

SYLLABUS

FOR

AGRICULTURAL SCIENCES AND TECHNOLOGY

[B.Sc. (Hons.) Ag.]

(First Semester)



PRAYAGRAJ

**FACULTY OF AGRICULTURAL
SCIENCES AND TECHNOLOGY**

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF AGRONOMY

Course Code: AGUCBG101T

Semester: I

L T P C
3 0 0 3

Objective:

The aim of the study is to explore the knowledge to get the maximum production at minimum cost. Developed the skills and knowledge by basic agriculture and allied sciences for higher crop production on aspects of doubling the farmer's income. Introducing new agricultural technology/ practices for enhancing the crop productivity/yield with advance, valuable knowledge and better understanding in respect of crop, soil and environment. Agronomy occupies a pivotal position and regarded as dynamic discipline.

Course Syllabus (Theory)

Agronomy and its scope, seeds and sowing, tillage and tilth, crop density and geometry, Crop nutrition, manures and fertilizers, nutrient use efficiency, water resources, soil plant water relationship, crop water requirement, water use efficiency, irrigation- scheduling criteria and methods, quality of irrigation water, water logging. Weeds- importance, classification, crop weed competition, concepts of weed management- principles and methods, herbicides- classification, selectivity and resistance, allelopathy. Growth and development of crops, factors affecting growth and development, plant ideotypes, crop rotation and its principles, adaptation and distribution of crops, crop management technologies in problematic areas, harvesting and threshing of crops.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Agronomy and Crop Nutrition Agronomy: scope, seeds and sowing, tillage and tilth, crop density and geometry. Crop nutrition, manures and fertilizers etc. other related topic covered during the courses.	10
2	Water and Irrigation Soil plant water relationship, Crop water requirement, water use efficiency. Irrigation: scheduling criteria and methods, quality of irrigation water etc. topic covered during the unit.	10
3	Weeds Weeds: importance, classification, crop weed competition. Concepts of weed management- principles and methods.	10
4	Herbicides Herbicides- classification, selectivity and resistance, allelopathy. Growth and development of crops, factors affecting growth and development etc.	10
5	Crop Rotation and its management Crop rotation: its principles, adaptation and distribution of crops, Crop management technologies in problematic areas. Harvesting and threshing of crops etc.	8

Course Outcomes

- Study the basic principle of agronomy, field management and fertilizers.
- Student will be able to understand the importance of water and Irrigation Management.
- Student will be able to understand the concept of weed and its management.
- Study the herbicides and its classification with application.
- Student will be able to understand the concept of crop rotation, harvesting & threshing of crops.

Recommended Text Books

1. Principles & Practices of Agronomy- S.S. Singh and Rajesh Singh, Kalyani Publishers.
2. Handbook of Agriculture: Indian Council of Agricultural Research (ICAR), New Delhi. 6th edition.
3. Fundamentals of Agriculture- Arun Katyayan, Kushi Publication
4. Principles of Agronomy- T. Yellamanda Reddy and G. H. Sankara Reddy, Kalyani Publishers.

Recommended Reference Books

1. Principles of Agronomy- S. R. Reddy, Kalyani Publisher.
2. Manures and Fertilizers- K. S. Yawalkar, J.P. Agrawal and S. Bokde Agri Horticultural Pub. House.
3. Fundamentals of Agronomy Gopal Chandra De. Oxford and IBH Publishing Co. Pvt. Ltd.
4. The Future of Indian Agriculture- Yoginder K. Alagh, National Book trust, New Delhi.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF AGRONOMY LAB

Course Code: AGUCBG101P

Semester: I

L T P C
0 0 2 1

Objective:

The aim of this lab is to teach the students theoretically as well as with more emphasized on practically for better understanding, skilling of the students with basic knowledge of principle and practices of soil, water and crop management.

- The course will consist of lectures (both theory and practical) in the Lab.
- Highlights mainly to practical oriented topics.
- Evaluation done not on the theory but on the basis of practical of field and numerical exercises.
- Aim of study to practically skilled the student on the scale of Learning by doing.

Course Syllabus (Practical)

Identification of crops, seeds, fertilizers, pesticides and tillage implements, Effect of sowing depth on germination and seedling vigour, Identification of weeds in crops, Methods of herbicide and fertilizer application, Study of yield contributing characters and yield estimation, Seed germination and viability test, Numerical exercises on fertilizer requirement, plant population, herbicides and water requirement, Use of tillage implements- reversible plough, one way plough, harrow, leveler, seed drill, Study of soil moisture measuring devices, Measurement of field capacity, bulk density and infiltration rate, Measurement of irrigation water.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Identification of crops, seeds, fertilizers	Common name, Botanical name, Family Chromosome no., Origin of the crops. Crops- Cereals, Pulses, Oilseeds Crops etc. Seed- Cereals, Pulses, Oilseeds crops etc. Fertilizers- Inorganic, Organic fertilizers, Bio fertilizers.	2
Identification of pesticides and tillage implements	Classification of pesticides- Fungicides, Herbicides, Insecticides. Tillage implement- Primary tillage implements, Secondary tillage implements etc.	2
Study of Agro-Climatic zone of India and Uttar Pradesh	Name of the 15 Agro- Climatic Zone (I-XV), Climate, Major Crops, Irrigation facility. 3 Agro-Climatic Zone (U.P.)- Middle Gangetic Plain Region, Upper Gangetic Plain Region, Central Plateau & Hills Region.	2
Identification of weeds in crops	Characteristics of weed, Classification of weed- On the basis of life cycle, Basis of site of Predominance. On the basis of parasitic nature, on the basis of Morphological characteristic, etc. Explanation of weed etc.	2
Methods of herbicide and fertilizer application	Classification of Herbicides: Inorganic herbicides, Organic herbicides. Selective, Non-Selective. Method- Preplanting, Pre-emergence, Post emergence. Fertilizer application- Solid form, Liquid form & other form.	2
Study of yield contributing characters and yield estimation	Cereal crops, Pulses crops & other crops- All yield contributing character- Plant height to harvest index. Estimation of yield.	2
Seed germination and viability test	Seed Germination Test: Three major methods. Viability Test- Potassium Permanganate Test, Embryo culture Method, TZ test/ Tetrazolium Chloride Test.	2
Numerical exercises on fertilizer requirement of Crops	Problem of Simple fertilizers- Urea, Superphosphate, Muriate of Potash. Problem of complex and mixed fertilizers etc.	2
Plant geometry and Plant Population of various crops	Different Crop geometries- Broadcasting, Square method/ square geometry, Rectangular method- Solid row, Paired row, Skip row, Triangular method of planting.	2
Herbicides requirement calculation and water requirement	Herbicides- Soluble Powder, Active Ingredient etc. Herbicides requirement for field crops. Calculation of quantity of herbicide for aquatic weeds. Formulation of water sprays solution.	2
Use of tillage implements- reversible plough, one way plough, harrow, leveler, seed drill	Primary tillage implements- Reversible Plough, One way plough. Secondary tillage implements- Harrow, Leveler. Sowing device- Seed drill.	2
Study of soil moisture measuring devices	Oven drying method, Volumetric method, Tensiometer. Gypsum block or Electrical resistance blocks.	2
Measurement of field capacity	Straw mulch, Black polythene sheet, Spade, Soil Auger, Moisture boxes, Water, Physical balance, Oven dry etc.	2
Determination of bulk density	Balance, Dry oven, Aluminium moisture boxes and core sampler etc.	2
Determination of Infiltration rate	Metal ring, Plastic bottle, Water, Stopwatch timer etc.	2
Measurement of irrigation water	Methods of water measurement: Volumetric measurements, Velocity area method, measuring structures etc.	2

Course Outcomes

- Understand and identify the different crops, seed & fertilizers.
- Skilled on identification of different pesticides and tillage implements with agro-climatic zones.
- Skilled on herbicide application, fertilizers application and weed identification in different crops.
- Understand the concept of yield contributing character, yield estimation with seed germination and viability test of seed.
- Understand the fertilizer requirement of soil and other scientific measuring methods for high productivity of crops.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF SOIL SCIENCE

Course Code: AGUCBG102T

Semester: I

L T P C
2 0 0 2

Objective:

Soil science provides the basic knowledge in respect of soil formation and how it functions and interacts with the water-plants under different agro-climate and its utmost important role in livelihoods of all living organism with the development of natural and cultural landscapes in modern agriculture.

Course Syllabus (Theory)

Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity; Elementary knowledge of soil taxonomy classification and soils of India; Soil water retention, movement and availability; soil air, composition, gaseous exchange, problem and plant growth; source, amount and flow of heat in soil; soil temperature and plant growth; Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids- inorganic and organic; silicate clays: constitution and properties; sources of charge ion exchange, cation exchange capacity, base saturation; soil organic matter: composition, properties and its influence on soil properties; humic substances- nature and properties; soil organisms: macro and micro-organisms, their beneficial and harmful effects; Soil pollution- behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Soil formation and properties of soil Soil as a natural body, Pedological and edaphological concepts of soil; Soil genesis: soil forming rocks and minerals; weathering, processes and factors of soil formation; Soil Profile, Components of soil; Soil physical properties: soil-texture, structure, density and porosity, soil colour, consistence and plasticity.	8
2	Soil Classification and Plant growth Elementary knowledge of soil taxonomy. Classification and soils of India; Soil water retention, movement and availability; Soil air, composition, gaseous exchange, problem and plant growth; source, amount and flow of heat in soil; soil temperature and plant growth.	8
3	Soil Reaction and Soil Colloids Soil reaction-pH, soil acidity and alkalinity, buffering, effect of pH on nutrient availability; soil colloids- inorganic and organic; silicate clays: constitution and properties; sources of charge; ion exchange, cation exchange capacity, base saturation.	8
4	Soil Organic Matter and Soil Pollution Soil organic matter: composition, properties and its influence on soil properties; humic substances- nature and properties; soil organisms: macro and microorganisms, their beneficial and harmful effects; Soil pollution- behaviour of pesticides and inorganic contaminants, prevention and mitigation of soil pollution.	8

Course Outcomes

- Student will able to understand the concept of soil formation and physical properties of soil.
- Study of soil classification and soil water plant relationship, gaseous exchange.
- Study the concept of soil reaction and general properties of soil colloids.
- Student will able to understand the composition and properties of organic manure and effect of soil pollution.

Recommended Text Books

1. Introductory Soil Science- D.K. Das, Kalyani Publishers.
2. Textbook of Soil Science- Susanta Kumar Pal, Oxford & IBH Publishing Co. Pvt.Ltd.
3. Fundamentals of Soil science- Indian Society of Soil Science.
4. Textbook of Soil Science- T. Biswas, S. Mukherjee, Tata McGraw, Hill Publishing Company Limited.

Recommended Reference Books

1. Soil Fertility and Fertilizer Use- Samuel L. Tisdale and Werner L. Nelson, Macmillan Coll Div.
2. Saline and Alkaline soil of India- RR Agarwal, JPS Yadav, & R.N. Gupta, ICAR, New Delhi.
3. Nature and Property of Soil- N. C. Braby, Macmillan Publishing Company Incorporated.
4. Soil Science- Mangat Rai, Anmol Publications Pvt.Ltd.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF SOIL SCIENCE LAB

Course Code: AGUCBG102P

Semester: I

L T P C
0 0 2 1

Objective:

The aim of this lab is to teach the students theoretically with more emphasized on practically for better understanding and skilling of the students on different aspects of soil with deep knowledge.

- The course consists of lecture both (theory and practical) in the lab.
- Emphasized mainly practical oriented topics.
- Evaluation will be done not only theory but on the basis of lab & numerical exercises.
- Aim of study to skilled the student on the scale of learning by doing.

Course Syllabus (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Study of soil profile in field	Introduction, Development of a soil profile (parent material, age, soil forming processes), master horizons, observations and interpretation of result.	2
Study of soil sampling tools, collection of representative soil sample, its processing and storage	Importance, purpose, identifications of sampling tools; Soil Augers, Clay Augers, Sand Augers & Mud augers, Diameter, Metal, uses and practical demonstration.	4
Study of soil forming rocks and minerals	Type of rocks, Igneous rocks, Sedimentary rocks, Metamorphic rocks and primary and secondary minerals.	4
Determination of soil density, moisture content and porosity.	Core Method, Excavation Method, Visual Method, R.D. bottle method of soil density, Gravimetric Method of soil moisture, Relationship between density and porosity.	2
Determination of field capacity, permanent wilting point of soil & WHC	Digging, Saturation method, Sunflower method, Keen box method.	4
Determination of Soil texture by feel and Bouyoucos Method	Rapid feel method, Hydrometer method, International pipette method, Stokes law.	2
Studies of capillary rise phenomenon of water in soil column and water movement in soil	Test materials, Capillary rise test, SWCC Test.	2
Determination of Bulk density by core sampler method	Measuring tools, Sampling the soil by core sampler, Volume of core, Dry soil weight, Critical value.	2
Determination of soil pH and electrical conductivity	Definition and role of pH and EC in plant growth, 1:2 soil solution ratio, Nernst equation, Wheatstone bridge principle, intermediate reading.	2
Determination of cation exchange capacity of soil	20 gm Soil, Neutral ammonium acetate solution, Magnesium oxide distillation, Ethanol, Silver nitrate	2
Determination of soil colour by munsell colour chart	Soil Sample, Munsell soil colour chart: Hue, value, chroma, General idea of soil minerals.	2
Demonstration of heat transfer in soil	Soil Sample, Soil temperature, conduction, convection and radiation; Soil mineralogy & texture.	2
Estimation of organic matter content of soil	Walkley & Black method/ Weight digestion method, Potassium dichromate, Sulphuric acid, Water, Peroxy Ammonium sulphate, Di-phenyl amine.	2

Course Outcomes

- Students will be able to recognise the soil profile and trained on soil sampling process.
- Study of soil forming rocks and will be trained to determine the soil density, moisture and field capacity.
- Student will be skilled to determine soil texture, capillary rise phenomenon of water and bulk density of soil.
- Student will be able to determine the soil pH, colour, cation exchange capacity, heat transfer and organic carbon of the soil.
- Student will be gently skilled to handling of all instruments.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF HORTICULTURE

Course Code: AGUCBG103T

Semester: I

L T P C
2 0 0 2

Objective:

Dissemination of skilled full knowledge and technology on horticultural crop & their scientific management to enhance the production and productivity through the innovative technology for the food and social, economical betterment of the depressed society.

Course Syllabus (Theory)

Horticulture- Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops; Plant propagation-methods and propagating structures; principles of orchard establishment; Principles and methods of training and pruning, juvenility and flower bud differentiation; unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy; kitchen gardening; garden types and parts; lawn making; medicinal and aromatic plants; species and condiments; use of plant bio-regulators in horticulture. Irrigation & fertilizers application- method and quantity. weed management, fertility management in horticultural crops- manures and fertilizers, different methods of application, cropping systems, intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Horticulture & Plant Propagation Horticulture- Its definition and branches, importance and scope; horticultural and botanical classification; climate and soil for horticultural crops, Plant propagation- methods and propagating structures; principles of orchard establishment.	6
2	Pruning and Pollination Principles and methods of training and pruning, juvenility and flower bud differentiation, unfruitfulness; pollination, pollinizers and pollinators; fertilization and parthenocarpy.	6
3	Kitchen Garden Kitchen gardening; garden types and parts; lawn making; medicinal and aromatic plants; species and condiments; use of plant bio-regulators in horticulture.	6
4	Horticultural Crop Operation Irrigation & fertilizers application-method and quantity, weed management, fertility management in horticultural crops-manures and fertilizers, different methods of application, cropping systems.	6
5	Mulching Intercropping, multi-tier cropping, mulching– objectives, types merits and demerits, Classification of bearing habits of fruit trees, factors influencing the fruitfulness and unfruitfulness.	8

Course Outcomes

- Study the basic principles of horticulture & method of plant propagation.
- Student will skilled in training, pruning and pollination incrop.
- Study the concept of kitchen garden and its importance.
- Study the different aspects of horticultural crop operation.
- Students will able to understand the mulching and classification of fruit trees with influencing factor.

Recommended Text Books

1. Basic Horticulture- Jitendra Singh, Kalyani Publisher.
2. Basic Horticulture- KV Peter, New India Publishing Agency.
3. Horticulture at a glance- A. Salaria, Jain Brothers.
4. Instant Horticulture- S. N. Gupta, Jain Brothers.

Recommended Reference Books

1. Plant growth regulators in agriculture and horticulture: Their role and commercial use-A.S. Basra, International Book Distributor, Dehradun.
2. Terminology of Horticulture- Neeraj Pratap Singh, International Book Distributing Co (IBDC Publishers).
3. Basic Concept of fruit Science- Neeraj Pratap Singh, International Book Distributing Co (IBDC Publishers).
4. Basics of Horticulture- K.V. Peter, New India Publishing Agency, New Delhi.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF HORTICULTURE
LAB

Course Code: AGUCBG103P

Semester: I

L	T	P	C
0	0	2	1

Objective:

The aim of this lab is to not just teach the student theoretically but too emphasized on scientific skill and technique in the field of horticulture science.

- The course consists of lecture both (theory and practical) in the lab.
- Emphasized mainly practical oriented topics.
- Evaluation will be done not only theory but on the basis of practical of field & numerical exercises of the horticulture crops.
- Aim of study to skilled the student on the scale of learning by doing.

Course Syllabus (Practical)

Identification of garden tools. Identification of horticultural crops. Preparation of seed bed/ nursery bed. Practice of sexual and asexual methods of propagation including micro-propagation. Layout and planting of orchard. Training and pruning of fruit trees. Preparation of potting mixture. Fertilizer application in different crops. Visits to commercial nurseries/orchard.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Identification of garden tools	Spade, Hoe, Hatchet, Axe, Sickle, Scythe, Pitchfork, Shovel, Trowel, Fork and Rake.	2
Identification of horticultural crops	Fruit, Vegetable, Flower, Spices & Condiments, Medicinal & Aromatic plants.	2
Preparation of seed bed/ nursery bed	Dry nursery, Wet nursery, Temporary nursery, Permanent nursery, Selection of site.	2
Practice of sexual and asexual methods of propagation	Seeding, Seeding Method, Method- Cuttings, Budding, Layering, Grafting, Managing nursery stock.	6
Micro-propagation	Methods- Meristem culture, Callus culture, Suspension culture, Embryo culture, Protoplast culture, Stages of Micro-propagation, Advantages.	2
Layout and planting of orchard	Equipment, System- Square System, Hexagonal System, Diagonal or Quincunx System, Contour System.	4
Training and pruning of fruit trees	Types- Thinning cut, Heading cut, Bench cut, Training system, Multi leader training, High Density central leader training.	2
Preparation of potting mixture	Potting, De-potting, Re-potting, Precaution.	2
Fertilizer application in different crops	Solid, Liquid, Irrigation water, Method-Broadcasting, Placement, Localized Placement, Pellet application, other application.	2
Layout and component of model nursery	Criteria, Site Selection, Sowing method, Disease management.	4
Visits to commercial nurseries/ orchard	Visit to commercial nurseries/ orchard as per the schedule.	4

Course Outcomes

- Understand and identify the different garden tools and horticultural crops.
- Skilled on ideal seed bed preparation, sexual & asexual propagation with micro-propagation techniques.
- Student will be able to recognize the layout and different planting system of orchard.
- Student will be trained on pruning and training of fruit crops and potting mixture.
- Student will be able to understand the different fertilizer application method, model & commercial nursery with excursion visit & demonstration.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: INTRODUCTION TO FORESTRY

Course Code: AGUCBG104T

Semester: I

L	T	P	C
1	0	0	1

Objective:

In nature trees play a vital role to sustain earth ecosystem and provide the direct and indirect benefit with their attendant resources to economic/ benefit of the society. As per the Forest Survey of India, now a days tree cover has been increases due to integration of tree component in Agriculture, this model comes under the smart agriculture “Agro-Forestry” socially and economically beneficial to the farmers for their livelihood and doubling the income.

Course Syllabus (Theory)

Introduction– definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration- natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration– objectives, choice between natural and artificial regeneration, essential preliminary considerations. Crown classification. Tending operations– weeding, cleaning, thinning– mechanical, ordinary, crown and advance thinning. Forest mensuration– objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement - shadow and single pole method; Instrumental methods of height measurement- geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees. Agroforestry– definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Forest classification and Regeneration Introduction– definitions of basic terms related to forestry, objectives of silviculture, forest classification, salient features of Indian Forest Policies. Forest regeneration, Natural regeneration- natural regeneration from seed and vegetative parts, coppicing, pollarding, root suckers; Artificial regeneration– objectives, choice between natural and artificial regeneration, essential preliminary considerations.	4
2	Crown Classification and Forest Mensuration Crown classification. Tending operations– weeding, cleaning, thinning– mechanical, ordinary, crown and advance thinning. Forest mensuration– objectives, diameter measurement, instruments used in diameter measurement; Non instrumental methods of height measurement- shadow and single pole method.	4
3	Measurement of Volume Instrumental methods of height measurement- geometric and trigonometric principles, instruments used in height measurement; tree stem form, form factor, form quotient, measurement of volume of felled and standing trees, age determination of trees.	4
4	Agroforestry Agroforestry– definitions, importance, criteria of selection of trees in agroforestry, different agroforestry systems prevalent in the country, shifting cultivation, taungya, alley cropping, wind breaks and shelter belts, home gardens. Cultivation practices of two important fast growing tree species of the region.	4

Course Outcomes

- Study the objective of silviculture, classification and types of forest regeneration.
- Student will be able to understand the crown classification and measurement of tree species.
- Study the agroforestry system and will be able to understand its diverse integration with agriculture crop/ livestock/ poultry with benefit of the system.

Recommended Text Books

- Handbook of Forestry- S.S. Negi, International book distributor, Dehradun.
- Principles and practices of Silviculture, L.S. Khanna, International book distributor, Dehradun.
- Agroforestry- Principles and practices- A.P. Dwivedi, Oxford and IBH Publishing Co., New Delhi.
- Indian wood technology- H. Brown, IBD Publishers, Dehradun.

Recommended Reference Books

- Favourite Agroforestry Trees- S. P. Singh, Agrotech Publishing Academy, Udaipur.
- India's forest – Myth and reality- Lal, J.B., Natraj Publishers, Dehradun Journals.
- Indian Forester (Journal).
- Indian Journal of Agroforestry.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: INTRODUCTION TO FORESTRY LAB

Course Code: AGUCBG104P

Semester: I

L	T	P	C
0	0	2	1

Objective:

The aim of this lab is to teach the students theoretically & practically both in scientific manner and skilled on basic measurement of tree species in respect of economic benefit and management of the forest.

- The course consists of lecture both (theory and practical) in the lab.
- Emphasized mainly practical oriented topics.
- Evaluation will be done not only theory but on the basis of practical of field & measurement of tree.
- Aim of study to skilled the student to evaluate the economic benefit of agroforestry.

Course Syllabus (Practical)

Identification of tree-species. Diameter measurements using calipers and tape, diameter measurements of forked, buttressed, fluted and leaning trees. Height measurement of standing trees by shadow method, single pole method and hypsometer. Volume measurement of logs using various formulae. Nursery lay out, seed sowing, vegetative propagation techniques. Forest plantations and their management. Visits of nearby forest based industries.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Identification of tree-species	Different tree species- Multipurpose tree, Commercial tree, Fruit tree, Fast growing tree, Recreational tree.	2
Diameter measurements using calipers and tape	Measurement of diameter, Height, Using different formulae; Quarter girth formula.	4
Diameter measurements of forked, buttressed, fluted and leaning trees	Measurement of diameter, Height, Using different formulae; Quarter girth formulae.	4
Height measurement of standing trees by shadow method, single pole method and hypsometer	Different method- Shadow method, Single pole method.	4
Volume measurement of logs using various formulae	Smalian's formula, Hubers formula, Prismoidal or Newton's formula.	4
Nursery lay out, seed sowing, vegetative propagation techniques	Classification of nurseries- Dry Nursery, Wet Nursery; Temporary Nursery, Permanent Nursery, Asexual propagation of trees species.	8
Forest plantations and their management	Site condition, Selection of Tree species, Preparation of planting site, Time of planting.	4
Visits of nearby forest based industries	Wood based industries, Pulp and paper industries, Match industry.	2

Course Outcomes

- Student will be able to understand and identify the different tree species with diameter measurement of tree species.
- Trained on height measurement of tree species with the different methods.
- Skilled on volume measurement, nursery layout and vegetative propagation techniques of tree species.
- Student will be able to understand the importance of forest plantation along with their management with visit of site as mentioned.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF PLANT BIOCHEMISTRY & BIOTECHNOLOGY

Course Code: AGUCBG105T

Semester: I

L T P C
2 0 0 2

Objective:

The study of biochemistry provides the depth of knowledge in chemical reaction of plants and function of chemical and physiological properties in plants growth. Microbes playing the important role in chemical changes of the plant, soil, animal and microbial activity determined the soil nutrient, soil organic matter along with soil fertility. Biotechnology provides the scientific study of the new technology in respect of plant tissue culture and multiplication of plant in lab.

Course Syllabus (Theory)

Importance of Biochemistry. Properties of Water, pH and Buffer. Carbohydrate: Importance and classification. Structures of Monosaccharides, Reducing and oxidizing properties of Monosaccharides, Mutarotation; Structure of Disaccharides and Polysaccharides. Lipid: Importance and classification; Structures and properties of fatty acids; storage lipids and membrane lipids. Proteins: Importance of proteins and classification; Structures, titration and zwitterions nature of amino acids; Structural organization of proteins. Enzymes: General properties; Classification; Mechanism of action; Michaelis & Menten and Line Weaver Burk equation & plots; Introduction to allosteric enzymes. Nucleic acids: Importance and classification; Structure of Nucleotides, A, B & Z DNA; RNA: Types and Secondary & Tertiary structure. Metabolism of carbohydrates: Glycolysis, TCA cycle, Glyoxylate cycle, Electron transport chain. Metabolism of lipids: Beta oxidation, Biosynthesis of fatty acids. Concepts and applications of plant biotechnology: Scope, organ culture, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications; Micro-propagation methods; organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; somatic hybridization and cybrids; Somaclonal variation and its use in crop improvement; cryo- preservation; Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacterium mediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Carbohydrates & Lipids: Introduction– Historical aspects of Biochemistry, Scope, impact and importance of Biochemistry in plant sciences, Properties of water, PH and Buffers. Carbohydrates– Classification, Structures– Monosaccharides– Structural aspects– mutarotation- Reducing and oxidizing properties. Oligosaccharides and polysaccharides, Functions of carbohydrates. Lipids– Importance and Classification, Structures and properties of fatty acids, Essential fatty acids, Storage lipids and membrane lipids, Functions of lipids, Saponification, hydrogenation, RM number, Iodine number and Acid value.	8
2	Amino acids, Proteins & Enzymes: Amino acids– Structures, Classification, Zwitterions, Titration of amino acids, Peptides ,Oligopeptides, Cyclic and acyclic peptides, Malformin, Glutathione, Gramicidin, Functions of peptides. Proteins– Importance, Classification, Properties of proteins, Isoelectric PH, Denaturation, Proteins– Structural organization– Primary, secondary, tertiary and quaternary structures and forces involved in stabilizing proteins. Enzymes-General properties and classification, Mechanism of action– Michaelis & Menten and Line Weaver Burk equation & plots, Introduction to allosteric enzymes.	8
3	Nucleic acids & Metabolism of Carbohydrates and Lipids: Nucleic acids- Importance and classification, Structures of nitrogen bases– Nucleosides– Nucleotides in RNA and DNA, A, B & Z DNA and Types of RNA, Secondary & Tertiary structure of B-DNA and t-RNA. Metabolism of carbohydrates– Glycolysis– Aerobic and anaerobic, Tricarboxylic Acid (TCA) cycle, Glyoxylate cycle,Electron transport chain. Metabolism of lipids- Beta oxidation, Biosynthesis of fatty acids.	8
4	Micropropagation & Recombinant DNA methods: Biotechnology– Concepts, Importance Applications and Scope of plant biotechnology. Introduction to plant tissue culture– History, Scientists, Terminology, Steps in general tissue culture, Types of sterilization and nutrient media. Types of cultures– Organ cultures, embryo culture, cell suspension culture, callus culture, anther culture, pollen culture and ovule culture and their applications. Micropropagation Methods– Organogenesis and embryogenesis, Synthetic seeds and their significance; Embryo rescue and its significance; Somatic hybridization and Cybrids; Somaclonal variations and its use in crop improvement; Cryopreservation. Introduction to recombinant DNA methods: physical (Gene gun method), chemical (PEG mediated) and Agrobacteriummediated gene transfer methods; Transgenics and its importance in crop improvement; PCR techniques and its applications; RFLP, RAPD, SSR; Marker Assisted Breeding in crop improvement; Biotechnology regulations.	8

Course Outcomes

- Study the basic importance of Biochemistry in Agriculture and its scope along with the concept of Water, pH and Buffers.
- Students will learn the classifications, structures, functions of different Biomolecules viz. Carbohydrates, Lipids, Proteins and Nucleic Acids.
- Students will learn the Structures, Classifications of amino acids and Mechanism of action of enzymes.
- Students will be able to get insight of Carbohydrates, Lipids, Metabolism and basic Concept on Micropropagation of plants and rDNA Technology.

Recommended Text Books

- Agricultural microbiology- D. J. Bagyaraj, g. Rangaswami, phi learning Pvt.Ltd.
- Fundamentals of Plant Biochemistry and Biotechnology-N.K. Gupta and Sunita Gupta, Kalyani Publishers.
- Principles of Biochemistry- David Lee Nelson, Michael M. Cox. W.H.Freeman.
- Agricultural Microbiology- Nilangshu Mukherjee and Tapash Ghosh, Kalyani Publisher.

Recommended Reference Books

- Soil Microbiology- Rao Oxford and IBH Publishing.
- Plant Biotechnology- B.D. Singh, Kalyani Publication, Ludhiana.
- Agricultural Applications of Microbiology- Neelima Rajvaidya, Dilip Kumar Markandey, APH Publishing.
- Fundamentals of Agricultural Microbiology- K. C. Mahanta, Oxford & IBH Publishing.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF PLANT
BIOCHEMISTRY & BIOTECHNOLOGY
LAB

Course Code: AGUCBG105P

Semester: I

L T P C
0 0 2 1

Objective:

The aim of this lab is completely emphasized on better understanding, skilling of the students on chemical substances and process that occur in plant, animal, microorganism during growth and development.

- The course will consist of lectures (theory & practical) in the lab.
- Highlight mainly to practical oriented topics.
- Evaluation done not only on theory basis but also on the basis of lab experiments & numerical exercises.
- Aim of study to train the student on scale of learning by doing.

Course Syllabus (Practical)

Preparation of solution, pH & buffers, Preparation of buffers and measurement of pH, Qualitative tests for carbohydrates, Qualitative tests amino acids, Estimation of reducing sugar by Nelson– Somogyi's Method, Estimation of Total soluble sugars by Anthrone method, Estimation of proteins by Lowry's method, Extraction of oil from oil seeds by Soxhlet apparatus, Qualitative tests for oil, Paper chromatography/ TLC demonstration for separation of amino acids, Sterilization techniques, Composition of various tissues culture media and preparation of stock solutions for MS nutrient medium, Callus induction from various explants, Micropropagation– Hardening and acclimatization, Demonstration of isolation of DNA and of gel electrophoresis technique, Demonstration of PCR Technique, Demonstration of DNA finger printing– RAPD and RFLP.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Preparation of solution, pH & buffers	Molar, Normal and Per Cent Solutions, Tissues, Separation, Quantitative estimation, Purification.	2
Preparation of buffers and measurement of pH	Acetate and Phosphate buffer, media, extraction, isolation and purification, biomolecules and enzymes.	2
Qualitative tests for carbohydrates	Molisch's test- conc. H ₂ SO ₄ , sulphonated α- naphthol, purple (violet red) colored complex, Iodine test- polysaccharides, Starch, iodine, reddish brown complex, Benedict's test- sodium citrate, reducing sugars, cuprous oxide, Barfoed's test, Seliwanoff's test, Bial's test.	2
Qualitative tests amino acids	Biuret test- alkaline CuSO ₄ , violet colored complex, proteins, simple amino acids, Ninhydrin test- amino acid and ninhydrin, diketohydrin (ruhemann's purple), diketohydrin (ruhemann's purple), Asparagine, Xanthoproteic test- Protein, Phenylalanine, triosine, tryptophan.	2
Estimation of reducing sugar by Nelson – Somogyi's Method	Alkaline copper reagent, Arsenomolybdate reagent, Colorimetrically at 500 nm.	2
Estimation of Total soluble sugars by Anthrone method	Colorimetric estimation, Carbohydrates, anthrone.	2
Estimation of proteins by Lowry's Method	Peptide bonds, Copper sulphate.	2
Extraction of oil from oil seeds by Soxhlet apparatus.	Extractor (Sextlet extraction), Solvent reflux, Siphon Principles.	2
Qualitative tests for oil	Solubility test for Lipids, Acrolein test for Glycerol.	2
Paper chromatography/ TLC demonstration for separation of amino acids.	Substances, Liquid phases, Water, Mobile phase, Silica gel, Solvent mixture, Ninhydrin, R _f values.	2
Sterilization techniques	Plant cell culture, Sterilized-Steam or wet sterilization (autoclaving), Filter sterilization, Irradiation.	2
Composition of various tissues culture media and preparation of stock solutions for MS nutrient medium.	Preparation of medium, Concentrated stock solutions- Macro- salts, Micro-salts, Vitamins, Amino acids, Hormones.	2
Callus induction from various Explants	Callus formation, Nutrient, Hormonal constituents, Somatic embryos.	2
Micropropagation– Hardening and acclimatization.	Tissue culture, Acclimatization process.	2
Demonstration of isolation of DNA and of gel electrophoresis Technique	Cells, Nucleic acid, Gel electrophoresis technique	2
Demonstration of PCR Technique	DNA, Heat tolerant DNA polymerase, Enzyme. Single Arbitrary primer, Enzymatic	2

and Demonstration of DNA finger
printing– RAPD and RFLP

procedure, Endonuclease enzymes, Southern hybridization.

Course Outcomes

- Understand and recognize the different solution, pH & buffer.
- Skilled on qualitative test of carbohydrate and amino acid.
- Skilled on quantitative estimation of glucose and protein & estimation of amino acids/lipids.
- Understand the paper chromatography for separation monosaccharides and sterilization techniques.
- Understand the gel electrophoresis techniques and DNA fingerprinting.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: RURAL SOCIOLOGY & EDUCATIONAL PSYCHOLOGY

Course Code: AGUCBG106T

Semester: I

L T P C
2 0 0 2

Objective:

The prominent objective of the rural sociology should have to make a scientific and comprehensive study of rural social life and it encompasses the social behavior, interaction, relationship and social and economic condition of the rural people. This course constructs, guideline to student and able to integrate concrete methods for rural construction so that all round development of village life becomes possible.

Course Syllabus(Theory)

Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology: Definition, objective, history, challenges and social ecology in Indian context, Rural Society: Important characteristics, differences & Relationship between Rural and Urban societies, Social Groups: Meaning, Definition, Classification, Factors considered in formation and organization of groups. Social stratification- Meaning, Definition, Functions, Forms of social stratification. Culture concept- Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions- Meaning, Definition and their role in Agriculture Extension. Social Institution: Meaning, Definition, Major Institution in rural society, Functions. Social change and Development: Meaning, Definition, Nature of social changes and factors of social change. Social process- Meaning, Definition, Types. Social Control- Meaning, Definition, Need and Means of Social control. Rural Leadership: Concept and Definition, types and roles of leaders in rural context; Methods of selection of leaders. Educational Psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain, Cognitive skills, Personality- Meaning, Definition, Types, Factors influencing the Personality and Role of Personality in Agricultural Extension., Motivation- Meaning, Definition, Importance in extension, Theories of Motivation, Intelligence- Meaning, Definition, Types, Factors affecting intelligence. Factors affecting intelligence. Teaching Learning Processes- Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Perception, Emotions.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Rural Sociology and Culture Sociology and Rural sociology: Definition and scope, its significance in agriculture extension, Social Ecology: Definition, objective, history, challenges and social ecology in Indian context, Rural Society: Important characteristics, differences & Relationship between Rural and Urban societies, Social Groups: Meaning, Definition, Classification, Factors considered in formation and organization of groups. Social stratification- Meaning, Definition, Functions, Forms of social stratification. Culture concept- Culture, Customs, Folkways, Mores, Taboos, Rituals and Traditions- Meaning, Definition and their role in Agriculture Extension.	8
2	Social Development and Leadership Social Institution: Meaning, Definition, Major Institution in rural society, Functions. Social change and Development: Meaning, Definition, Nature of social changes and factors of social change. Social process- Meaning, Definition, Types. Social Control- Meaning, Definition, Need and Means of Social control. Rural Leadership: Concept and Definition, types and roles of leaders in rural context; Methods of selection of leaders.	8
3	Educational Psychology and Personality Educational psychology: Meaning & its importance in agriculture extension. Behavior: Cognitive, affective, psychomotor domain, Cognitive skills, Personality- Meaning, Definition, Types, Factors influencing the Personality and Role of Personality in Agricultural Extension.	8
4	Motivation and Learning Motivation- Meaning, Definition, Importance in extension, Theories of Motivation, Intelligence- Meaning, Definition, Types, Factors affecting intelligence. Factors affecting intelligence. Teaching Learning Processes- Meaning and Definition of Teaching, Learning, Learning experience and Learning situation, Elements of learning situation and its characteristics. Perception, Emotions.	8

Course Outcomes

- Study the basics of the sociology and rural sociology with different rituals & culture.
- Student will be able to understand the importance of social development through the good leadership.
- Study the educational psychology and role of personality in rural extension & development.
- Student will be able to understand the concept of motivation, teaching and learning process in agriculture extension.

Recommended Text Books

- Introductory Rural Sociology: A synopsis of concepts and principles- J. B. Chitambar, New Age International.
- Rural Sociology- S. L. Doshi, Rawat Publishers, Delhi.
- Rural Sociology and Psychology in Extension Education- N.K. Tripathi, Aman Publishing House.

- Fundamentals of Extension Education and Rural Development (In Hindi)- B. D. Tyagi, Dr. S.K. Arun and Dr. Manju Tyagi, Rama PublishingHouse.

Recommended Reference Books

- Extension communication and management. G. L. Ray, KalyaniPublication.
- Rural Sociology and Psychology. B. D. Tyagi, Anshu and Parul Tyagi. Rama PublishingHouse.
- Rural Sociology- J. M. Gillette, McmillonPublishers.
- Sociology- C.N.S. Rao, S Chand and Company, NewDelhi.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF CROP
PHYSIOLOGY

Course Code: AGUCBG107T

Semester: I

L	T	P	C
1	0	0	1

Objective:

The aim of this course is to facilitate students in deep and knowledgeable concept on plant physiological process and their relationship with factor affecting the productivity of crop.

Course Syllabus (Theory)

Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology. Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms. Photosynthesis: Light and Dark reactions, C₃, C₄ and CAM plants. Respiration: Glycolysis, TCA cycle and electron transport chain. Fat Metabolism: Fatty acid synthesis and Breakdown; Plant growth regulators: Physiological roles and agricultural uses. Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in cropproductivity.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Plant Cell and Osmosis Introduction to crop physiology and its importance in Agriculture; Plant cell: an Overview; Diffusion and osmosis; Absorption of water, transpiration and Stomatal Physiology.	4
2	Mineral Nutrition and Photosynthesis Mineral nutrition of Plants: Functions and deficiency symptoms of nutrients, nutrient uptake mechanisms. Photosynthesis: Light and Dark reactions, C ₃ , C ₄ and CAM plants.	4
3	Respiration and Metabolism Respiration: Glycolysis, TCA cycle and electron transport chain. Fat Metabolism: Fatty acid synthesis and Breakdown.	4
4	PGR and Growth Analysis Plant growth regulators: Physiological roles and agricultural uses. Physiological aspects of growth and development of major crops: Growth analysis, Role of Physiological growth parameters in crop productivity.	4

Course Outcomes

- Study the basic concept of plant physiology and different functions of plantcell.
- Student will be able to understand the functions and nutrition ofplant.
- Student will be able to realize different cycle and fat metabolism of theplant.
- Study the plant growth hormone and role of growth parameter in cropproductivity.

Recommended Text Books

- Handbook of Plant and Crop Physiology- Mohammad Pessarakli, CRCPress.
- Physiology of Crop Plants- Gardner, F.P., Pearce, R.B. and Mitchell, R.L., Scientific Publishers,Jodhpur.
- Fundamentals of Crop Physiology- N.K. Gupta & Sunita Gupta, Kalyani Publication, NewDelhi.
- Crop Physiology- B.L. Bagdi, New India Publishing Agency, NewDelhi.

Recommended Reference Books

- Crop Physiology- Girish Chand Srivastava, BiotechBooks.
- A Text Book of Crop Physiology- A.B. Jadhav, S.B. Borgaonkar, Shri RajlaxmiPrakashan.
- Crop Physiology- S. R. Ghadekar, C. N. Chore, R. K. Patil, AgrometPublishers.
- Practicals in Plant Physiology- M. Bala, S. Gupta, N.K. Gupta, Scientific Publisher,Jodhpur.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF CROP
PHYSIOLOGY LAB

Course Code: AGUCBG107P

Semester: I

L	T	P	C
0	0	2	1

Objective:

The aim of this lab is to teach basics of crop physiology with field practical demonstration and slide sample of the different growth activities and processes of the crop and its role in enhancement of the crop productivity.

- The course will consist of lectures (both theory and practical) in theLab.
- Highlights the field practical and visual demonstration of the different plant processes.
- Evaluation will be done not on the theory basis but on the basis of field practical & assignment.
- Prime aim of the course to practically skilled the student as percourse.

Course Syllabus (Practical)

Study of plant cells, structure and distribution of stomata, imbibitions, osmosis, plasmolysis, measurement of root pressure, rate of transpiration, Separation of photosynthetic pigments through paper chromatography, Rate of transpiration, photosynthesis, respiration, tissue test for mineral nutrients, estimation of relative water content, Measurement of photosynthetic CO₂ assimilation by Infra Red Gas Analyser (IRGA). Demonstrate that light and CO₂ is essential for photosynthesis using Molls half leaf experiment, Measurement of plant growth analysis parameter.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Study of plant cells	Eukaryotic cell, Cell type-Parenchyma, Sclerenchyma, Wet Mount.	2
To study structure and distribution of stomata in leaf	Leaf Epidermal surface, Guard cells, Dicot and Monocot, Leaves underside & topside, CO ₂ Conc.	2
Study of Imbibitions	Physical process, Diffusion, Permeable membrane, Water absorption, Roots, Seed germination.	2
To demonstrate the process of Osmosis	Pot Model, Potato piece, Lost mass, Concentrated sucrose solution, Distilled water, Mass change	2
To demonstrate the process of Plasmolysis	Hypertonic solution, Water, cytoplasm, Plasmolysed cell, Protoplasm, Cell wall, Observation, Evaluation.	2
To measure the root pressure in plant	Manometer method, Stem fluid exudation.	2
Separation of photosynthetic pigments through paper chromatography	Pigments, Two greenish pigment-Chlorophyll, Yellowish pigment- Carotenoids, Relative solubilities.	2
To measure the rate of transpiration using Ganongs Potometer	Light, Temperature, Humidity, Light intensity, Rate of transpiration.	2
To demonstrate that O ₂ is evolved during photosynthesis	Hydrilla plant, Water level, Sunlight, Water observation, Accumulation of Gas, Glowing splinter.	2
Rapid tissue tests for mineral nutrients	Fresh plant material, Chemical analysis, Dry matter, Tissue testing, Soluble nutrients, Observation.	2
Measurement of respiration quotient	Respirometer– CO ₂ , Oxygen, Temperature & Pressure, Observation.	2
Estimation of relative water content in plants	Leaf tissue, Cellular water deficit, Water supply, Transpiration rate.	2
Measurement of photosynthetic CO ₂ assimilation by Infra Red Gas Analyzer (IRGA)	Gas exchange, Infrared light, O ₂ measurement, Electrochemical sensors, Leaf chamber, Infrared spectroscopy, Difference observation.	4
To demonstrate that light and CO ₂ is essential for photosynthesis using Molls half leaf experiment	Molls half leaf experiment- half leaf, KOH Solution, Sunlight, Air exposed, Presence of Starch, Observation.	2
Measurement of plant growth analysis parameter.	Leaf area, leaf area Index, Leaf area ratio, Specific leaf weight, Absolute growth rate, Relative growth rate, Crop growth rate.	2

Course Outcomes

- Understand the plant cells and structure of stomata with its distribution.
- Understand the process of osmosis and plasmolysis through demonstration.
- Skilled on measuring of root pressure and rate of transpiration in plants by some scientific methods.
- Skilled on estimation of relative water content and photosynthetic pigment.
- Understand the role of oxygen, light and carbon dioxide in photosynthesis by demonstration.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: AGRICULTURAL HERITAGE

Course Code: AGUCBG108T

Semester: I

L	T	P	C
1	0	0	1

Objective:

The main objective of the study is to provide the knowledgeable information about the traditional agriculture and inherited agricultural practices, they can make to food and livelihood security of family farmers and indigenous peoples.

Course Syllabus (Theory)

Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society; Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge; Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India; Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Indian Agricultural Heritage Introduction of Indian agricultural heritage; Ancient agricultural practices, Relevance of heritage to present day agriculture; Past and present status of agriculture and farmers in society.	4
2	Agriculture Development Journey of Indian agriculture and its development from past to modern era; Plant production and protection through indigenous traditional knowledge.	4
3	Scope of Agriculture Crop voyage in India and world; Agriculture scope; Importance of agriculture and agricultural resources available in India.	4
4	Scenario of Indian Agriculture Crop significance and classifications; National agriculture setup in India; Current scenario of Indian agriculture; Indian agricultural concerns and future prospects.	4

Course Outcomes

- Study the history of agriculture in respect of traditional practices and present status of agriculture & farmers in society.
- Student will be able to understand the agriculture development from past to modern era along with indigenous knowledge for production and protection of plant.
- Study the importance of agriculture and scope in India.
- Student will be able to understand the crop classification and current scenario of Indian agriculture.

Recommended Text Books

- Fundamentals of Agriculture- Arun Katayan, Kushal Publication.
- Principles of Agronomy - T. Yellamanda Reddy and G. H. Sankara Reddy, Kalyani Publisher.
- Integrated Pest Management- G.S. Dhaliwal and Ramesh Arora, Kalyani Publisher.
- Handbook of Agriculture: Indian Council of Agricultural Research, New Delhi. Update edition.

Recommended Reference Books

- Manures and Fertilizers - K. S. Yawalkar, J.P. Agrawal and S. Bokde, Agri, Horticultural Pub. House.
- Fundamentals of Agronomy- Gopal Chandra, De. Oxford and IBH Publishing Co. Pvt. Ltd.
- A text book on Ancient history of Indian Agriculture- Nene, Y.L., Saxena, R.C, Choudhary, S.L. 2009. Munshiram Manoharlal Publisher Pvt. Ltd.
- A text book on Ancient history of Indian Agriculture- Nene, Y.L., Saxena, R.C, Choudhary, S.L. 2010. Asian Agri-History Foundation.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FARMING SYSTEM AND SUSTAINABLE AGRICULTURE

Course Code: AGUCBG109T

Semester: I

L	T	P	C
1	0	0	1

Objective:

This course consists of farming system of agriculture and sustainable agriculture system to develop and imparting the deep understanding of student which is ecologically and economically beneficial in India.

Course Syllabus (Theory)

Farming System- scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system, Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture- problems and its impact on agriculture, indicators of sustainability, adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system- historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones, resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Farming System Farming System- scope, importance, and concept, Types and systems of farming system and factors affecting types of farming, Farming system components and their maintenance, Cropping system and pattern, multiple cropping system.	4
2	Cropping System and Sustainable Agriculture Efficient cropping system and their evaluation, Allied enterprises and their importance, Tools for determining production and efficiencies in cropping and farming system; Sustainable agriculture- problems and its impact on agriculture, indicators of sustainability.	4
3	Agriculture Strategies Adaptation and mitigation, conservation agriculture strategies in agriculture, HEIA, LEIA and LEISA and its techniques for sustainability, Integrated farming system- historical background, objectives and characteristics, components of IFS and its advantages, Site specific development of IFS model for different agro-climatic zones.	4
4	Agricultural Resource Resource use efficiency and optimization techniques, Resource cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field. cycling and flow of energy in different farming system, farming system and environment, Visit of IFS model in different agro-climatic zones of nearby states University/ institutes and farmers field.	4

Course Outcomes

- Study the different farming system, its importance with component and management.
- Student will be able to understand the concept of sustainable agriculture and cropping system.
- Student will be able to understand the agriculture conservation strategies, technology and integrated farming system.
- Study the resource use efficiency and flow of energy in different farming system.

Recommended Text Books

- Fundamentals of Agriculture- Arun Katyayan, Kushal Publication.
- Principles of Agronomy- T. Yellamanda Reddy and G. H. Sankara Reddy, Kalyani Publisher.
- Handbook of Agriculture- Indian Council of Agricultural Research (ICAR), New Delhi. Update edition.
- Cropping system and Farming System- Panda S.C. 2004. Agrobios (India) Jodhpur.

Recommended Reference Books

- Fundamentals of Agronomy- Gopal Chandra De, Oxford and IBH Publishing Co. Pvt. Ltd.
- A Handbook of Organic Farming- Arun K. Sharma, Agribios. (India) Ltd. Jodhpur.
- Cropping Systems in the Tropics: Principles and Management- Palaniappan, S.P. and Sivaraman, K. 1996. New Age Publ.
- Sustainable Agriculture- Rajeev K. Shukla. 2004. Surbhee Publication, Jaipur.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: PROFESSIONAL PROFICIENCY
(B.Sc. Ag.)- I

Course Code: PTSPPBG10T

Semester: I

L	T	P	C
4	0	0	3

Objective:

Students should be able to read and write correct English, attain reasonable fluency in the Language and should also be exposed to introductory lessons of Aptitude Building.

Course Syllabus (Theory)

Hard skill includes Basic Grammar, Vocabulary, Articles, Tenses, Construction of Sentences and Reading Comprehension etc. Efforts should be made to overcome the initial hesitation of speaking English of students and hence improve their fluency in English. Suggested methods include: Follow only English language in the class, Class should be interactive and students should always be engaged in some kind of conversation, Each student should speak 5 minutes, 3-4 times in 1st semester on topics of his choice selected from Social, Global Warming & Climate Change, Environment & Disaster Management, Agricultural Issues, Agri-Entrepreneurship and Agri-Economics, Dairy, Poultry and Agro-Industries, Agriculture Journalism, Politics, World Affairs and Religion etc. In the above process students should be regulated towards better Vocabulary and Pronunciation. Aptitude building, Quantitative aptitude; Basic Calculations: BODMASS rule, Square and square root, Cube and cube root, Different types of numbers, Divisibility rule, Fraction and comparison of fraction, Number System: Multiples, Factors Remainder, Remainder Theorem, Unit Place, Number formation, Factorial, LCM and HCF Finding and its application, Percentage: Basics of percentage and it's calculation, Comparison of percentage, How to use in data interpretation, Venn diagram, Logical reasoning; Coding and decoding, NumberSeries.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Hard Skills Hard skill includes Basic Grammar, Vocabulary, Articles, Tenses, Construction of Sentences and Reading Comprehension etc.	20
2	Communication Skill Efforts should be made to overcome the initial hesitation of speaking English of students and hence improve their fluency in English. Suggested methodsinclude: <ul style="list-style-type: none"> Follow only English language in theclass. Class should be interactive and students should always be engaged in some kind ofconversation. Each student should speak 5 minutes, 3-4 times in 1st semester on topics of his choice selected from Social, Global Warming & Climate Change, Environment & Disaster Management, Agricultural Issues, Agri-Entrepreneurship and Agri- Economics, Dairy, Poultry and Agro-Industries, Agriculture Journalism, Politics, World Affairs and Religionetc. In the above process students should be regulated towards better Vocabulary and Pronunciation.	15
3	Aptitude Building Quantitative Aptitude <ol style="list-style-type: none"> Basic Calculations: BODMASS rule, Square and square root, Cube and cube root, Different types of numbers, Divisibility rule, Fraction and comparison of fraction. Number System: Multiples, Factors Remainder, Remainder Theorem, Unit Place, Number formation, Factorial, LCM and HCF Finding and itsapplication. Percentage: Basics of percentage and it's calculation, Comparison of percentage, How to use in data interpretation, Venn diagram. Logical Reasoning <ol style="list-style-type: none"> Coding anddecoding NumberSeries BloodRelation 	10

Course Outcomes

- Better representation of himself/ herself in terms of communication skills, overall personality development and aptitude building required for Government & Non-government jobs.
- This program will help students employable and ready for Seed Company, Fertilizer Company, Agro-Industries/ Dairy & Poultry based Industries /Corporate/ CSR project and other Public and Private Sector, Non -Governmental Organization jobs.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: ELEMENTARY MATHEMATICS

Course Code: AGUCBG110T

Semester: I

L	T	P	C
2	2	0	2

Objective:

This main aim of this course is to use of all shape, differentiation, line, equation and calculus for better understanding of student become confident in using mathematics to analyse and implement in agriculture.

Course Syllabus (Theory)

Straight lines: Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines, Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$. Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions. Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it). Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Line and Equation Straight lines: Distance formula, section formula (internal and external division), Change of axes (only origin changed), Equation of co-ordinate axes, Equation of lines parallel to axes, Slope-intercept form of equation of line, Slope-point form of equation of line, Two point form of equation of line, Intercept form of equation of line, Normal form of equation of line, General form of equation of line, Point of intersection of two st. lines, Angles between two st. lines, Parallel lines, Perpendicular lines, Angle of bisectors between two lines.	8
2	Circle and Equation Area of triangle and quadrilateral. Circle: Equation of circle whose centre and radius is known, General equation of a circle, Equation of circle passing through three given points, Equation of circle whose diameters is line joining two points (x_1, y_1) & (x_2, y_2) , Tangent and Normal to a given circle at given point (Simple problems), Condition of tangency of a line $y = mx + c$ to the given circle $x^2 + y^2 = a^2$.	8
3	Differential Calculus and Problem Differential Calculus: Definition of function, limit and continuity, Simple problems on limit, Simple problems on continuity, Differentiation of x^n , e^x , $\sin x$ & $\cos x$ from first principle, Derivatives of sum, difference, product and quotient of two functions, Differentiation of functions of functions (Simple problem based on it), Logarithmic differentiation (Simple problem based on it), Differentiation by substitution method and simple problems based on it, Differentiation of Inverse Trigonometric functions.	8
4	Integral Calculus and Matrices Maxima and Minima of the functions of the form $y=f(x)$ (Simple problems based on it). Integral Calculus: Integration of simple functions, Integration of Product of two functions, Integration by substitution method, Definite Integral (simple problems based on it), Area under simple well-known curves (simple problems based on it). Matrices and Determinants: Definition of Matrices, Addition, Subtraction, Multiplication, Transpose and Inverse up to 3rd order, Properties of determinants up to 3rd order and their evaluation.	8

Course Outcomes

- Study the basics of straight line, general, normal and angles with equation of line.
- Student will be able to understand the equation of circle along with the problem.
- Understand the concept of differential calculus its functions with inverse trigonometric function.
- Study the integral calculus, matrices, addition, subtraction and multiplication with determinants & their evaluation.

Recommended Text Books

- Mathematics text books for class XII (2018)- NCERT, New Delhi.
- A text books for Elementary Mathematics- Yogesh D. Zanzane and Anand R. Reshimkar, Universal Prakashan, Pune.
- Mathematics textbooks for class X (2018), NCERT, New Delhi.
- Elementary Calculus- D.C. Gokhroo and S.L. Bhargava 1986. Jaipur Publishing House, Jaipur.

Recommended Reference Books

- Understanding Geometry for a Changing World: Seventy-first Yearbook- Tim Craine and Rheta Rubenstein, National Council of Teachers of Mathematics.
- Vectors, Matrices and Geometry- K. T. Leung & S. N. Suen, Hong Kong University Press.
- What is Mathematics? An Elementary Approach to Ideas and Methods- Richard Courant & Herbert Robbins, Oxford University Press.
- The Book of Squares- Leonardo Pisano Fibonacci, Academic Press, Inc.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: INTRODUCTORY BIOLOGY WITH PRACTICAL

Course Code: AGUCBG111T

Semester: I

L T P C
2 0 2 2

Objective:

The main aim of this course is to illustrate the student for better understanding on biological processes like metabolism, physiology of organism, genetics, reproduction and interrelationship with form and function of biological structure. The course also illustrates on morphology, cells, tissue of plants and its identification.

Course Syllabus Introductory Biology with Practical (Theory)

Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics, Binomial nomenclature and classification Cell and cell division. Morphology of flowering plants. Seed and seed germination. Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae. Role of animals in agriculture.

Course Syllabus Introductory Biology with Practical (Practical)

Morphology of flowering plants– root, stem and leaf and their modifications. Inflorescence, flower and fruits. Cell, tissues & cell division. Internal structure of root, stem and leaf. Study of specimens and slides. Description of plants- Brassicaceae, Fabaceae and Poaceae.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Introduction and Origin of life Introduction to the living world, diversity and characteristics of life, origin of life, Evolution and Eugenics.	8
2	Nomenclature and Cell Introduction Binomial nomenclature and classification, Introduction of cell and cell organelles, structure and function of cell organelles, structure and function of tissue.	8
3	Cell Division and Plant Morphology Cell division- Mitosis, Cell division- Meiosis, Morphology of flowering plants- General morphology, root with their modifications, Morphology of flowering plants-stem and leaf with their modification.	8
4	Seed and Plant Systematic Morphology of flowering plants- flower and fruit with their modification, seed and seed germination, Plant systematic- viz; Brassicaceae, Fabaceae and Poaceae, Role of animals in agriculture.	8

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Morphology of root and their modification	Monocotyledonous, Dicotyledonous, Monocot plant, Slides, Distinguish the root features.	2
Morphology of stem and their modification	Monocot stem, Dicot stem, Slides, Distinguish the stem and their modification.	2
Morphology of leaf and their modification	Monocot leaves, Function, leaves Venation, Dicot leaves, Distinguish the leaf and their modification.	2
Morphology of flowering and inflorescence and their modification	Monocot flowers, Parts of flower, Dicot flowers, Distinguish the florescence and their modification.	2
Morphology of fruit and their modification	Epicarp, Mesocarp, Endocarp, False fruit or Pseudocarp, Composite fruit, Distinguish the florescence and their modification.	2
Description of plants– related to family Fabaceae and Poaceae	Common Name, Scientific name, Family, Origin, Chromosome no., Uses.	2
Introduction about microscope and its parts and functioning	Eye piece, Body tube, Objective lens, Coarse adjustment knob, Fine adjustment knob, Nose Piece, Hole clip, Vertical arm.	2
Types of tissue with chart slide and diagram	Meristematic tissue, Permanent tissue, Simple and Complex tissue, Epidermis tissue, Guard cell & Stomata, Parenchyma & Collenchyma tissue.	2
Slide preparation related to mitosis	Interphase, Stages of Mitosis- Prophase, Metaphase, Anaphase, Telophase. Cytokinesis.	2
Slide preparation related to meiosis	Meiosis-I- Prophase-I, Leptotene, Zygotene, Pachytene, Diplotene, Diakinesis, Metaphase-I, Anaphase-I, Telophase-I. Meiosis-II-Prophase-II, Metaphase-II, Anaphase-II, Telophase-II.	2
Slide preparation related to internal structure of root	Dicot root, Monocot root.	2
Slide preparation related to internal structure of stem	Epidermis, Hypodermis, Ground tissue, Vascular bundle, Xylem, Phloem, Pith.	2
Slide preparation related to internal	Monocot leaves, Dicot leaves.	2

structure of leaf		
Specimen of root, flower, stem, florescence and fruits	Dicot & Monocot. Epidermis, Cortex, Endodermis, Pericycle, Vascular bundle, Phloem, Pith.	2
Specimen/ permanent slides of cell and cell division, anatomical aspects of flowering plants.	Dicot & Monocot Specimen, Ethyl alcohol, Watch Glass, Incubate, Safranin.	2
Description of plants– related to Family Brassicaceae, Fabaceae	Common Name, Scientific name, Family, Origin, Chromosome no., Uses.	2

Course Outcomes

- Study the nature of life, diversity and evolution of life.
- Student will be able to understand the cell, cell organelles & function of tissue, morphology of flowering plants, seed and its germination.
- Understand the difference between dicot & Monocot and able to distinguish the root & stem of plants and skilled on handling of microscope, slide preparation on mitosis, meiosis, morphology of different plant and internal root structure of plants.
- Trained on slide preparation and specimen of different anatomical plant parts with cell division and description of some plant family.

Recommended Text Books

- Modern Textbook of Botany- M.P. Kaushik 1989, Prakash Publication, Muzaffarnagar (U.P.)
- Textbook of Botany- Saxena and Sarabhai. 2003, Rastogi Publication, Meerut
- Plant Taxonomy- O.P. Sharma, Tata McGraw- Hill Education, New Delhi
- A textbook of Practical Botany- A.C. Sahu, Kalyani Publisher, New Delhi.

Recommended Reference Books

- Organic evolution- V.B. Rastogi, Rastogi Publication.
- A textbook of Practical Botany- A. Bendre and A. Kumar, Vol- I & II, Rastogi Publication.
- Principle of Genetics- Phundan Singh, Kalyani Publishers.
- Concept of Biology, Eldon D. Enger, Frederick C. Ross, David B. Bailey, McGraw Hill Education.

SYLLABUS

FOR

AGRICULTURAL SCIENCES AND TECHNOLOGY

[B.Sc. (Hons.) Ag.]
(Second Semester)



PRAYAGRAJ

**FACULTY OF AGRICULTURAL
SCIENCES AND
TECHNOLOGY**

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF GENETICS

Course Code: AGUCBG201T

Semester: II

L	T	P	C
2	0	0	2

Objective:

Crop genetic resources are playing an important role to develop a new cultivar and high yielding variety of crops with specific character for strengthening of agriculture with replacement of existing variety.

Course Syllabus (Theory)

Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis. Probability and Chi-square. Dominance relationships, Epistatic interactions with example. Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping. Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation. Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Mendelian Principles and Theory of inheritance Pre and Post Mendelian concepts of heredity, Mendelian principles of heredity. Architecture of chromosome; chromonemata, chromosome matrix, chromomeres, centromere, secondary constriction and telomere; special types of chromosomes. Chromosomal theory of inheritance- cell cycle and cell division- mitosis and meiosis.	8
2	Probability and Sex determination Probability and Chi-square, Dominance relationships, Epistatic interactions with example. Multiple alleles, pleiotropism and pseudoalleles, Sex determination and sex linkage, sex limited and sex influenced traits, Blood group genetics, Linkage and its estimation, crossing over mechanisms, chromosome mapping.	8
3	Chromosome and Mutation Structural and numerical variations in chromosome and their implications, Use of haploids, dihaploids and doubled haploids in Genetics. Mutation, classification, Methods of inducing mutations & CIB technique, mutagenic agents and induction of mutation.	8
4	Traits and Genetic Material Qualitative & Quantitative traits, Polygenes and continuous variations, multiple factor hypothesis, Cytoplasmic inheritance. Genetic disorders. Nature, structure & replication of genetic material. Protein synthesis, Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons. Transcription and translational mechanism of genetic material, Gene concept: Gene structure, function and regulation, Lac and Trp operons.	8

Course Outcomes

- Study the Mendelian Principles and law of inheritance with the cell cycle & cell division.
- Student will be able to understand the Probability and Sex determination and linkage along with the chromosome mapping.
- Student will be able to understand the chromosome, variation of chromosome and mutation and its classification & technique.
- Student will be able to understand traits, genetic material & disorders along with concept of gene.

Recommended Text Books

1. Principles of Genetics- Phundan Singh, Kalyani Publishers.
2. Fundamentals of Genetics- B.D. Singh, Kalyani Publishers.
3. Genetics- P.K. Gupta, Rastogi Publication.
4. Genetics- Robert I. Booker, McGraw Hill.

Recommended Reference Books

1. Genetics (3rd edn.)- M.W. Strickberger, Mac Millan Publishing Co., New Delhi.
2. Concepts of Genetics- W.S. Klug. and M.R Cummings, Charles E. Merrill Publishing Co., London.
3. Genetics- M.W. Strickberger, Prentice Hall of India Pvt. Ltd., New Delhi.
4. Concept of Genetics- W.S. Klug, and M.R Cummings, Pearson Education (Singapore) Pvt. Ltd., New Delhi.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF GENETICS LAB

Course Code: AGUCBG201P

Semester: II

L	T	P	C
0	0	2	1

Objective:

The aim of indicated course lab is to elaborate the student theoretically with emphasized on skilling of practical for deep & knowledgeable understanding of basic process and purposes of the cell structure, meiosis, and mitosis, as well as predict the outcomes.

- The course will consists of lecture (both theory and practical) in the lab.
- Illustrate the mainly practical oriented topics.
- Evaluation will be done not on the theory but on the basis of field practical & assignment.
- Aim of study to practically skilled the student on the scale of learning by doing.

Course Syllabus (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Study of microscope: parts and types	Eye piece, Body tube, Objective lens, Coarse adjustment knob, Fine adjustment knob, Nose Piece, Hole clip, Vertical arm, Types.	2
Study of cell structure Onion peel	Stained temporary mount of Onion, record and draw labeled diagram, Apparatus, Compound Microscope.	2
Preparation of microscopic Slides of mitosis - onion root tips	Mount of onion root tips cells, Compound microscope, Acetocarmine stain, Water, Burner, N/10 Hydrochloric acid, Filter paper, Coverslip, Acetoalcohol.	2
Preparation of microscopic Slides of meiosis – tradescantia/onion /Wheat inflorescence	Plant Material, Multistage staining, Compound Microscope, Cell division, Tradescantia/onion/ Wheat inflorescence, Acetocarmine stain, Glass slides, Coverslips.	2
Methods of finding out the gametes and gametic recombination	Bracket Method, Checker Board Method.	2
Problems on monohybrid and dihybrid cross	Monohybrid, Contrasting Character, Phenotypic ratio, Dihybrid, Parents, Law of independent, Normal dihybrid ratio.	2
Experiments on trihybrid cross	Parents, Three pairs of contrasting characters, Trihybrid cross. Phenotypic ratio.	2
Experiments on test cross and back cross	Hybrid (F ₁), Homozygous recessive parent, F ₁ parents, Typical monohybrid, Dihybrid and trihybrid test cross ratio.	2
Gene interaction– I Gene interaction without modification of F ₂ ratio (comb-shape) and complementary gene interaction	Typical Dihybrid Ratio, Complementary Gene Action.	2
Gene interaction– II Gene interaction with modification of F ₂ ratio: supplementary factor, epistatic factor, inhibitory factor	Supplementary Gene Action (9:3:4), Inhibitory Gene action (13:3).	2
Gene interaction– III Gene interaction with modification of F ₂ ratio: Additive factor, duplicate factor and lethal factor	Additive factors (9:6:1), Duplicate Factors (15: 1 Ratio), Lethal Factor (2:1 Ratio).	2
Problems on probability	Principles of classical genetics: Segregation, Independent assortment, Independent events.	2
Problems on Chi-square test	Significance test, Closely observed data, Predicted ratio, Experimental condition, Biased sampling.	2
Determination of linkage and cross over analysis (through two point test cross and three point test cross data)	Non crossover, Single cross over (SCO), Double cross over (DCO), Coefficient of coincidence, Observed double crossover frequency, Expected double crossover frequency, Interference.	2
Study on sex linked inheritance in <i>Drosophila</i>	Sex chromosomes, Non-sexual characters, Colour blindness, Haemophilia in human, White-eye colour, Sex linked inheritance.	2
Study of models on DNA and RNA structure	Model of Watson and Crick, Double helix, mRNA, rRNA and Clover leaf structure of tRNA.	2

Course Outcomes

- Student will be able to understand the microscope, cell structure and able to prepare slides on mitosis and meiosis of inflorescence.
- Skilled on solving of problems on monohybrid and dihybrid cross along with the finding of gametes.
- Understand the concept of test cross and back cross with gene interaction-I, II & III and probability and Chi-square test.
- Understand the determination of linkage, sex linked inheritance with DNA and RNA structure.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF PLANT PATHOLOGY

Course Code: AGUCBG202T

Semester: II

L T P C
4 0 0 3

Objective:

The aim of this course to facilitate the knowledge about diseases caused by biotic and abiotic factor, development of pathogens and relation to the environment along with the scientific management of diseases.

Course Syllabus (Theory)

Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes/ factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms due to abiotic causes.

Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes. Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction. Viruses: nature, structure, replication and transmission. Study of phanerogamic plant parasites. Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina, Radopholus etc.) Growth and reproduction of plant pathogens. Liberation/ dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Plant Pathology and Disease Classification Introduction: Importance of plant diseases, scope and objectives of Plant Pathology. History of Plant Pathology with special reference to Indian work. Terms and concepts in Plant Pathology. Pathogenesis. Causes / factors affecting disease development: disease triangle and tetrahedron and classification of plant diseases. Important plant pathogenic organisms, different groups: fungi, bacteria, fastidious vesicular bacteria, phytoplasmas, spiroplasmas, viruses, viroids, algae, protozoa, phanerogamic parasites and nematodes with examples of diseases caused by them. Diseases and symptoms by abiotic stress.	12
2	Fungi and Bacteria Fungi: general characters, definition of fungus, somatic structures, types of fungal thalli, fungal tissues, modifications of thallus, reproduction (asexual and sexual). Nomenclature, Binomial system of nomenclature, rules of nomenclature, classification of fungi. Key to divisions, sub-divisions, orders and classes. Bacteria and mollicutes: general morphological characters. Basic methods of classification and reproduction.	12
3	Viruses and Nematodes Viruses: nature, structure, replication and transmission. Study of phanerogamic plant parasites. Nematodes: General morphology and reproduction, classification, symptoms and nature of damage caused by plant nematodes (Heterodera, Meloidogyne, Anguina, Radopholus etc.) Growth and reproduction of plant pathogens. Liberation / dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens.	12
4	Pathogenesis and Disease Management Liberation/ dispersal and survival of plant pathogens. Types of parasitism and variability in plant pathogens. Pathogenesis. Role of enzymes, toxins and growth regulators in disease development. Defense mechanism in plants. Epidemiology: Factors affecting disease development. Principles and methods of plant disease management. Nature, chemical combination, classification, mode of action and formulations of fungicides and antibiotics.	12

Course Outcomes

- Student will be able to understand the plant diseases and its classification with causing pathogens.
- Study of nomenclature, fungi and bacteria with sexual and asexual reproduction system of plants.
- Study of viruses, nematodes and its replication, transmission with types of pathogens.
- Student will be understand the concept of dispersal of pathogens, roles of enzymes, formulation of fungicide and antibiotics with plant disease management.

Recommended Text Books

- Plant Pathology- P.D. Sharma, Rastogi Publications.
- Plant Pathology- G.N. Agrios, 5th edition. Academic Press, New York.
- Essentials of Plant Pathology- V. N. Pathak. 1972. Prakash Publ., Jaipur.
- Essential of Phytopathological Techniques- K. Vishunawat and G.J. Kolte, Kalyani Publishers, New Delhi.

Recommended Reference Books

- Introductory Plant Pathology- M. N. Kamat. 1967. Prakash Publ,Jaipur.
- Plant diseases by R. S. Singh, Oxford and IBHPublishing.
- Soil Microbiology- Rao Oxford and IBHPublishing.
- Plant Pathology- G. N. Agrios, Elsevier Academic press,London.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF PLANT
PATHOLOGY LAB

Course Code: AGUCBG202P

Semester: II

L T P C
0 0 2 1

Objective:

The aim of this lab is to teach and skilled the student on identification, nature of disease, survival and skilled on diagnosing and controlling the different disease/ pathogen of crops.

- The course will consist of lecture (both theory and practical) in the lab.
- Emphasized mainly filed practical oriented topics with learning.
- Evaluation will be done by both theory as well as filed/ demo practical also.
- Main aim of the study to train the student on eager to learn scale.

Course Syllabus (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Acquaintance with various laboratory equipments and microscopy	Microscope, Autoclave, Pressure cooker, Hot air oven, BOD Incubator, Refrigerator, Fermentor, Inoculation chamber/ Laminar flow, Centrifuge, Spectrophotometer or colorimeter, PH meter.	2
Collection and preservation of disease specimen	Field trips, Collect specimens, Leaf specimens, Dry specimens, Mounting, Paper board, Preservative solution, Water, Formaldehyde (40 percent), Ethyl alcohol (95 percent).	2
Preparation of media, isolation and Koch's postulates	Agar medium, Powder form, tubes, sterilize, Sterile petri dishes, Fruit/ Vegetable/Plant tissue, Plate, Organism, Symptoms shown, Suspected Pathogen, Pure culture, Original observation, Re-isolate organism.	2
General study of different structures of fungi	Yeast, Nucleus, Vacuole, Mitochondria, Golgi apparatus, Endoplasmic reticulum, Hyphae, Mycelium.	2
Study of symptoms of various plant diseases	Mold or fungal spores, Bacterial ooze, Syndrome, Local infection, Systemic infection, Lesion, Local lesion, Morphological symptoms, Histological symptoms.	2
Study of representative fungal genera	Phycomycetes (Lower Fungi), Ascomycetes (Sac Fungi), Basidiomycetes (Club Fungi), Deuteromycetes (Fungi imperfecti).	2
Staining and identification of plant pathogenic bacteria	Characteristics; Gram reaction, cell wall composition, Susceptibility to penicillin, Basic dyes, Dark Violet or purple, Red or Brown, More Resistant, Less resistant.	2
Transmission of plant viruses	Non Persistent (Style borne), Semi Persistent (Fore gut borne), Persistent circulative, Persistent propagative.	2
Study of phanerogamic plant parasites	Parasitic plant, Haustorium, Phanerogamic parasitic plant, Symptoms, Systematic position, Control.	2
Study of morphological features and identification of plant parasitic nematodes	Symptoms, Above ground: Chlorosis (yellowing), Stunted top growth, Wilt more readily, Below ground: stunted root growth, Root rotting, Root lesions, Field history, Laboratory assay of soil /Plantsamples.	4
Sampling and extraction of nematodes from soil and plant material, preparation of nematode mounting	Dissection, Baermann funnel, Funnel spray method, Blender nematode filter method, Blender centrifugal flotation method, Nematode cotton wool filter method, Decanting and sieving: Cobb's method.	4
Study of fungicides and their formulations	Fungistat, Antisporulant, Protectant, Therapeutant, Eradicant, Based on general uses, Based on Chemical Composition, Sulphur fungicides, Copper Fungicides, Mercury Fungicides, Systemic Fungicides, Other Fungicides, Emulsifiable Concentrates (EC), Wettable Powders (WP), Granules (Pellets), Dispersing agents, Emulsifying agents.	2
Methods of pesticide application and their safe use	Dusting, Spraying, Granular application, Seed pelleting/seed dressing, Seedling root dip, Sett treatment, Trunk/ stem injection, Padding.	2
Calculation of fungicide spray concentrations	LD50 values, Extremely toxic, Highly toxic, Moderately toxic, Slightly toxic (Least toxic)	2

Course Outcomes

- Understand the importance of laboratory equipment and study the different diseases with collection and preservation of insects.
- Skilled on preparation of media and study of different structure of fungi, symptoms of different diseases.
- Study and identification of plant pathogenic bacteria, viruses and plant parasitic nematodes.
- Study of fungicide, pesticide application & skilling on spray with extraction of nematodes from soil and plant materials.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: AGRICULTURAL MICROBIOLOGY

Course Code: AGUCBG203T

Semester: II

L	T	P	C
1	0	0	1

Objective:

The aim of this course study is to imparting the knowledge about the plant-associated microbes, plant and animal diseases. It also deals with the soil fertility, problems in agricultural practices usually caused by a lack of biodiversity in microbial communities such as microbial degradation of organic matter, nutrient use efficiency and soil nutrient transformations.

Course Syllabus (Theory)

Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth. Bacterial genetics: Genetic recombination transformation, conjugation and transduction, plasmids, transposon. Role of microbes in soil fertility and crop production: Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic. Azolla, blue green algae and mycorrhiza. Rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Prokaryotic and eukaryotic microbes Introduction. Microbial world: Prokaryotic and eukaryotic microbes. Bacteria: cell structure, chemoautotrophy, photo autotrophy, growth.	4
2	Bacterial Genetics and Role of microbes Bacterial genetics: Genetic recombination transformation, conjugation and transduction, plasmids, transposon. Role of microbes in soil fertility and crop production.	4
3	Nutrient cycle and Nitrogen fixation Carbon, Nitrogen, Phosphorus and Sulphur cycles. Biological nitrogen fixation- symbiotic, associative and asymbiotic.	4
4	BGA and Microbes in human welfare Azolla, blue green algae and mycorrhiza. rhizosphere and phyllosphere. Microbes in human welfare: silage production, biofertilizers, biopesticides, biofuel production and biodegradation of agro-waste.	4

Course Outcomes

- Study the Prokaryotic and eukaryotic microbes with bacterial autotrophy and growth.
- Study the bacterial genetics and role of microbes in soil fertility and crop production.
- Student will be able to understand the concept of different nutrient cycle and symbiotic and asymbiotic nitrogen fixation of the crop.
- Study about the azolla, different Blue green algae and microbes used in agro-industry for the human welfare.

Recommended Text Books

- Agricultural Microbiology- G. Rangaswamy and D.J. Bhagyaraj, Prentice Hall of India Pvt. Ltd. New Delhi.
- Agricultural Microbiology- Nilangshu Mukherjee, Tapash Ghosh, Kalyani Publishers.
- Microbiology- E.C.S. Chan, Michael J. Pelczar, Jr., Noel R. Krieg, 1998. Tata McGraw- Hill Edition Pvt. Ltd., India.
- Soil Microbiology- N.S. Rao, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Recommended Reference Books

- Agricultural Applications of Microbiology- Neelima Rajvaidya, Dilip Kumar Markandey, APH Publishing.
- Fundamentals of Agricultural Microbiology- K. C. Mahanta, Oxford & IBH Publishing.
- Plant Pathology- G. N. Agrios, Elsevier Academic press, London.
- Introductory Plant Pathology- M. N. Kamat. 1967. Prakash Publication, Jaipur.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: AGRICULTURAL MICROBIOLOGY LAB

Course Code: AGUCBG203P

Semester: II

L	T	P	C
0	0	2	1

Objective:

The prime aim of this lab is to skilled the students on sterilization, identification and isolation of different microbial culture (viruses, bacteria, fungi, protozoa and some algae) as microbiology has emerged as an applied science for their industrial applications on one hand while on the other for their pathogenic properties too.

- The course will consist of both (theory and practical) in the lab.
- Emphasized on lab practical as well as field practical and visual demonstration of the microbes.
- Prime aim of this course is to skilled the student on different parameter as per course.
- Evaluation will be done both (theory and practical) basis along with assignment, presentation.

Course Syllabus (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Introduction to microbiology laboratory and its equipments	Common Glassware, Tools, Sterilization of essentials/ glassware, Uses, Precautions in Handling.	2
Study of Compound Microscope	Identification of different parts, Resolving power and numerical aperture, Examination of animate and inanimate objects.	4
Methods of sterilization	Dry heat sterilization, Steam or Wet sterilization.	2
Nutritional media and their preparations	Carbohydrates, Proteins, Beef extract and yeast extract, Amino acids, Growth factors, Solidifying agents, Mineral salts, Liquid Media, Solid Media, Semi solid media, Synthetic Media, Non-synthetic Media, Enriched media, Selective media and Differential media.	6
Methods of isolation and purification of microbial cultures	Streaking, Plating, Dilution, Enriched procedure, Single cell techniques.	6
Isolation of <i>Rhizobium</i> , <i>Azotobacter</i> and BGA	<i>Rhizobium</i> : Legume plant root, 70% ethanol, 0.1% mercurous chloride solution, Sterile distilled water, Pipette, YEMA plate, Test tubes. <i>Azotobacter</i> : Nitrogen free medium, Burk's medium. BGA: N ₂ free inorganic medium (Pringsheims Medium, 1964).	4
Staining and microscopic examination of microbes	Primary stain, Mordant, Decolorizing agent, Counter stain, Clean slides, Inoculation needle, Bacterial cultures, Microscope, Immersion oil, Wet mount and Hanging drop technique.	4
Enumeration of Microbial population in soil- bacteria, fungi and actinomycetes	Nutrient agar, Jensen's media, Sabouraud media, Enumeration of heterotrophic bacteria, Fungi, Pour plating technique, Colony counter, CFU.	4

Course Outcomes

- Understand the microbiology laboratory and its equipment with method of sterilization.
- Skilled on preparation of nutritional media and isolation & purification of microbial culture.
- Skilled on staining & microscopic examination with isolation of different bacteria.
- Understand the method of staining and enumeration of microbes in soil in scientific manner.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: SOIL AND WATER CONSERVATION
ENGINEERING

Course Code: AGUCBG204T

Semester: II

L T P C
1 0 0 1

Objective:

This course is develop to facilitate students a broad & deep understanding about the conservation and management of Soil and Water Resources with maximum sustained level of production from a given area of land by preventing soil degradation and environmental pollution.

Course Syllabus (Theory)

Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion. Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques. Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways and their design. Water harvesting and its techniques. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Soil Erosion & Water Erosion Introduction to Soil and Water Conservation, causes of soil erosion. Definition and agents of soil erosion, water erosion: Forms of water erosion.	4
2	Gully & Soil Loss Measurements Gully classification and control measures. Soil loss estimation by universal Loss Soil Equation. Soil loss measurement techniques.	4
3	Erosion Control Principles of erosion control: Introduction to contouring, strip cropping. Contour bund. Graded bund and bench terracing. Grassed water ways and their design.	4
4	Water Harvesting and Wind Erosion Water harvesting and its techniques. Wind erosion: mechanics of wind erosion, types of soil movement. Principles of wind erosion control and its control measures.	4

Course Outcomes

- Study the soil and water erosion its causes with different forms of erosion.
- Student will be able to understand the concept of gully formation, land degradation and soil loss estimation.
- Study of principle of erosion, control methods with contouring, different bunds along with design.
- Student will be able to understand the concept & technology of water harvesting along with wind erosion and its control.

Recommended Text Books

- Principles of soil conservation and water management Hanumappa Ramappa Arakeri, Roy Luther Donahue Rowman & Allan held.
- Land and water management engineering-V.V.N. Murthy (1982), Kalyani Publishers, New Delhi.
- Watershed Management- Vijay P. Singh, Ram Narayan Yadava, Allied Publishers.
- Handbook of Agriculture- ICAR, New Delhi.

Recommended Reference Books

- Principles of Soil Conservation and Management- Humberto Blanco- Canqui, Rattan Lal, Springer.
- Principles of Agricultural Engineerings, Vol-II- A.M. Michael, and T.P. Ojha.
- Advances in Soil and Water Conservation- Francis J. Pierce, CRC Press.
- Integrated Watershed Management in Rainfed Agriculture- Suhas P. Wani, Johan Rockstrom, Kanwar Lal Sahrawat, CRC Press.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: SOIL AND WATER CONSERVATION
ENGINEERING LAB

Course Code: AGUCBG204P

Semester: II

L	T	P	C
0	0	2	1

Objective:

The aim of this lab is to teach the student theoretically as well as with more emphasized on practically for better skilling of students with basic knowledge of soil and water conservation and/or improvement of soil and water resources for economic and recreational purposes.

- The course will consist of lecture (both theory & practical) in the lab.
- Prime aim of study to practically skilled the student in field level as well as in machinery.
- Evaluation will be done not on the theory basis but on the basis of field and numerical exercises.
- Emphasized mainly the field practical oriented topics.

Course Syllabus (Practical)

General status of soil conservation in India. Calculation of erosion index. Estimation of soil loss. Measurement of soil loss. Preparation of contour maps. Design of grassed water ways. Design of contour bunds. Design of graded bunds. Design of bench terracing system. Problem on wind erosion.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
General status of soil conservation in India and Uttar Pradesh	Soil, detachment, Transportation, Deposition, Status, Importance	2
Calculation of erosion index	Empirical Models, Semi Empirical Models, Physical Process-based Model.	2
Estimation of soil loss	Simulation model, USLE model	4
Preparation of contour maps	Estimating Contour Intervals, Engineering scale.	4
Numerical on design of contour bunds	Vertical interval, Horizontal interval, Bund cross-section, Earth work, Bunding.	4
Numerical problems on friction heads, velocity heads, total heads and horse power calculation of pumps	Concrete lined (100mm), Cast iron (100mm), P.V.C. (100mm & 25mm), Galvanised iron (25mm), Polyethylene (25mm).	4
Measurement of irrigation water in the field by different methods and related numerical	Desired flow rate, Measure the height the water, Estimate friction losses from the pipe, Measure the flow rate, Specific gravity of the fluid, Values into the water horsepower formula.	4
Study of different component of drip irrigation system	Point-source emitters (drip bubbler), In-line drip emitter, Basin bubblers, Micro spray sprinkler.	2
Study of different component of Sprinkler Irrigation system	Pump and prime mover, Water source, Pipe network, Emitting devices, Control devices, Filtration devices, Chemical injectors.	2
Visit to nearby Watersheds.	Nearest Watershed.	4

Course Outcomes

- Understand and recognize the status and importance of soil conservation in India and U.P.
- Skilled on calculation and estimation of erosion and soil loss along with preparation of map.
- Skilled on design of contour & numerical of contour bunds, power heads, velocity heads, horse power etc.
- Skilled on measurement of irrigation water, drip irrigation and sprinkler irrigation with its components.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: INTRODUCTION TO REMOTE SENSING
& GIS

Course Code: AGUCBG205T

Semester: II

L	T	P	C
1	0	0	1

Objective:

The prominent objective of the course is to teach concepts of GIS and remote sensing with specific applications in agriculture related statistics with detecting and monitoring the physical characteristics of an area by measuring its reflected and emitted radiation at a distance.

Course Syllabus (Theory)

Introduction to remote sensing- Definitions, types of remote sensing, Fundamental principle of remote sensing, Remote sensing interaction processes, Electromagnetic energy, remote sensing platforms and sensors, Resolutions and their types, EMR- Atmosphere interaction, Radiation matter and interaction, Scatterings, Visual Image interpretation, Pattern, Tone, Texture, Shadow, Site, Resolution, Digital Image and Digital Image Processing Applications of Remote sensing, Introduction of GPS. GPS segments, GPS Principle, GPS services, GPS positioning system, GPS antennas Application of GPS, Introduction of GIS, Definitions, History of GIS, GIS data. DBMS and Applications of GIS Components of GIS.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Remote Sensing and types Introduction to remote sensing- Definitions, types of remote sensing, Fundamental principle of remote sensing, Remote sensing interaction processes.	4
2	Platforms and sensors Electromagnetic energy, Remote sensing platforms and sensors, Resolutions and their types, EMR- Atmosphere interaction, Radiation matter and interaction, Scatterings.	4
3	Visual Image Interpretation and Digital Image Visual Image interpretation, Pattern, Tone, Texture, Shadow, Site, Resolution, Digital Image and Digital Image Processing Applications of Remote sensing, Introduction of GPS.	4
4	GPS and GIS GPS segments, GPS Principle, GPS services, GPS positioning system, GPS antennas Application of GPS, Introduction of GIS, Definitions, History of GIS, GIS data. DBMS and Applications of GIS Components of GIS.	4

Course Outcomes

- Study the remote sensing with its fundamental principles and interaction processes.
- Student will be able to understand the remote sensing platforms, sensors with scattering.
- Study the visual image interpretation, resolution along with application of GPS and GIS & its components.
- Student will be able to understand the concept of GPS principles, services with GPS positioning system.

Recommended Text Books

- Text book of Remote Sensing and Geographical Information System- M. Anji Reddy, Fourth edition, B.S. Publication.
- Text book of Remote Sensing and Geographical Information System- Kali Charan Sahu, Atlantic Publishers & Distributors (P) Ltd.
- Remote Sensing and GIS- Basudeb Bhatta, Oxford higher education, Oxford University Press.
- Fundamentals of Remote Sensing- George Joseph and C Jeganathan, Third edition, University Press.

Recommended Reference Books

- Concept of Cartography Remote Sensing and GIS- K.K. Maltiar & S.R. Maltiar, Rajesh Publication.
- Remote Sensing Principles and Applications- B.C. Panda, Viva Books Private Limited.
- An Introduction to Geographic Information Technology- Sujit Choudhury, D. Chakrabarti & S. Choudhury, I K International.
- Advanced Surveying: Total Station GPS, GIS & Remote Sensing, Second Edition- Gopi Satheesh, R. Sathikumar & N. Madhu, Pearson Paper back.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: INTRODUCTION TO REMOTE SENSING
& GIS LAB

Course Code: AGUCBG205P

Semester: II

L	T	P	C
0	0	2	1

Objective:

This basic course is to teach the students theoretically with more emphasized on practically for their knowledge and practical expertise in RS and GIS technologies with deep study at the graduate level to develop learners' research, analytical and problem- solving skills.

- The course will consist of lecture (theory & practical) in the lab.
- Evaluation done not on the theory basis but also on the basis of field practical & numerical exercises.
- Aim of study to enable the student to learn by doing.
- Highlights mainly practical oriented topics for skilling of students.

Course Syllabus (Practical)

Electromagnetic spectrum, Full forms of abbreviation related with RS and GIS, Write the 25 terms and definitions related with RS and GIS, To study about the Arc- GIS, History, working and applications, To study about the ERDAS- Imagine, History, working and applications, To study about the Gram++, History, working and applications, Identification of GPS tools, Identification of DGPS tools, GIS software.

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Electromagnetic spectrum	Radio waves (e.g., commercial radio and Television, microwaves, radar), Infrared radiation, Visible light, Ultraviolet radiation, X-rays, and Gamma rays.	2
Full forms of abbreviation related with RS and GIS	Decodes, Abbreviations and Acronyms.	2
Write the 25 terms and definitions related with RS and GIS	Almanac, Altitude, Annotation, Analysis, Band, Arc, ArcCatalog, ArcGIS, ArcMap.	4
To study about the Arc-GIS, History, working and applications	GIS evolving, ArcGIS database, Key database concept, Geodatabase storage.	4
To study about the ERDAS-Imagine, History, working and applications	The Intelligent Viewer, LiDAR Tools, Terrain Tools, Spectral Tools, Radar Tools, Spatial Model Editor, History.	4
To study about the Gram++, History, working and applications	Software, GRAM++ GIS, Low-cost, GIS software -CSRE.	4
Identification of GPS tools	Mapping Tools, Google Maps, Google Earth.	4
Identification of DGPS tools	Differential Correction, Geodetic/ High Precision Applications, Differential GPS survey, Differential GPS Positioning, Limitation & Errors of GPS/ DGPS.	4
GIS software	Desktop GIS, Other geospatial tools, Web map servers, Spatial database management systems, Cataloging application.	4

Course Outcomes

- Student will be able to understand the concept of electromagnetic spectrum with study of abbreviation and full forms of remote sensing and GIS.
- Study the basic terms and definitions related with remote sensing and GIS for better understanding of the subject.
- Skilled on Arc-GIS, ERDAS- Imagine and Gram++ with its working and application in agricultural field.
- Trained on identification of Global Positioning System, Differential Global Positioning System along with tools application.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF ENTOMOLOGY

Course Code: AGUCBG206T

Semester: II

L T P C
4 0 0 3

Objective:

The prominence aim of the study is to create the basic understanding of insect classes, body segment and function with their habitat and economic importance in respect of human and environment. The study of insects serves as the basis for developments in biological and chemical pest control, food and fiber production and storage, pharmaceuticals epidemiology, biological diversity, and a variety of other fields of science.

Course Syllabus (Theory)

History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae. Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors– food competition, natural and environmental resistance. Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control importance, hazards and limitations. Recent methods of pest control, repellents, anti-feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes. Systematics: Taxonomy – importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae, Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera: Tenthredinidae, Apidae. Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyzidae, Culicidae, Muscidae, Tephritidae.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Animal Kingdom and Morphology of Insect History of Entomology in India. Major points related to dominance of Insecta in Animal kingdom. Classification of phylum Arthropoda upto classes. Relationship of class Insecta with other classes of Arthropoda. Morphology: Structure and functions of insect cuticle and molting. Body segmentation. Structure of Head, thorax and abdomen. Structure and modifications of insect antennae, mouth parts, legs, Wing venation, modifications and wing coupling apparatus. Structure of male and female genital organ. Metamorphosis and diapause in insects. Types of larvae and pupae.	10
2	Insect Physiology and Insect Ecology Structure and functions of digestive, circulatory, excretory, respiratory, nervous, secretory (Endocrine) and reproductive system, in insects. Types of reproduction in insects. Major sensory organs like simple and compound eyes, chemoreceptor. Insect Ecology: Introduction, Environment and its components. Effect of abiotic factors– temperature, moisture, humidity, rainfall, light, atmospheric pressure and air currents. Effect of biotic factors– food competition, natural and environmental resistance.	10
3	IPM and Insecticides Categories of pests. Concept of IPM, Practices, scope and limitations of IPM. Classification of insecticides, toxicity of insecticides and formulations of insecticides. Chemical control importance, hazards and limitations. Recent methods of pest control, repellents, anti-feed ants, hormones, attractants, gamma radiation. Insecticides Act 1968- Important provisions. Application techniques of spray fluids. Symptoms of poisoning, first aid and antidotes.	10
4	Taxonomy and Classification of Insecta Systematics: Taxonomy –importance, history and development and binomial nomenclature. Definitions of Biotype, Sub-species, Species, Genus, Family and Order. Classification of class Insecta upto Orders, basic groups of present day insects with special emphasis to orders and families of Agricultural importance like Orthoptera: Acrididae, Tettigonidae, Gryllidae, Gryllotalpidae; Dictyoptera: Mantidae, Blattidae; Odonata; Isoptera: Termitidae; Thysanoptera: Thripidae; Hemiptera: Pentatomidae, Coreidae, Cimicidae, Pyrrhocoridae, Lygaeidae.	10
5	Important Orders and Families Cicadellidae, Delphacidae, Aphididae, Coccidae, Lophophidae, Aleurodidae, Pseudococcidae; Neuroptera: Chrysopidae; Lepidoptera: Pieridae, Papilionidae, Noctuidae, Sphingidae, Pyralidae, Gelechiidae, Arctiidae, Saturniidae, Bombycidae; Coleoptera: Coccinellidae, Chrysomelidae, Cerambycidae, Curculionidae, Bruchidae, Scarabaeidae; Hymenoptera:	8

Tenthredinidae, Apidae, Trichogrammatidae, Ichneumonidae, Braconidae, Chalcididae; Diptera: Cecidomyiidae, Tachinidae, Agromyziidae, Culicidae, Muscidae, Tephritidae.	
--	--

Course Outcomes

- Study the history of insect with classification of phylum with animal kingdom & morphology of insect.
- Student will be able to understand the insect digestive, respiratory & reproductive system with other physiological activities along with environment & ecology of insect.
- Student will be able to understand the concept of integrated pest management its scope with the recent method of pest control.
- Study the taxonomy with nomenclature and classification of class insect up to order.
- Study the important order and families with special emphasis on Agricultural importance.

Recommended Text Books

- The Insect: Structure and Function- R.F. Chapman, Cambridge University Press.
- Elements of Entomology- Rajendra Singh, Rastogi Publications.
- General entomology- M.S. Mani. 1968. Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 912p.
- Principles of Insect Morphology- R.E. Snodgrass. 2001. CBS Publishers and Distributors, New Delhi.

Recommended Reference Books

- Integrated Pest Management- G.S. Dhaliwal and Ramesh Arora, Kalyani Publisher.
- Principles of Insect Morphology- R. E. Snodgrass, Cornell University Press.
- Entomology and pest management- L.P. Pedigo, 1999. III Edition. Prentice Hall, New Jersey, USA, 691p.
- Agricultural Pests of South Asia and Their Management- G.S. Dhaliwal and Ramesh Arora, Kalyani Publisher.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF ENTOMOLOGY
LAB

Semester: II

Course Code: AGUCBG206P

L	T	P	C
0	0	2	1

Objective:

The prime aim of this lab is to provide basic understanding of insect identification, structure, and function along with evolutionary and ecological relationship of insect with other life forms and the impact of insects relative to human health, well-being, animal and plant health.

- The course will consist of lecture (both theory & practical) in the lab.
- Emphasized the field practical and visual demonstration of the different insect.
- Evaluation done not on the theory basis but on the basis of field practical on insect.
- The prominence aims of the study to practically skilled the student as per course.

Course Syllabus (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hours
Methods of collection and preservation of insects including immature stages	Collecting bag, Fishing jackets, Forceps, Killing bottles, Round boxes, Specimen tubes or Glass jars, Plastic bags.	2
External features of Grasshopper/Cockroach	Head, Thorax, Abdomen.	2
Types of insect antennae, mouthparts and legs	Antennae: Setaceous, Moniliform, Serrate, Pectinate. Mouthparts; Labrum, Mandibles, Maxillae, Labium, Hypopharynx. Legs: Saltatorial, Raptorial, Fossorial, Natatorial, Cursorial.	8
Wing venation, types of wings and wing coupling apparatus	Costa, Subcosta, Radius, Media, Types: tegmina, elytra, and hemelytra. Apparatus: Hamulate, Amplexiform, Frenate, Jugate.	2
Dissection of digestive system in insects (Grasshopper/ Cockroach)	Alimentary Canal: Fore Gut, Mouth Opening, Pharynx, Oesophagus, Gizzard, Ileum or Small Intestine, Large Intestine, Salivary Glands.	2
Dissection of male and female reproductive systems in insects (Grasshopper/ Cockroach)	Male reproductive organs: pair of testes (ii) A pair of vasa deferentia (iii) Seminal vesicles (iv) Ejaculatory duct (v) Penis or Aedeagus (vi) Accessory glands (vii) Male genital atrium. Female reproductive system: (i) Apophyses (ii) Apophyses (iii) Spermatheca (iv) Vagina and genital chamber (v) Accessory glands (Collateral glands).	2
Study of characters of orders Orthoptera, Dictyoptera, with their families	Order- Orthoptera (Ortho-straight; ptera- wing), Synonyms, Grasshoppers, Characters, Acrididae (Caelifera), Tettigonidae (Ensifera), Order-Dictyoptera (Dictyon-network; ptera- wings): Synonyms, Cockroaches, Characters, Blattellidae, Mantodea.	2
Study of characters of orders Odonata, Isoptera, Thysanoptera with their families	Order- Odonata (Odon-tooth; strong mandibles); Dragonflies, Characters, Order- Isoptera (Iso-equal; ptera-wing); Termitina, Termites, Characters. Order- Thysanoptera (Thysano-fringe; ptera- wing); Thrips, Characters, Terebrantia, tubulifera.	2
Study of characters of order Hemiptera with its families	Order- Hemiptera (Hemi- half; ptera- wings); True bugs, Characters, Heteroptera, Homoptera	2
Study of characters of order Lepidoptera with its families	Order: Lepidoptera (Lepido- scale; ptera- wings), Butterflies, Characters, Ditrysia and Monotrysia.	2
Study of characters of order Coleoptera with its families	Order: Coleoptera (Coleo-Sheath; ptera- wing), Beetles, Weevils, Characters, Adephaga (predators/ devourers) and Polyphaga (eaters of many things).	2
Study of characters of order Diptera with its families	Order- Diptera (Di-two; ptera-wings): True flies, Mosquitoes, Characters, Syrphidae (Horse flies, Flower flies), Tephritidae (Fruit flies), Tachinidae (Tachinid flies).	2
Study of characters of orders Neuroptera, Hymenoptera with their families	Order- Neuroptera (Neuro-nerve; ptera-wing): Ant lions, Characters, Families: Chrysopidae, Mantispidae. Order: Hymenoptera (Hymen-membrane; ptera- wings), (Marriage on wings); Sawflies, ants, bees, characters, Tenthredinidae (Saw flies), Apidae (Honey bee), Formicidae (ant)	2

Course Outcomes

- Understand and skilled on the collection and preservation of insect along with external features of grasshoppers/ Coackroach.
- Understand the types of insects antennae, mouth and wing venation of insect along with theirfamilies.
- Skilled on dissection of digestive and reproductive system of male and female of the insect.
- Study of different insect order with their families and characters of individual of insectfamilies.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF AGRICULTURAL
EXTENSION EDUCATION

Course Code: AGUCBG207T

Semester: II

L T P C
2 0 0 2

Objective:

The prime objective of the course is to explore the knowledge regarding agriculture extension education, dissemination of innovative technological sources, Lab to land programme, agri-entrepreneurship development with government scheme, policy on development of Small and Medium Scale Enterprises.

Course Syllabus (Theory)

Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.) and post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market- led extension, farmer- led extension, expert systems, etc. Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.- meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes; transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Education and Extension System Education: Meaning, definition & Types; Extension Education- meaning, definition, scope and process; objectives and principles of Extension Education; Extension Programme planning Meaning, Process, Principles and Steps in Programme Development. Extension systems in India: extension efforts in pre-independence era (Sriniketan, Marthandam, Firka Development Scheme, Gurgaon Experiment, etc.).	8
2	Extension efforts and New trend in Extension Post-independence era (Etawah Pilot Project, Nilokheri Experiment, etc.); various extension/ agriculture development programmes launched by ICAR/ Govt. of India (IADP, IAAP, HYVP, KVK, IVLP, ORP, ND, NATP, NAIP, etc.). New trends in agriculture extension: privatization extension, cyber extension/ e-extension, market-led extension, farmer-led extension, expert systems, etc.	8
3	Rural Development and Extension Administration Rural Development: concept, meaning, definition; various rural development programmes launched by Govt. of India. Community Dev.- meaning, definition, concept & principles, Philosophy of C.D. Rural Leadership: concept and definition, types of leaders in rural context; extension administration: meaning and concept, principles and functions. Monitoring and evaluation: concept and definition, monitoring and evaluation of extension programmes.	8
4	Transfer of Technology (TOT) and Communication Transfer of technology: concept and models, capacity building of extension personnel; extension teaching methods: meaning, classification, individual, group and mass contact methods, ICT Applications in TOT (New and Social Media), media mix strategies; communication: meaning and definition; Principles and Functions of Communication, models and barriers to communication. Agriculture journalism; diffusion and adoption of innovation: concept and meaning, process and stages of adoption, adopter categories.	8

Course Outcomes

- Study the concept of education and extension systems along with the programmes in India.
- Student will be able to understand the extension efforts pre and after independence of India with new trends in agriculture extension.
- Student will be able to understand the various rural development programmes and concept of extension administration.
- Student will be able to understand the concept of transfer of technology (TOT) and principle of communication along with Agriculture journalism.

Recommended Text Books

- A Textbook of Extension Education- S.V. Supe (2nd Edition), Agrotech Publishing Academy, Udaipur.
- Textbook of Agricultural Extension Management- C. Karthikeyan, R. Sendikumar And D. Jaganathan Atlantic Publishers & Dist.

- Agricultural Extension (Scope & Methods) and Community Development- Jagdish Saran Garg GayaPrasad.
- Agricultural Extension: Worldwide Innovations- R. Saravanan, New India Publishing Collis.

Recommended Reference Books

- Dimesionof Agricultural Extension- O.P. Sharma and L.L. Somani, AgrotechPublishing Academy,Udaipur.
- Agricultural Extension Systems: Issues and Approaches B.S. Hansra (ed.) Concept PublishingCompany.
- Handbook of Agriculture. ICAR Publication, NewDelhi.
- A Textbook of Agricultural Extension Management- C. Karthikeyan, R. Sendikumar, D. Jaganathan, Atlant.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF AGRICULTURAL
EXTENSION EDUCATION LAB

Course Code: AGUCBG207P

Semester: II

L T P C
0 0 2 1

Objective:

The main aim of this lab is to teach the students theoretically with highlights on practicals for better and deep understanding on farmer education, lab to the field programme, boosting agricultural productivity, increasing food security, improving rural livelihoods, and promoting agriculture as an engine of pro-poor economic growth.

- The course will consist of lecture (both theory & practical) in the lab.
- Emphasized the field practical and visit of the rural area/ villages of the district.
- Evaluation done not on the theory basis but on the basis of field/ demopractical.
- The prime aims of the study to practically skilled the student as per course.

Syllabus organised in Unit (Practical)

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

Syllabus organised in Unit (Practical)

Topics	Description with Practical Applications	Hour
To get acquainted with university extension system	ICAR, Extension System of ICAR, Organization, Milestones, Extension System of SAU, Extension role of Agriculture Universities, Application of Extension Education.	2
Group discussion- exercise	Communicating, Analysing & Interpreting, Team working, Body language, Conflicts effectively, time, Team player.	2
Preparation and use of AV aids	Range of audio-visual aids, Objects, Chalkboards, Posters, Flip charts, Flannel graphs, Projected aids, Principles, Select, Use, Make sure, Practice.	8
Preparation of extension literature – leaflet, booklet, folder, pamphlet news stories and success stories	Heading, Subheadings, Text, Pictures, Advantages, Limitations, Purposes of Pamphlets, Preparing Pamphlets, Style, Advantages, Limitation, Booklet, Purposes, Principles, Guidelines, Presentation, Application, Theme, Customer Quotes and "Sound Bites", Story Telling, Sections, Approval Process. Comments and Hints.	8
A visit to village to understand the problems being encountered by the villagers/ farmers	Water Shortage, Low Fertility, Pest Attack, Disease attack, Low Yield and Variety, Fragmented land holding, Irrigation problems, Seed problems, Sustainability problems, Lack of market understanding, Storage facilities, Agricultural strategy or policy.	2
To study organization and functioning of DRDA and other development departments at district level	Poverty alleviation, Project formulation, Social organisation and Capacity building, Gender concerns, Engineering supervision, Quality control, Project monitoring, Anti-poverty programmes, Line departments; Panchayati Raj Institutions, banks, other financial institutions, NGOs, Technical institutions, Target groups (SC/ST, women and disabled), BPL Census.	2
Visit to NGO and learning from their experience in rural development	Small and Horizontally structured, Responding flexibly, Technical advice, Feedback, Training, Working with groups, Developmental plans, Mediator between people and government.	2
Understanding PRA techniques and their application in village development planning	Participation, Flexibility, Team Work, Optimal ignorance, Systematic, Visualization, Sequencing, Optimal ignorance, Triangulation, Daily activity profile, Semi structured interviewing, MAPs, Permanent Group interviews, Timelines, Local histories, Venn diagrams, Wealth rankings, Matrices, Traditional Mgt, System, Case studies, Folklore, Songs, Poetry, Dance, Diagram Exhibition.	4
Exposure to mass media/ TV/ Radio script	Information function, Interpretation function, Instructive function, Bonding function, Diversion function.	2

Course Outcomes

- Student will be able to understand the ICAR, State Agricultural University (SAU) extension system and exercise on group discussion with topic on agricultural system.
- Skilled on preparation of audio-visual aids and extension literature with its uses in agriculture.
- Student will be able to understand the actual problems being encountered by the villagers/ farmers in the field along with NGO learning experiences in respect of rural development.
- Student will be able to understand the concept of PRA methods in village development with study of RDA/ATMA/KVK along with role in poverty alleviation in villages.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF AGRICULTURAL ECONOMICS

Course Code: AGUCBG208T

Semester: II

L T P C
2 0 0 2

Objective:

The basic objective of this course is to facilitate the fundamental knowledge of utilization and distribution of farming resources, as well as the commodities produced by farming to maximize profitability in agriculture to the benefit of society.

Course Syllabus (Theory)

Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country. Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts, short run and long run cost curves. Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement. Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Economics and Agriculture Economics Economics: Meaning, scope and subject matter, definitions, activities, approaches to economic analysis; micro and macro economics, positive and normative analysis. Nature of economic theory; rationality assumption, concept of equilibrium, economic laws as generalization of human behavior. Basic concepts: Goods and services, desire, want, demand, utility, cost and price, wealth, capital, income and welfare. Agricultural economics: meaning, definition, characteristics of agriculture, importance and its role in economic development. Agricultural planning and development in the country.	8
2	Demand and Production Demand: meaning, law of demand, schedule and demand curve, determinants, utility theory; law of diminishing marginal utility, equi-marginal utility principle. Consumer's equilibrium and derivation of demand curve, concept of consumer surplus. Elasticity of demand: concept and measurement of price elasticity, income elasticity and cross elasticity. Production: process, creation of utility, factors of production, input output relationship. Laws of returns: Law of variable proportions and law of returns to scale. Cost: concepts, short run and long run cost curves.	8
3	Supply and Distribution Supply: Stock v/s supply, law of supply, schedule, supply curve, determinants of supply, elasticity of supply. Market structure: meaning and types of market, basic features of perfectly competitive and imperfect markets. Price determination under perfect competition; short run and long run equilibrium of firm and industry, shut down and break even points. Distribution theory: meaning, factor market and pricing of factors of production. Concepts of rent, wage, interest and profit. National income: Meaning and importance, circular flow, concepts of national income accounting and approaches to measurement, difficulties in measurement.	8
4	Banking and Tax Population: Importance, Malthusian and Optimum population theories, natural and socioeconomic determinants, current policies and programmes on population control. Money: Barter system of exchange and its problems, evolution, meaning and functions of money, classification of money, supply, general price index, inflation and deflation. Banking: Role in modern economy, types of banks, functions of commercial and central bank, credit creation policy. Agricultural and public finance: meaning, micro v/s macro finance, need for agricultural finance, public revenue and public expenditure. Tax: meaning, direct and indirect taxes, agricultural taxation, VAT. Economic systems: Concepts of economy and its functions, important features of capitalistic, socialistic and mixed economies, elements of economic planning.	8

Course Outcomes

- Study the macro and micro economics with its theory and agriculture economics along with its role in Indian economy.
- Student will be able to understand the concept of demand, its theory with law of diminishing return, production & law of return.
- Study the supply, law of supply and market structure with distribution theory and national income.
- Student will be able to understand the socioeconomic determinants, population importance, money, classification of money and banking, agricultural and public finance with taxes.

Recommended Text Books

- Principles of Agricultural Economics- David Colman and Trevor Young, Cambridge University Press.
- An Introduction to Economics for student of agriculture- Berkeley Hill. 1980. Pergaman Press, Oxford.
- A Textbook of Agricultural Economics- C.B. Singh and R.K. Singh, Laxmi Publications Pvt. Limited.
- Agricultural Economy of India- S. Sankaran, Margham Publications.

Recommended Reference Books

- Handbook of Agriculture- Indian Council of Agricultural Research (ICAR), Update edition, New Delhi.
- Introduction to Economic Theory- B. L. Gupta. 1996. Arya Book Depot, New Delhi.
- Agricultural Finance And Management- Subba Reddy and P. Raghu Ram, Oxford & IBH Publishing Company.
- Modern Economic Theory - Dewet K.K. 1992. Shyam Lal Charitable Trust, S. Chand and Company Ltd., New Delhi.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: FUNDAMENTALS OF COMPUTER AND APPLICATIONS

Course Code: AGUCBG209T

Semester: II

L	T	P	C
4	0	0	2

Objective:

The prominent aim of the study is to provide the fundamental knowledge of Computer hardware, software with its application and DOS keys to the students.

Course Syllabus (Theory)

Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices- Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes. MS-DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR (CD), CLS, COPY, DATE, DEL (ERASE), DIR, CHARACTER, EXIT, MKDIR (MD), REM, RENAME (REN), RMDIR (RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT, HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT, XCOPY. Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails. MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge. MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping, Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets. MS Power Point: Starting MS-Power Point, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS- Access: creating table and database.

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	Computer and Software Introduction and Definition of Computer: Computer Generation, Characteristics of Computer, Advantages and Limitations of a computer, Classification of computers, Functional components of a computer system (Input, CPU, Storage and Output Unit), Types of memory (Primary and Secondary) Memory Hierarchy. Hardware: a) Input Devices- Keyboard, Mouse, Scanner, Bar Code Reader b) Output Devices- Visual Display Unit (VDU), Printers, Plotters etc. Software: Introduction, types of software with examples, Introduction to languages, Compiler, Interpreter and Assembler. Number System: Decimal, Octal, Binary and Hexadecimal Conversions, BCD, ASCII and EBCDIC Codes.	12
2	MS-DOS and Commands MS- DOS: Getting Started on DOS with Booting the System, Internal Commands: CHDIR (CD), CLS, COPY, DATE, DEL (ERASE), DIR, CHARACTER, EXIT, MKDIR (MD), REM, RENAME (REN), RMDIR (RD), TIME, TYPE, VER, VOL, External Commands: ATTRIB, CHKDSK, COMMAND, DOSKEY, EDIT, FORMAT, HELP, LABEL, MORE, REPLACE, RESTORE, SORT, TREE, UNDELETE, UNFORMAT, XCOPY.	12
3	Internet and MS Word & Excel Introduction of Internet: History of internet, Web Browsers, Searching and Surfing, Creating an E-Mail account, sending and receiving E-Mails, MS Word: Starting MS WORD, Creating and formatting a document, Changing fonts and point size, Table Creation and operations, Autocorrect, Auto text, spell Check, Word Art, Inserting objects, Page setup, Page Preview, Printing a document, Mail Merge. MS Excel: Starting Excel, Work sheet, cell inserting Data into Rows/ Columns, Alignment, Text wrapping, Sorting data, Auto Sum, Use of functions, Cell Referencing form, Generating graphs, Worksheet data and charts with WORD, Creating Hyperlink to a WORD document, Page set up, Print Preview, Printing Worksheets.	12
4	MS Power Point and MS Access MS Power Point: Starting MS-Power Point, Creating a presentation using auto content Wizard, Blank Presentation, creating, saving and printing a presentation, Adding a slide to presentation, Navigating through a presentation, slide sorter, slide show, editing slides, Using Clipart, Word art gallery, Adding Transition and Animation effects, setting timings for slide show, preparing note pages, preparing audience handouts, printing presentation documents. MS- Access: creating table and database.	12

Course Outcomes

- Student will be able to understand the fundamental of computer hardware its components and the role of each of these components along with the software applications.
- Understand the MS- Dos and different types of command and their role in application program.

- Student will be able to understand the concept of internet and skilled in creation of different types of format, file, worksheets, presentations, email and recognize email netiquette along with their properties.
- Student will be able to get insight of slide show, world art gallery, animation effect in addition of creating table and database.

Recommended Text Books

- Computer Fundamentals- Sinha P.K., BPBPublishing.
- Computer Fundamentals- Anita Goel, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, NewDelhi.
- The Essentials Office 2000 Book- Bill Bruck, BPBPublishing.
- Introductions to Computers- Alexis Leon & Mathews Leon, VikasPublications.

Recommended Reference Books

- Introductions to Computers- Peter Norton S., Tata McGrawHill.
- Office in Easy Steps- Price Michael, TMHPublication.
- Computer Networks & Internets: With Internet Applications- D. E .Comer, M. S. Narayanan, Update edition, Pearson Education, NewDelhi.
- Computer Networks & Distributed Processing: Software, Techniques & Architecture-Martin, James,Prentice HallPTR.

Syllabus for B.Sc. (Hons.) Agriculture

Course Title: PROFESSIONAL PROFICIENCY (B.Sc. Ag)- II

Course Code: PTSPPBG20T

Semester: II

L T P C
4 0 0 2

Objective:

Students should be able to read and write correct English, attain reasonable fluency in the Language and should also be exposed to introductory lessons of Aptitude Building.

Course Syllabus (Theory)

HARD SKILLS: Hard skill includes Basic Grammar, Vocabulary, Articles, Tenses, Construction of Sentences and Reading Comprehension etc. **COMMUNICATION SKILL:** Efforts should be made to overcome the initial hesitation of speaking English of students and hence improve their fluency in English. Suggested methods include Follow only English language in the class, Class should be interactive and students should always be engaged in some kind of conversation, Each student should speak 10 minutes, 2-5 times in 2nd semester on topics of his choice selected from Social, Global Warming & Climate Change, Environment & Disaster Management, Agriculture Issues, Agri-Entrepreneurship and Agri-Economics, Dairy, Poultry and Agro-Industries, Agriculture Journalism, Politics, World Affairs and Religion etc. In the above process students should be regulated towards better Vocabulary and Pronunciation. **APTITUDE BUILDING: QUANTITATIVE APTITUDE:** Ratio and proportion, Partnership, Problem on Ages. **LOGICAL REASONING:** Inequalities, Direction Test, Syllogism (Basics).

Syllabus organised in Unit (Theory)

Unit	Content	Hours
1	HARD SKILLS Hard skill includes Basic Grammar, Vocabulary, Articles, Tenses, Construction of Sentences and Reading Comprehension etc.	10
2	COMMUNICATION SKILL Efforts should be made to overcome the initial hesitation of speaking English of students and hence improve their fluency in English. Suggested methods include: <ul style="list-style-type: none"> Follow only English language in the class. Class should be interactive and students should always be engaged in some kind of conversation. Each student should speak 10 minutes, 2-5 times in 2nd semester on topics of his choice selected from Social, Global Warming & Climate Change, Environment & Disaster Management, Agriculture Issues, Agri-Entrepreneurship and Agri-Economics, Dairy, Poultry and Agro-Industries, Agriculture Journalism, Politics, World Affairs and Religion etc. In the above process students should be regulated towards better Vocabulary and Pronunciation.	25
3	APTITUDE BUILDING QUANTITATIVE APTITUDE <ol style="list-style-type: none"> Ratio and proportion. Partnership. Problem on Ages. LOGICAL REASONING <ol style="list-style-type: none"> Inequalities. Direction Test. Syllogism (Basics). 	10

Course Outcomes

- Better representation of himself/ herself in terms of communication skills, overall personality development and aptitude building required for Government & Non-government jobs.
- This program will help students employable and ready for Seed Company, Fertilizer Company, Agro-Industries/ Dairy & Poultry based Industries /Corporate/ CSR project and other Public and Private Sector, Non-Governmental Organization (NGO) jobs.