapopulationparameter etc.

Learning Outcome:

Students will be well equipped to handle field level data for analysis and modelling purposes. They will learn how to draw a good sample from a population in order to draw valid inference aboutthepopulationapopulationparameterandhowtobuildmultiplelinearregressionmodels and study correlation among them under a multivariableset-up.

STAT551: Experimentaldesigns3+1

Objectives:

This course is designed to give a comprehensive knowledge on how to design a study or experiment so that the results of the experiments are free from errors or biases, and then how to draw a valid conclusion using the results so obtained. In this context, laying out of different agricultural field experiments will also be covered. Designing an experiment is an integrated component of research in almost all sciences.

Learning Outcome:

The students would be exposed to various concepts of designing an experiments so as to enable themunderstandthescienceinvolvedinplanning,designingtheirresearchexperimentsandhow to make analysis of different experimentaldata.

STAT552: Bio-assay 3+0

Objectives:

Todevelopexpertiseinmodellingdifferentbiologicalphenomena,wheretheobservations areof specialcharacters.Differenttypesofgrowthmodelswillbestudiedtomodelsuchdatasets. More frequently applied statistical tools may not be applicable directly to such data sets. Some transformations may needed before making the data fit for application of differentstatistical tools.Skillsofselectingappropriatetransformationtomakethedatasetamenableforapplication of statistical tools for a particular situation will be developed at theend.

Learning Outcome:

Expertise in handling data related to different biological variables in relation to their modelling will be developed. The course, as expected, will help the student modelling of biological data in a better way and making proper inference for data sets where data have to be transformed to make them amenable for usual statistical treatments.

STAT553 Nonparametrictechniques 2+1

Objectives:

The course will introduce different inferential procedures used to analyze data when there is no knowledge about the functional form of the population distribution from which the sample has beendrawn.Thestudentswilllearnhowtotestdifferenthypothesesrelatedtolocationandscale parameters for one or morepopulations.

Learning Outcome:

Itisexpectedthatthestudentswilldevelopskillstodrawinferencefromdatasetswhicharenon-normal and are not of quantitativenature.

STAT554 Dataanalysis

Objectives:

This course is meant for the students to let them know about the usage of various statistical packagesforanalyzingdata.Itwouldprovidethestudentsahandsonforanalysingtheirresearch data along with some basic ideas on the statistical tools used in the research analysis with their applications.

Learning Outcome:

Some expertise on analysing data using software packages will be developed. Special skills will bedevelopedforreadingoftheoutputtablesandpickingupoftherightnumbersfromtheout put tables for inferential purposes. At the end, Skills will be developed in writing computer programmes when it is not available in the menu driven software packages.

DEPARTMENT OF CROP PHYSIOLOGY

CPH 501 : Stressphysiology

Objectives:

To study various types of stresses in crop production and strategies to overcome them.

Learning Outcome:

The students will understand various aspects of stress physiology such as physiological and molecular basis of abiotic stress tolerance in plants; the knowledge in stress physiology will be useful for developing climate resilient genotypes for sustainable crop production.

CPH 502 : Mineral nutritionofplants

Objectives:

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

Learning Outcome:

Thestudentswillunderstandvariousaspectsofmineralnutritionofplantssuchasphysiological and molecular basis of mineral ion uptake and utilization in plants; the knowledge in mineral nutrition will be useful for improving nutrient use efficiency of crops for achieving higher productivity.

DEPARTMENT OF ANIMAL SCIENCE

PSC501 Poultry breedingandgenetics

Objectives

To impart knowledge on different systems of breeding, selection methods, design and implementation of breeding programme in developing egg-type and meat type birds. Modern tools in poultry breeding.

Learning Outcome:

Students will get exposure on different systems of breeding, selection methods, design and implementation of breeding programme in developing egg-type and meat type birds. Modern tools in poultry breeding.

PSC502 Poultry nutritionandfeeding

Objectives

Teaching about nutrients & their functions, nutrient requirements of poultry and factors influencing the same. Imparting knowledge of different types of feeds and feeding methods.

Learning Outcome:

Studentswilllearnaboutnutrients&theirfunctions,nutrientrequirementsofpoultryandfactors influencing the same. Imparting knowledge of different types of feeds and feedingmethods.

PSC503 Commerciallayerproduction

Objectives

To impart knowledge on different systems of rearing commercial egg laying birds, care and management of commercial layers for optimal egg production.

Learning Outcome:

Students will exposure on different systems of rearing commercial egg laying birds, care and management of commercial layers for optimal egg production.

PSC504 Commercialbroilerproduction

Objectives

Todealwithdifferentsystemsofrearingcommercialbroilers,managementalpracticesforhigher bodyweight with best feed efficiency in commercial broilers. Marketing of broilersefficiently.

Learning Outcome:

Students will exposure on different systems of rearing commercial broilers, manage mental practices for higher bodyweight with best feed efficiency in commercial broilers. Marketing of broilers efficiently.

PSC505 Breeder stock andhatcherymanagement

Objectives

To impart knowledge about care and management of breeders, hatchery operation, health management of breeder stock. And to study about common diseases and disorders of poultry, diagnosis, vaccination, prevention, control and treatment. Bio security measures in control of general & hatchery borne diseases.

Learning Outcome:

Studentswillgetknowledgeaboutcareandmanagementofbreeders,hatcheryoperation,healt h
managementofbreederstock;commondiseasesanddisordersofpoultry,diagnosis,vaccinatio n, prevention, control and treatment. Bio security measures in control of general & hatchery borne diseases.

PSC506 Management of poultry otherthanchicken

Objectives

Care and management of different breeds, varieties of poultry other than chicken, methods of rearing and common diseases affecting them and their control measure.

Learning Outcome:

Studentswillgetknowledgeaboutcareandmanagementofdifferentbreeds,varietiesofpoultry other than chicken, methods of rearing and common diseases affecting them and their control measure.

PSC507 Poultry products technologyandmarketing

Objectives

Compositionandnutritivevalueofeggsandchickenmeat,gradingandpreservationmethodsof eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

LearningOutcome:

Students will get knowledge about composition and nutritive value of eggs and chicken meat, grading and preservation methods of eggs and meat, functional and value added poultry products, marketing of eggs and poultry meat.

PSC508 Poultry economics, projectsandmarketing

Objectives

To study about measures of performance efficiency in poultry farms and its allied sector, components of project reports and preparation of viable projects related to poultry Industry.

Learning Outcome:

Students will get knowledge about measures of performance efficiency in poultry farms and its allied sector, components of project reports and preparation of viable projects related to poultry Industry.

PSC509Physiology ofpoultryproduction

Objectives

To study the basic principles of physiology of poultry production in relation to egg formation, production, incubation, stress and role of environment.

Learning Outcome:

Students will get knowledge about basic principles of physiology of poultry production in relation to egg formation, production, incubation, stress and role of environment.

PSC510 Diseases of poultry andflock health

Objectives

To study about common diseases and disorders of poultry, their diagnosis, vaccination, prevention & treatment, emphasis on control of emerging poultry diseases of zoonotic importance, disease diagnostic techniques.

Learning Outcome:

Students will get knowledge about common diseases and disorders of poultry, their diagnosis, vaccination, prevention & treatment, emphasis on control of emerging poultry diseases of zoonotic importance, disease diagnostic techniques.

PSC- 511 Avian Anatomy and physiology of different systems; related to Poultry production

Objectives:

To study about avian anatomy and physiology of different systems

Learning Outcome:

Students will get knowledge about avian anatomy and physiology of different systems.

PSC- 512- Applied pharmacology and therapeuticsinPoultry

Objectives:

To study about pharmacology and therapeutics in Poultry

Learning outcome:

Know therapeutics knowledge.

PSC- 513 – Poultry diseases, pathological changesanddiagnosis

Objectives:

To study about poultry diseases, pathological changes and diagnosis

PSC- 514 Poultry Medicine &Preventivemeasures

Objectives:

To study about poultry medicine & Preventive measures

PSC- 515 Poultry wastes management, integrated fish farming with poultry production, Bio-technological interventionandEnvironment

Objectives:

To study about poultry wastes management, integrated fish farming with poultry production, Bio-technological intervention and Environment

PH. D. IN THE DEPARTMENT OF AGRONOMY

AGR 600 Research methodologyandtechniques

Objectives:

To familiarize students with basics of research and the research process, to enable the participantsinconductingresearchworkandformulatingresearchsynopsisandreport, to familiarize participants with statistical techniques and interpretation of results, to impartknowledgeforenablingstudentstodevelopdataanalyticsskillsandmeaningful interpretation to the data sets so as to solve the researchproblem.

Learning Outcome:

Upon successful completion of the course participants are expected to develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling, have basic knowledge on qualitative and quantitative research techniques, have basic awareness of analysis and presentation of data.

AGR601 Crop production andsystemmodeling

Objectives:

To familiarize the students about elementary models for crop growth, system approaches and to simulate yields and growth of crops under varied soil and weather conditions particularly under climate change with different management practices and their optimization.

Learning Outcome:

Upon successful completion of the course students are expected to develop understanding on the techniques of development of elementary models for crop growth, simulation of crop growth and production under limited water and nutrient management options, production potentials and sensitivity analysis under various climatic and crop management practices.

AGR602 Advances in crop growthandproductivity

Objectives:

To impart in-depth ideas of the physiology of different crops under various environmentsinrelationtotheproductivity,techniquesofgrowthanalysis,assessment of growth and yield and analysis of productivity trends in different agroecological situations.

Learning Outcome:

Upon successful completion of the course participants are expected to develop understanding on the techniques of growth analysis, prediction of crop growth and yield and development of optimum crop management strategies to achieve expected yield, analysis of productivity trends under irrigated and rainfed conditions.

AGR603: Advances in soilfertilitymanagement

Objectives:

To impart in-depth knowledge on modern concepts of plant nutrient availability, fertilizer evaluation, nutrient use efficiency, soil fertility and its evaluation, soil productivity under long term intensive cropping and to apprise about the advances in the techniques of nutrient analysis in soil and plant samples.

Learning outcome:

Upon satisfactory completion of the course participants are expected to develop knowledge of fertilizer evaluation, nutrient budgeting in different crops according to soil condition, understand essentiality of plant nutrients and mechanism of nutrient transport to plant and factor affecting nutrient availability, to be able about procedure of soil testing and establish soil testing laboratory in future as an entrepreneur.

AGR604 Advances inirrigationmanagement

Objectives:

To impart in-depth knowledge about soil, plant water relationships, strategies of optimization of irrigation under limited water supply, consumptive use and water requirement of cropping systems under variable agroclimatic conditions.

StrategiesofusinglimitedwatersupplyfactorsaffectingET,controlofETbymulching and use of anti-transpirations; fertilizer use in relation to irrigation; optimizing the use of given irrigationsupplies.

Learning Outcome:

Upon successful completion of the course participants are expected to develop understandingonthetechniquesofirrigationmanagementinmajorcropsandcropping systems, strategies of optimum utilization of limited water supply and develop skill of agronomic evaluation of irrigationprojects.

AGR605: Advances inweedmanagement

Objectives:

To impart advanced knowledge about causes and effect of changes in weed flora, advances in herbicide application techniques, use of new generation herbicides, their phytotoxicity, herbicide resistance and integrated weed management in different crops and cropping systems.

Learning outcomes:

Upon satisfactory completion of the course studentswill be able to develop comprehensive ideas about recent advances in the approaches of weed management, biology, ecology of major weeds, recent advances in the conceptof herbicide selectivity, herbicide resistance, knowledge on selection of specific herbicides indifferentcropsandcroppingsystemsandplanningforintegratedweedmanagement strategies.

AGR606 Integrated farming systems for sustainable agriculture

Objectives:

Toappriseaboutthenewconceptsandapproachesoffarmingsystems,efficientfarming systems, selection of different enterprises suitable for different agroclimatic situations for sustainableagriculture.

Learning Outcome:

Uponsuccessfulcompletionofthecoursethestudentwillbeabletoexplaintheconcept of sustainability in farming systems, preparation of farming system models under different agroecological situations, develop knowledge of agronomic management of different cropping systems and have the exposure of different farming systems of various agroclimaticzones.

AGR607 Soil conservation and watershed management

Objectives:

To apprise about different soil moisture conservation techniques, watershed management, concept of alternate landuse systems, techniques of preventing soil erosion, drainage and agronomic management for enhancing the agricultural productivity through holistic approach.

conservationmeasures;Run-offandsoillossmeasurements;Layingoutrun-offplotand deciding treatments; Identification of different grasses and trees for soil conservation; Visit to a soil conservation research centre, demonstration and trainingcentre.

Learning Outcome:

Upon successful completion of the course participants are expected to develop understanding on the techniques soil moisture conservation, watershed management, preventing soil erosion, drainage and agronomic management for enhancing the agricultural productivity through holistic approach and development of suitable farming systems in watershed areas.

AGR608 Stresscropproduction

Objectives:

To impart detailed ideas about various types of abiotic stresses and environmental pollution in relation to crop production and practical ways and means to overcome stresses and prevent environmental pollution.

Learning outcome:

Upon successful completion of the course participants are expected to develop understanding on causes and effect of various abiotic stresses and environmental pollutioninrelationtocropproductionandtodevelopsuitablestrategiesforadaptation and mitigation of stresses and to prevent environmental pollution for successful crop production.

Course III Review of research work and written presentation of synopsis

Objectives:

To apprise the participants about evaluation and synthesis of the relevant literature within a specific field of research, the current state of thinking on the selected research topic and to identify research gaps and articulates how a particular research project addresses the gap.

Learning Outcome:

Upon satisfactory completion of the course participants are expected to evaluate and synthesis the current existing literature on the selected research topic, finalize and prepare synopsis of the proposed research work.

Ph. D. Syllabus in the Department of Soil Science & Agricultural Chemistry

SSC 600 Research methodology and technique

Objective:

The students are expected to gain knowledge on different aspects of research methodology and techniques like objectives, types, approaches of research, design of experiments, precaution and safety measures to be taken in laboratory, working principle of different instruments like Absorption Spectroscopy, pH meter etc. and principle of chromatography etc.

Learning Outcome:

Students will acquire detailed knowledge on research methodology and techniques.

ACH601 Advances in chemistryof pesticides

Objective:

The students are expected to gain detailed and in-depth and advanced knowledge on classification, formulation, movement, fate, persistence, transformation, chemistry, mode of action of various pesticides, fungicides, nematicidesetc.

Learning Outcome:

Students will acquire detailed knowledge on different aspects of pesticides chemistry.

SSC601 Advances insoilphysics

Objective:

Thestudentsareexpectedtogainin-depthandadvancedknowledgeormodernconcept on different aspects of soil physics like soil water potential, free energy and thermodynamics, fluid flow, Poiseuilles law, Darcy's law, theories of infiltration, mass flow and diffusion of soil air, thermal properties of soil, soil crust, soil conditioners, evapotranspiration, Atterberg limits. Aggregate analysis, soil-moisture characteristic curve, hydraulic conductivity and soon.

Learning Outcome:

Students will acquire detailed and advanced knowledge on different aspects of soil physics.

SSC602 Advances insoilfertility

Objective:

Thestudentsareexpectedtogainin-depthandadvancedknowledgeormodernconcept ondifferentaspectsofsoilfertilitylikenutrientavailability,nutrientresponsefunctions and availability indices, nutrient movement in soils, nutrient absorption by plants, chemical equilibria involving nutrient ions in soils, nutrient use efficiency and nutrient budgeting,fertilizerapplication;soilfertilityevaluationtechniques,long-termfertilizer experiments, soil and plant analysisetc.

Learning Outcome:

Students will acquire detailed and advanced knowledge on modern concepts of soil fertility.

SSC603 Advances insoil chemistry

Objective:

The students are expected to gain in-depth and advanced knowledge on different aspectsofsoilchemistrylikecolloidalchemistry,clayorganicinteraction,clayminerals, cation exchange equilibria - thermodynamics, diffuse double layer theory (DDL), thermodynamicsofnutrienttransformationsinsoils,cationicandanionicexchangeand their models, adsorption/desorption isotherms, solubility equilibria, chemistry of acid soils and salt affected soilsetc.

Learning Outcome:

Students will acquire detailed and advanced knowledge on different modern concepts of soil chemistry.

SSC604 Advances in soil biologyandbiochemistry

Objective:

The students are expected to gain in-depth and advanced knowledge on different aspects of soil biology and biochemistry like soil microbial ecology, soil microbial biomass, microbial interactions, phyllosphere, soil enzymes, microbial transformations of soil nutrients, soil organic matter, biodegradation of pesticides, manures, biofertilizers, soil microbial processes etc.

Learning Outcome:

Students will acquire detailed and advanced knowledge on different modern concept of soil biology and biochemistry.

PH. D. IN THE DEPARTMENT OF AGRICULTURAL ENTOMOLOGY

ENT 601 Advanced Economic Entomology and Integrated Pest Management

Objective:

Toenablethestudentstogetacquaintedwiththeadvancedpartsofappliedentomology related to commercial entomology**,** Integrated Pest Management modules for various agriculturally important crops, their assessment through statistical analysis etc. they will also learn about the various management strategy especially eco-friendly means of control.

Learning Outcome:

Afterthesuccessfulcompletionofthecoursethestudentswillbeabletogetacquainted with the different techniques of management of crop pest in an integrated way. They will

also learn about the ecofriendly means of insect pest control and commercial entomology.

PPT602 ResearchPrelims

Objective:

Collection of literature and preparation of two review articles. Preparation of synopsis of research topic. Final registration seminar (including methodology of trial and experiments). Data analysis and preparation of MS for thesis

Learning Outcome:

The students will get an idea about writing an abstract and synopsis which will further help them in writing their thesis and perform data analysis.

PPT601 Research Methodology and Techniques inPlantProtection

Objective:

Toenable thestudents tosolvea research problem systematically and acquainting them how to prepare a holistic plan of work for research. Also to providetraininginchoosingmethodsmaterials,scientifictoolsandtechniquesrelevant to the solution of the problem including application of suitable statisticalanalysis

Learning Outcome:

After the completion of the course the students will be able draw the objectives of the research work, their plan of work, proper training methods and tools which are adequate for reaching out the objectives.

Ph. D. Syllabus in the Department of Agricultural Statistics

AST601 Research methodologyandtechniques

Objective:

The course has been designed to give ideas about research and its various steps and designs. Data being the core of any research, this course will also give ideas on data classification and their collection, sampling techniques and concepts of parametric and nonparametric test procedures.

Learning Outcome:

Skills of doing research will be increased and the power of drawing valid conclusions from the analysis of research data will be enhanced.

AST602 Advanced courses onstatisticalinference

Objectives:

Idea on different procedures of statistical inferences will be given. Different estimation procedures to estimate the population parameters of interest and different procedures of testing of hypothesis will be covered.

Learning Outcome:

Expected to learn different techniques of statistical inferences, so that valid conclusion can be drawn having analysis of data.

AST604 Reviewing of published research work and presentation of synopsis

Objectives:

The course will basically training on how to write a thesis and how to present the research findings in seminar.

Learning Outcome:

ExpectedthatstudentwilllearndifferentaspectofwritingaPh.D.thesis.Enoughskills willbedevelopedinwritingdifferentcomponentsofathesislikeintroduction,review of literature, research methods, bibliography etc.

PH. D. IN THE DEPARTMENT OF GENETICS AND PLANT BREEDING

GPB1: Research methodologyandtechniques

Objectives:

This course is aimed at understanding the concepts of research, helping students to develop their analytical skills for data processing and analysis.

Learning Outcome:

Understand the concepts of research, research designing, Data processing andanalysis, Use and handling of microscope, laminar air flow, vacuum pumps, viscometers, thermometer, magnetic stirrer, micro-ovens, incubators, sand-bath, water-bath, oil- bath, Different field plot techniques for germplasmevaluation.

GPB2: Advances in plant breedingandgenetics

Objectives:

Thislessondealswithheredityandthereasonsbehindthevariationamong individuals of the same species. To impart knowledge to the students on the principles and procedures of plant breeding in self and cross pollinated crops to develop the high yielding varieties / hybrids. It also includes the concept of moleculargenetics.

Learning outcomes :

Apply the principles of inheritance to plantbreeding; acquaint with the fundamentals of selectionprocedures; learn breeding procedures in self and cross pollinatedcrops; understand exploitation of heterosis utilizing male sterility and othermethods; know about the various population improvement programmes; study about the fundamentals of molecular markers and their role in cropimprovement.

GPB3: Review collection and presentationofsynopsis

Objectives:

This lesson deals with review collection and presentation ofsynopsis.

Learning Outcome:

Learn about researchproblem; acquaint with the scope ofresearch; understand synopsis presentation of proposed area.

PH. D. IN THE DEPARTMENT OF HORTICULTURE AND POSTHARVEST TECHNOLOGY

HOR 600 Research methodology forhorticulturalscience

Objective:

Students are expected to know the detail about ethics of research, aspects of data and statistical approaches, experimental design, laboratory techniques, scientific writing methods, research project formulation etc.

Learning Outcome:

Students will gather the knowledge of ethics of research, aspects of data and statistical approaches, principles of experimental design, laboratory techniques used in horticultural research, scientific writing methods (vig. abstracts, reviews, research papers), research project formulation etc.

HOR602 Advances in production offruit crops

Objective:

Students are expected to gain the knowledge on recent advances in propagation and rootstock management, high density planting, precision farming, crop regulation, modern approaches of water and nutrient management with special reference to different major tropical, subtropical and temperate fruits.

Learning Outcome:

Students will gather the advanced knowledge on different types of propagation and management of rootstock, high density planting, precision farming, crop regulation, modern approaches of water and nutrient management with special reference to different major tropical, subtropical and temperate fruits.

HOR603 Advances invegetable production

Objective:

Studentsareexpectedtogatherdetailsonadvancesinnutritionalandeconomicalvalue, edaphic factors of production, choice of variety, nursery management, water, nutrient and weed management, protected and year round cultivation, export oriented productionetc.

LearningOutcome:

Students will acquire advanced knowledge in nutritional and economical value, edaphic factors of production, choice of variety, nursery management, water, nutrient and weed management, protected and year round cultivation, export oriented production etc.

HOR661 Thesiswriting

Objective:

Students are expected to know the basics of research designing and synopsis writing, methodsofcollectionofreviewofliterature,identificationofresearchproblem,framing research methodology as well as acquire the concepts of thesis and its preparation techniques including seminarpreparation.

Learning Outcome:

Students will gather the basic knowledge of designing and writing synopsis, methods ofcollectionofreviewofliterature,identificationofresearchproblem,framingresearch methodology as well as they will acquire the concepts of thesis and its preparation techniques including seminarpreparation.

Ph. D. Syllabus in the Department of Plant Pathology

PPT 601 : Research Methodology and Techniques inPlantProtection

Objective:

To provide fundamental knowledge about the dimension of agricultural research, methodology, data analysis and interpretations, pathometry, maintenance of plants pathogens and their management.

Learning Outcome:

Help the researcher to understand the basic techniques required for plant pathological research, help them to identify the niche areas of research and make them competent enough for individual research.

PPC601: FungalPlantPathology

Objective:

To provide detail knowledge about the fungal pathogens their ecology and host pathogen interactions, development of diseases and their epidemics and management through various approaches.

Learning Outcome:

Developed tangible idea about the fungi and their different dimensions in relation to ecology,diseaseandmanagementamongtheresearcherswhichhelptoinitiateresearch in fungal plantpathology.

PPC 604: Mushroom and Commercial Mushroom Production Technology

Objective:

To provide detail knowledge about the macro-fungi (mushrooms), edible fungi and importantcultivatedmushrooms,theircultivationtechnology,andsmallandlargescale production.

Learning Outcome:

Generate knowledge about the mushrooms, their biology and cultivation techniques among the researchers for conducting individual research on mushroom and entrepreneur development.

PPC606:AdvancedVirology

Objective:

To provide detail knowledge about the plant viruses their ecology, host-vector-environmental interactions, assay techniques, viral diseases and their epidemics and management through various approaches.

Learning Outcome:

To develop overall idea about the plant viruses and different techniques associated with plant virus research among the students.

PPT602 : ResearchPrelims

Objective:

To provide fundamental knowledge about the collection of literature and reviews, arrangements of data, analysis and their interpretation, preparation of dissertation and research articles.

Learning Outcome:

Help the researcher to understand the basic principles for writing experimental findings, dissertation, research articles etc.

PH. D. IN THE DEPARTMENT OF AGRICULTURAL ENGINEERING

AEG600 Research methodologyandtechniques

Objective:

To acquaint and equip the students with various research methodologies and statistical techniques for their future research work.

Learning Outcome:

Thiscourseenablesthestudentstomaketheirexperimentaldesigns,statisticalanalysis, and error estimation etc. for their research work. The students will also able to work with the standard statistical software such as SPSS, R and MATLABetc.

AEG 602 Advances in food and agriculturalprocessengineering

Objective:

To acquaint and equip the students with various engineering principles and technologies in food and agricultural processing and application of mathematical modeling techniques in food processing operations.

Learning Outcome:

This course enables the students to develop research skill in advanced technology in food and agricultural processing viz. thermal and non-thermal processing, extrusion, ultrasound, infrared, low temperature, aseptic processing, hurdle technology, irradiation, hydrostatic pressure, food texture, etc.

AEG603. Advances in farm machineryandpower

Objectives:

To familiarize students with new and advance machinery for farm operations and emphasis on reducing the use of traditional energy sources in farm activities.

Learning Outcome:

Thiscoursewillencouragestudenttousemodernandefficienttoolsandequipmentsin placeoftraditionalequipmentandpractices.Thiswillencouragethestudentstodesign small equipments to fulfil localrequirements.

AEG604Advances in soil and water conservation engineering

Objective:

To acquaint and equip the students with various engineering principles and technologies in soil and water conservation including soil erosion, soil loss estimation, groundwater recharge, hydrology, hydrodynamics in flow, reservoir, well hydraulics, etc.

Learning Outcome:

Thiscourseenablesthestudentsinadvancesinsoilandwaterconservationengineering suchassoilloss,sedimentation,rainfallmodels,channelflow,groundwatermodelling, well hydraulics, hydrologic models, hydrodynamics in flow, biological wastewater treatment,etc.

AEG605. Advances inbio-energyresources

Objectives:

To acquaint and equip the students with alternative energy sources for carrying out farm activities and importance

Learning Outcome:

The students will able to use their skill in using alternative energy sources such as biomass gasifier, solar panel, bio-fuel, biogas plant, wind energy for carrying out farm activities. It also reduces the use of traditional energy sources such as petroleum products, coal etc.

AEG601 Review of Research Work and Written Presentation of Synopsis

Objectives:

The course will basically training on how to write a thesis and how to present the research findings in seminar.

Learning Outcome:

ExpectedthatstudentwilllearndifferentaspectofwritingaPh.D.thesis.Enoughskills willbedevelopedinwritingdifferentcomponentsofathesislikeintroduction,review of literature, research methods, bibliography etc.

Ph. D. Syllabus in the Department of Agricultural Economics

AEC601 Research methodologyandtechniques

Objectives

To develop a way in relation to systematically solve a research problem relating to agricultural economics. It is stated that how research is done scientifically and it also aims to give the work plan of research. It provides training in choosing methods materials, scientific tools and techniques relevant to the solution of the problem of agricultural economics.

Learning Outcome

Students can develop a theoretical concept regarding the subject researchmethodology and can able to understand the possible application in the field of agricultural economics.

AEC602 Advancedeconomictheory

Objectives

Understand the fundamental principles and models of modern economics in depth, and be able to apply them to economic and socialissues; Be able to use mathematical models to analysebehavior; Beabletoapplyadvanced,moderneconometricmethodstotheanalysisofdata; Have a deep mastery of the subject area in two fields ofconcentration; Be able to conduct scholarlyresearch; Be able to describe and critique economic research to both technical and non- technicalaudiences; Be able to explain economic principles, models and methods toothers; Be prepared for employment in academic and/or non-academicinstitutions.

Learning outcome

Develop the ability to explain core economic terms, concepts, and theories; Explain the function of market and prices as allocativemechanisms; Apply the concept of equilibrium to both microeconomics andmacroeconomics; Identifykeymacroeconomicindicatorsandmeasuresofeconomicschange,growth, anddevelopment; Identify and discuss the key concepts underlying comparativeadvantage; Identify and explain major types of market failures. Demonstrate the ability to employ the "economic way ofthinking"; Discuss the application of marginal analysis; Explain the use of benefit/costanalysis; Explain the contribution of economics to the analysis of non-market social issues. Demonstrate awareness of global, historical, and institutionalforces; Assess the role of domestic and international institutions and norms in shaping economies. Apply economic theories and concepts to contemporary social issues, as well as formulation and

analysis of policy; Describe how economic trade-offs and social values impact public/private social policy, and the success or failure of policies to achieve intendedoutcomes; Recognize the role of ethical values in economic decisions; Distinguish between normative and positiveeconomics; Identify the limits of economicanalysis; Compare and contract efficiency and equity. SkillAreas Apply both oral and written communication skills within the discipline; Present economic arguments in non-quantitativeform; Synthesize the arguments found in both academic and popular economicmedia; Discuss economic concepts in an articulate manner in a classroom. Demonstrate quantitative reasoningskills; Present an economic argument in quantitativeterms; Demonstrate ability to solve systems ofequations; Be able to conduct economic analysis using equations andgraphs; Demonstrate the ability to collect, process, and interpret data, including statistical inference; Recognize how to use scientific method ineconomics; Formulate empirically testablehypotheses; Construct a data set of economicvariables; Calculate, present, and discuss descriptivestatistics; Conduct a regression analysis; Critically assess the statistical analysis of other researchers. Demonstrate computer proficiency withineconomics; Access, download, and use electronicdatabases; Use standard softwarepackages; Be able to use critical thinking skills within the discipline of economics about economic matters; Present viewpoints and alternative hypothesis on economicissues; Recognize underlying assumptions in economicmodels; Demonstrate ability to use the economic tools ofanalysis.

AEC603 Advanced course onagriculturaleconomics

Objectives

Variouseconomicprinciplesandbusinessmanagementconceptswhichareinvolvedin the decision-making process when organizing and operating a farming/ranching operation. Includes production economics, record keeping systems, financial budgets andanalysis,cropandlivestockenterpriseanalysis,leasingarrangements,depreciation, farm business organizations, farm investment analysis, pasture/rangeland management, and production efficiencyindicators.

Learning outcome

After completion of this course **s**tudents may have the skills to succeed in a business, agency, or academic environment and use agricultural economic concepts to quantify and analyze issues as directed by their employer.

AEC604 Courses onthesiswriting

Objectives

Learn the structure ofparagraph; Use various strategies to write the lead-in andintroduction; Write a clear thesis statement and essaymap; Write an essay that demonstrates unity, coherence, andcompleteness; Support general statements with

effectiveexamples; Develop examples with specific details to illustrate apoint; Proofread for minor/major grammar and mechanicalerrors.

Learning Outcome

Student may develop knowledge about the art of thesis writing after completion of this course.

PH. D. IN THE DEPARTMENT OF AGRICULTURAL EXTENSION

AEX601 Research methodologyandtechniques

Objectives:

To orient the scholars regarding various concepts and techniques of research methodology in agricultural extension

Learning Outcome:

The learners are expected to develop expertise on different concepts and techniques of research methodology in agricultural extension

AEX602 Advances inExtensioneducation

Objectives:

To orient the scholars regarding various advance concepts and issues of extension education, communication, extension management, project management and development communication in the field of agricultural extension

Learning Outcome:

The learners are expected to develop expertise on different concepts and issues of extension education, communication, extension management, project managementand development communication in the field of agriculturalextension.

AEX604 Courses onthesiswriting

Objectives:

To orient the scholars regarding various concepts and issues of thesis writing,

presentation and writing of synopsis and seminar presentation.Syllabus.

Learning Outcome:

Thelearnersareexpectedtodevelopexpertiseondifferentconceptsandissuesofthesis writing, presentation and writing of synopsis and seminarpresentation.

PH. D. IN THE DEPARTMENT OF CROP PHYSIOLOGY

CPH600: Research methodologyandtechniques

Objectives:

To orient the scholars regarding various growth analysis parameters, agro-meteorological observations, to handle about different laboratory equipments.

Learning Outcomes:

Studentswillunderstandaboutdifferentmethodologiesofplantphysiologicalresearch; students will understand the principles of different laboratory equipments; the knowledgeinresearchmethodologyacquiredbythestudentswillbeusefulforcarrying out research in thesubject.

CPH 601 Physiology of growth andyieldmodelling

Objectives:

To orient the scholars regarding applications in crop physiological research; physiological basis of yield variation in crop plants and know about yield modelling.

Learning Outcome:

Students will understand about different aspects of crop growth analysis and their applications in crop physiological research; students will understand the physiological basisofyieldvariationincropplants;theknowledgeinyieldmodellingacquiredbythe students will be useful for predicting yield ofcrops.

CPH 602 Advances instressphysiology

Objectives:

Toimpartbasicknowledgeaboutdifferentaspectsofstressphysiologicalprocessesand their applications in agricultural research; to impart knowledge the physiological and molecular basis of abiotic stress tolerance in plants and climate resilientcrops.

Learning Outcome:

Students will understand about different aspects of stress physiological processes and their applications in agriculturalresearch; Students will understand the physiological and molecular basis of abiotic stress tolerance inplants; The knowledge in stress physiology acquired by the students will be usefulfordevelopment of climate resilient crops.

CPH 603 hormonal regulation of plant growthanddevelopment

Objectives:

To provide basic information about different aspects of phytohormones and plant growth regulators and their applications in agriculture; physiological functions and mechanism of action of various plant hormones and knowledge in plant growth regulation acquired by the students will be useful for achieving higher productivity of crops.

Learning Outcome:

Studentswillunderstandaboutdifferentaspectsofphytohormonesandplantgrowth regulators and their applications in agriculture; Students will understand the physiological functions and mechanism of action of various planthormones; Theknowledgeinplantgrowthregulationacquiredbythestudentswillbeusefulfor achieving higher productivity ofcrops

CPH 604 Seedphysiology

Objectives:

To impart knowledge different aspects of seed physiology and their applications in agricultural research; understand the physiological and biochemical basis of dormancy and seed germination.

Learning Outcome:

Students will understand about different aspects of seed physiology and their applications in agriculturalresearch; Students will understand the physiological and biochemical basis of dormancy and seedgermination; The knowledge in seed physiology acquired by the students will be useful for achieving higher cropstand.

CPH 605 Molecular approaches for improvingphysiologicaltraits

Objectives:

To provide knowledge about various aspects of plant physiology and molecular biology; different techniques of molecular biology and knowledge about climate ready crops.

Learning Outcome:

Students will understand various aspects of plant physiology and molecular biology; Students will be able to know about different techniques of molecular biology; The knowledge in molecular biology acquired by the students will be useful for development of clime ready crops.