

Name of Programme: M.Sc. (Ag.)Agroforestry

Academic eligibility for admission: - B.Sc. (Ag.)

Curriculum and Syllabus

Semester	Course Code & No.	Course Title	Credit Hrs.	Mid Exam.	Final Exam		Total
					Theory	Practical	
Ist Sem.	AGF 6391	Principles and Practices of Agroforestry systems	3 (2+1)	20	40	40	100
	AGF 6392	Silviculture of Agroforestry trees	3 (2+1)	20	40	40	100
	AGF 6393	Nursery and Seed Technology	3 (2+1)	20	40	40	100
	AST-6394	Statistical Methods	3 (2+1)	20	40	40	100
Total			12				

IInd Sem	AGF 6395	Fundamentals of Soil Science & Land Use Planning	3 (2+1)	20	40	40	100
	AGF 6396	Tree Improvement & Physiology	3(2+1)	20	40	40	100
	AGF 6397	Plant protection in Agroforestry System	3 (2+1)	20	40	40	100
	AST-6398	Design of Experiments	3(2+1)	20	40	40	100
	Total			12			

IIIrd Sem	AGF 7391	Multipurpose Tree Species and Measurements in Agroforestry	3(2+1)	20	40	40	100
	AGF 7392	Wasteland Development and Watershed Management	3(2+1)	20	40	40	100
	AGF 7393	Management and Productivity in Agroforestry	3(2+1)	20	40	40	100
	AGF 7394	Silvipasture and Animal Production Management	3(2+1)	20	40	40	100
	Total			12			

IVth Sem	AGF-7395	Utilization of Agroforestry Produce	3(2+1)	20	40	40	100	
	AGF-7396	Socio-economic aspect of Agroforestry	3(2+1)	20	40	40	100	
	AGF-599	Seminar	1	Satisfactory/Unsatisfactory				
	Optional (any one from two)							
	AGF-7397	Principles of Crop production in Agroforestry	12 (9+3)	20	40	40	100	
	or							
	AGF-598	Thesis Research	12	40 % Internal +60% External)				100
Total			19					
Grand Total			55					

SYLLABUS FOR M.Sc. (Ag.) AGROFORESTRY COURSES

SEMESTER I

PRINCIPLES AND PRACTICES OF AGROFORESTRY SYSTEMS: (AGF-6391)

Concept and definition of agro/ social/community/farm forestry, classification of agroforestry structural, functional, ecological, socio-economic, agroforestry practices as existing in India specially in Bundelkhand, criteria for selection and screening of tree species, advantages of agroforestry, design and diagnosis methodology in relation to agroforestry, strategies for promoting agroforestry, transfer of agroforestry technology, overview of global agroforestry system- shifting cultivation, taungya cultivation, shelter belt and wind breaks, energy plantation and homestead gardens.

SILVICULTURE OF AGROFORESTRY TREES: (AGF-6392)

Definition, objectives and scope of silviculture and its place in agroforestry, Forest types of India and its distribution, locality factors, natural regeneration from seed and vegetative parts. Artificial regeneration- reforestation, afforestation, choice of species, site selection, pure versus mixed crop, planting techniques and methods, protection of seedlings/ plantations from environmental and biological adversaries, tending operations, concept of coppice etc. Silviculture of agroforestry trees with special reference to *Acacia nilotica*, *Acacia catechu*, *Acacia totilis*, *Albizia lebbek*, *Albizia procera*, *Azadirachta indica*, *Dalbergia sisoo*, *Tectona grandis*, *Emblica officinalis*, *Leucaena leucocephala*, *Anogeisis latifolia*, *Anogeisis pendula*, *Prosopis spp.*, *Hardykia piñata*, *Tamarindus indica* and *Madhuca latifolia*.

NURSERY AND SEED TECHNOLOGY: (AGF-6393)

Concept of nursery, temporary and permanent nursery, criteria for site selection, lay out and design of beds, type of containers its uses and limitations, sowing techniques, soil mixtures, sowing manuring, fertilization in nursery, water management in nursery, scope of mechanism of nurseries: seedling protection from environmental and biological agents; Acceleration early growth of seedling. Bare root versus container seedling; Nursery disease, pests and their control; Techniques of raising seedling of *Acacias*, *Neem*, *Bakain*, *Mahua*, *Shisham*, *Bamboo*, *Imli*, *Teak*, *Nilgiri*, *Poplar*, *Terminalia*, *Siris*, *Anjan*, *Aonla*, *Khair*, *Khejri*, *Plas* etc. in nursery. **Seed collecting, seed transport extraction of seed, Quality of seed and pretreatment, germination, sanitation, seed storage, seed certification, seed source and elite seed trees.**

STATISTICAL METHOD: (AST- 6364)

Frequency distribution, Classification and tabulation of data, graphical and diagrammatic representation of data, measures of central tendency, measures of dispersion, coefficient of variance, standard error, skewness & kurtosis. Census and sample survey, population and sample, probability, concept of random sampling, simple random sample, stratified sample systematic & cluster sampling parameter & sample value. Testing of hypothesis, test of significance based on Z, t and F test, χ^2 – test for goodness of fit and independence of attributes. Scattered diagram. Linear regression & correlation, regression and correlation coefficient.

SEMESTER II

FUNDAMENTALS OF SOIL SCIENCE AND LAND USE PLANNING: (AGF-6395)

Soil concept, definition, weathering, properties of soil, soil classification, soil organic matter and its impact on soil fertility, source, composition and steps in decomposition, Humus properties and role. C/N ratio, micro-organisms in soil and their classification, Biological nitrogen fixation, mycorrhiza and its role in plant nutrition, soil fertility and productivity, factors of soil nutrition, factors of soil fertility, essential nutrients for plant growth, methods of soil fertility evaluation, role and deficiency symptoms of essential plant nutrients land use planning, land capability classification classes , subclasses.

TREE IMPROVEMENT AND PHYSIOLOGY: (AGF-6396)

General concepts and principles of tree improvement, qualitative and quantitative variation in important traits of trees, variation in natural stands and plantations, concepts of seed stand and provenance testing, selection genetic gain and superior tree grading system, seed orchard establishment and progeny test: Breeding methods, advanced generation breeding and hybridizations, mutation and polyploidy, vegetative propagation its uses and methods, plagiotropic, orthotropic age responses due to vegetative propagation, clonal forestry, monoculture, polyculture, exotics, indigenous trees in relation to tree improvements. Tree water relationships, basic process, water balance, long distance transport, physiological and practical aspects of water stress hormones in relation to growth and development; flower periodicity and its mechanism, ageing in trees. Allelopathy-mechanism and its perspective in agroforestry.

PLANT PROTECTION IN AGROFORESTRY SYSTEMS: (AGF-6397)

Introduction, susceptibility of forest trees and agricultural crops to damages and destructive agencies, nature of damages, causes, preventive and protective measures and beneficial effects if any injurious plants/ weeds of cultivated lands climbers, noxious weeds and their control, economics of control measures, problem of weeds in forest nursery and plantations, crop-weed competition insect-pests of agroforestry trees and crops pests control of forest nurseries and their management, pest of forest tree seeds and their control in standing trees and in storage, general principles of insect pest management, IPM, biological, silvi-cultural and chemical controls, disease situation in different agroforestry models, important disease in trees and crops in agroforestry system, interaction of crops and trees in relation to disease problems.

DESIGN OF EXPERIMENT (AST-6364)

Analysis of variance, Basic principals of experiment design, CRD, RBD, LSD with their analysis mission, plot technique in RBD and LSD. Factorial experiments its concepts and analysis of 2^3 , factorial confounding in symmetrical factorial (in 2^3 experiments), split plot design, strip plot design, uniformity trials, progeny row trials. Complete family block design, with over trials and simple rotational experiments. Statistical organization, statistics of livestock & filstrics. Source of livestock and agriculture in general. Sources of official statistician, crop cutting experiments.

SEMESTER III

MPTS IN AGROFORESTRY AND MEASUREMENTS IN AGROFORESTRY (AGF-7391)

Introduction, importance of woody elements in agroforestry, role of woody elements in biomass production, suitability of species for specific sites, MPTs and their role in agroforestry systems, role of nitrogen fixing trees and shrubs, choice of species for various agro-climatic zone for the production of timber, fuel wood, fodder, fiber, forage, live hedge, wind- breaks and shelterbelts. Root behavior and crown architecture including methods for minimizing unfavorable interactions, production potential of trees in different agroforestry combination. Tree measurement techniques, instruments and methods for measurement of tree diameter, height, bark thickness, crown volume crown surface area, tree stem form, yield tables, volume tables, concept of sustained yield, and kind of tree rotation, increment and yield, estimation of biomass. Determination of tree age and introduction of working plan.

WASTELAND DEVELOPMENT AND WATERSHED MANAGEMENT: (AGF- 7392)

Wasteland definition, types: ecological characteristics, landslides, soil erosion hoods, drought, salinity, water logging and fire, biological causes of deforestation, grazing, shifting cultivation and faulty agricultural practices, reclamation of wastelands, scientific land use practices, afforestation, soil conservation practices, improvement of water catchment areas and development of recreational and amenity areas, extent of wasteland in Bundelkhand and its development through agroforestry, choice of trees on wastelands plantation, techniques on wasteland developments, concept of wasteland, idiotypes of watershed development plans and activities for watershed size determination and criteria characteristics of a watershed and their role in management, quantification of the benefits and effectiveness of the package of practices, biological and engineering approaches, integrates and multiple approach.

MANAGEMENT AND PRODUCTIVITY IN AGROFORESTRY: (AGF-7393)

Concept and classification of agroforestry systems and productivity, eco-zones and choice of system, system components and their integration, management of tree plantation, thinning, lopping, pruning etc.. Criteria for selection of agroforestry design, role tree architecture and management in agroforestry, development and management of agroforestry system resources output and input flows, interpretation and system viability, ecological sustainability, bioenergetics and production dynamics, recent trends in agroforestry, development-technologies and research with special on space and time considerations and introduction to on farm trials.

SILVIPASTURE AND ANIMAL PRODUCTION MANAGEMENT: (AGF-7394)

Definition scope and potentials of silvipasture systems, system of grazing, pasture systems, nomadic and migratory grazing, grass cover types, quality improvement of grazing lands, and effect of grazing on productivity. Grazing and Indian forest laws, grassland arid tree management of rangelands, fodder of Bundelkhand and their chemical composition, nutritive values, cultivation practices, economics of silvi-pasture, silvi-pasture in relation to reclamation of degraded lands, importance of cattle, sheep and goat vis-a-vis in agroforestry systems, feed and fodder resources in agroforestry systems, nutrient analysis of forage derived from fodder trees shrubs, nutrient requirement for various livestock and their ration competition with agroforestry

forages and tree leaves, forage and tree leaves preservation, calendars for forage crop production, animal products technology and markets.

SEMESTER IV

UTILISATION OF AGROFORESTRY PRODUCE : (AGF 7395)

Product and service available from woody species, chemical constituents of wood and their calorific value, charcoal burning, destructive distillation of wood, wood seasoning and preservation with reference to small timber, food, fiber flosses, waxes, oils, gums, dyes,. Resin, tannin, cutch and katha utilization of wood waste material-sawdust lops, tops and bark, medicinal and aromatic plants, edible plants both of human and animal use and their nutritive value and digestibility.

SOCIO- ECONOMICS ASPECT OF AGROFORESTRY: (AGF-7396)

Basic principles of economics applied to agroforestry, cost- benefits analysis, estimation of demand and supply, analysis of trends in national and international market and changes in production and consumption pattern, role of private sector and co-operatives, socio-economic analysis of agroforestry projects, recent trends in agroforestry extension, participatory approaches of NGO's. voluntary organizations, local leaders, farm youth and women in generation and adoption of agroforestry development, legislations and forest policies and their implications in agroforestry extension program, advances in marketing management of agroforestry products including medicinal and aromatic plants.

SPECIAL PAPER

PRINCIPLES OF CROP PRODUCTION IN AGROFORESTRY: (AGF-7397)

Choice of inter-crops for different tree species, sowing and planting techniques. Planting patterns, crop geometry, nutrients requirements, irrigation scheduling and weed management of field crops, cereals, pulses, oil seed, fodder, vegetables, medicinal plants and ornamental, seed production. Production potentials in multiple cropping in relation to agro-climatic conditions. Crop combination, interaction in crop mixtures, allelopathy, canopy management and plant protection.

MASTER'S RESEARCH/ THESIS: (AGF-7398)

SEMINAR-(AGF-599)