

**M.Sc. (Ag.) Agronomy 1<sup>st</sup>Sem.**  
**Fundamentals of Bio-statistics and Computer Applications**  
**(J-1004)**

**1. Processing data:**

Introduction to Statistics, Classification and tabulation of statistical data, frequency distribution, diagrammatic and graphical representation of data- bars, circles, rectangles, histogram, frequency polygon, frequency curve and cumulative frequency curves.

**2. Measures of central Tendency and Dispersion:**

Mean, Median, Mode, Qualities and Calculation of median, mode and quartiles by graphs, range, quartile deviation, mean deviation, standard deviation, variance, coefficient of variation and standard error of mean

**3. Probability and Distribution:**

Random experiment, events-exhaustive, mutually exclusive, equally likely, independent and favorable, definition of probability (with simple exercise), Law of addition and law of multiplication of probability (with simple ex.), random variable – discrete and continuous, definitions of Binomial, Poisson and Normal distributions and simple properties of the above distributions (without derivation)

**4. Correlation and Regression:**

Bivariate data, bivariate frequency distribution, simple correlation, Karl pearson's correlation coefficient, linear regression, regression lines, regression coefficients and their relation with correlation coefficient, multiple regression, multiple and partial correlation coefficients (for three variables only).

**5. Computer Application:**

- **Introduction to Computer:** - Definition, History, Generation of development, Characteristics of computers, benefits and application of computers
- **Organization of Computer- Hardware:** - Inputs devices, output devices, CPU, storage unit, Software, Types of software, application of software, system software, utility software, general purpose software. Binary number system and its conversion, Intermodulation to statistical packages (Excel, SPSS, SYSTAT, Sigma stat).

**Note: - Calculators may be used in theory paper**

**M.Sc. (Ag.) Agronomy 1<sup>st</sup>Sem.**  
**Modern Concept of crop Production (J-1005)**

1. Crop Growth In Relation to Environment.
2. Concept of Potential yield and its relation.
3. Modern concept in tillage: - Zero, minimum, conservation tillage etc.
4. Optimization of plant population and planting geometry in relation to soil fertility.
5. Mitscherlich, Banle, and Inverse yield nitrogen law.
6. Biotic And Abiotic Stresses of Plant.
7. Concept of Ideal Plant Type (IPT).
8. Crop Modeling for maximizing crop yield.
9. Crop Response production function.
10. Crop Rotation and Cropping Scheme
11. Cropping and Farming system for sustainable agriculture.
12. Crop production under protective agriculture, precision agriculture.
13. Crop and Growth analysis in relation yield maximation

**M.Sc. (Ag.) Agronomy 1<sup>st</sup>Sem.**  
**Kharif Crops (J-1006)**

Study under to Origen, History, distribution, Adaptation, Classification, Morphology, Phenology, Varietal Improvement, and Production Technology of given crops-

1. Rice
2. Maize
3. Sorghum
4. Millets
5. Pigeon pea
6. Mung bean
7. Urad bean
8. Groundnut
9. Soybean
10. Cotton
11. Jut
12. Sun hemp

Quality Components, industrial uses of the main and by product and their post harvest, handling for marketing.

**M.Sc. (Ag.) Agronomy 1<sup>st</sup>Sem.**

**Management of Problem Soil (J-1007)**

1. Origen, Nature, Properties and Distribution of Saline, Sodic, Calcareous, Acid and waterlogged Soils.
2. Response to Soil reaction, Nutrient, Imbalance in problem soils.
3. Extent of damage to crop.
4. Crop tolerance to salinity, sodicity, acidity and waterlogging Soils.
5. Reclamation of problem soils.
6. Role of Soil Amendments and soil drainage.
7. Agronomic practices in relation to problem soils- water land dimensions, causes, need and practices of management.
8. Managing the eroded and ravine lands.
9. Soil requiring the unusual management-organic, acid sulfate, sand, forest, and rangelands and disturbed soil.

CCSU

**M.Sc. (Ag.) Agronomy 2<sup>nd</sup>Sem.**  
**Statistical Methods in Agriculture (J-2004)**

**1. Theory of Sampling:**

Concept of sampling, Sampling Vs. complete enumeration, simple random sampling, stratified sampling, systematic sampling, cluster sampling and multi-stage sampling (methods, advantage, and disadvantage only).

**2. Testing of Hypothesis:**

Null and alternative hypothesis. Two types of error, level of significance, power of the test, one-tailed and two-tailed tests.

**3. Test of Significance:**

Z & T tests for testing equality of two means, Chi-square ( $\chi^2$ ) test for testing goodness of fit, Independence of attributes (contingency table) with Yates correction and testing for the variance and homogeneity of means (analysis of variance)

**4. Analysis of variance**

Analysis of variance with one-way and two-way classification (One observation per parcel)

**5. Design of Experiments:**

Basic principles of design of experiments, uniformity trials, shape and size of the plots and Blocks, completely randomized, randomized block and Latin Square designs and their analysis, missing plot technique in R.B.D., simple factorial experiments of the  $2^2$  and  $2^3$

**M.Sc. (Ag.) Agronomy 2<sup>nd</sup>Sem.**  
**Principles & Practices Of Water Management (J-2005)**

- Water and Its role in Plants.
- Water Resources of India.
- Major Irrigation projects and extent of area and crops.
- Irrigation in India.
- Soil water Water movement and water availability, uptake, transport, and transpiration in Plants.
- Soil Water Plant Relationship.
- Plants response to water stress
- Scheduling, Depth, Methods of Irrigation.
- Micro irrigation system, Fertigation.
- Management of water controlled in Environment and Polyhouse.
- Water use Efficiency,
- Water management of crops and cropping system, soil, plants.
- Metrological factors determining water needs of crops.
- Crop plant adoption to moisture stress condition.
- Quality of irrigation water.
- Effect of Saline water and soil salinity on plants.
- Water relationship and management of crops.
- Excess soil water plant growth.
- Water management of problem soils.
- Drainage requirement of crops and methods of field drainage, their layout and spacing.
- Drainage Coefficient and Irrigability of lands.

**M.Sc. (Ag.) Agronomy 2<sup>nd</sup>Sem.**  
**Soil Fertility Management & Fertilizer Use (J-2006)**

- Soil Fertility and productivity.
- Soil composition in relation to crop production.
- Organic and Inorganic constituents.
- Essential plant nutrients.
- Deficiency and Toxicity symptoms of major and micronutrients.
- Remedial, measures, transformation and dynamics of major plant nutrients.
- Kinds of fertilizers –straight, complex and bulk blended methods of fertilizers.
- Application crop response to nutrients.
- Fertilizer use efficiency.
- Nutrients interaction, fertilizer application in cropping system.
- Direct residual and cumulative effects integrated plants.
- Nutrients supply system, Organic manures, Compost, Green Manure (G.M.), Vermi compost, Bio-fertilizers, Crop residue.
- Inorganic fertilizers.
- Sustainable agriculture and Soil fertility, fertilizers and Environment.
- Fertilizer use in problem soil.
- Soil moisture nutrients interactions.

**M.Sc. (Ag.) Agronomy 2<sup>nd</sup> Sem.**  
**Rabi Crops (J-2007)**

Study under to Origen, History, distribution, Adaptation, Classification, Morphology, Phenology, Varietal Improvement, and Production Technology of given crops

- Wheat
- Barley
- Chick pea
- Lentil
- Pea
- Rapeseed
- Mustard
- Sunflower
- Linseed
- Sugarcane
- Sugarbeet
- Potato
- Tabaco and
- Other regional crops of the area.

Quality Components, industrial uses of the main and by product and their post harvest, handling for marketing

**M.Sc. (Ag.) Agronomy 3<sup>rd</sup>Sem.**  
**Principles & Practices of Weed Management (J-3005)**

- Classification and Characteristics of weeds.
- Special weed problem including aquatic and parasitic weeds.
- Ecology and physiology of major weeds.
- Ecophysiology of crop-weed competition including allelopathy.
- Weed indices-principle and methods of weed control.
- Concept of integrated weed management.
- Weed control through bio herbicides, mycoherbicides and allelochemicals.
- Herbicides history, development, classification.
- Mode & mechanism of action of herbicides selectivity, herbicide mixture.
- Advantage, safeners, degradation of herbicides in soil and plants.
- Effect of herbicide in relation to environment.
- Herbicides resistance in weed and crops.
- Weed management in major crops and cropping systems.
- Weed shifts in cropping systems.
- Control of weed in non-cropped situations.

**Practical.**

- Identification of important weed of different crops
- Preparation of a weed herbarium.
- Weed survey in crops and cropping system.
- Crop weed competition studies.
- Preparation of spray solutions of herbicides for high and low volume sprayers.
- Use of various types spray pump and nozzles and calculation of swath width.
- Economics of weed control.

**M.Sc. (Ag.) Agronomy 3<sup>rd</sup>Sem.**  
**Agronomy of Fodder, Forage, Medicinal & Aromatic**  
**(J-3006)**

**Fodder Forage Crops.**

Adaptation, distribution, varietal improvement, agro techniques and quality aspects including anti-quality factors of important fodder crops like

1. Teosinte
  2. Maize
  3. Bajra
  4. Guar
  5. Cowpea
  6. Oats
  7. Barley
  8. Berseem
  9. Lucerne and
  10. Clovers
- Year round fodder production and management preservation and utilization of forage crops
  - Principles and methods of hay and silage making, chemical and biochemical changes.
  - Nutrients losses and factors affecting quality of hay and silage.
  - Use of physical and chemical enrichments and biological methods for improving nutrition value of poor quality fodder.
  - Economics of forage cultivation.

**Medicinal & Aromatic Crops.**

Importance of medicinal, and aromatic plants in human health, national economy and related industries.

Classification of medicinal and aromatic plants according to botanical, characteristics and uses, climate, and soil requirement, cultural practices, yield and important constituents of medicinal and aromatic plants (given blow)

- Isabgol
- Citronella
- Palmarosa
- Rauwolfin
- Poppy
- Nux Vomica (poison nut)
- Mentha
- Basil
- Germanium.

**M.Sc. (Ag.) Agronomy 3<sup>rd</sup>Sem.**  
**Soil Conservation and watershed management**  
**(J-3007)**

**Soil erosion:-**

- Definition, nature and extent of erosion;
- Types of erosion,
- Factors affecting erosion;

**Soil conservation:-**

- Definition methods of soil conservation-
- Agronomic measures, contour cultivation, strip cropping cover crops, vegetative barrier, improved dry farming practices, mechanical measures - bonding. Gully control, bench terracing, role of grasses and pastures in soil conservations; wind breaks and shelter belts;

**Watershed management:-**

- Definition, objectives, concepts, approach, components,
- Steps in implementaion of watershed
- Development of cropping system for watershed areas;
- Alternate land use systems;
- Agroforestry,
- Ley farming:
- Jhum management - basic concepts, socio ethnic-aspects, and rehabilitation of abandoned jhum lands and measures to prevent soil erosion.

**M.Sc. (Ag.) Agronomy 3<sup>rd</sup>Sem.**  
**Organic Farming (J-3008)**

- Impact of high technology agriculture on crop production, and environment.
- Alternate agriculture / sustainable agriculture,
- Status of organic farming in India.
- Organic farming- concept and definition its relevance to India and global agriculture as well as future prospects.
- Components of organic farming cycle in research- and soil management,
- Organic residues, Organic manures, earthworm vermi compost, green manure on farm waste recycling, non chemical weed management bio fertilizing
- Domestic and Industrial waste recycling, Energy use, food quality etc.
- Ecological agriculture - concept, definition and objectives, Ecological farming system Integrated intensive farming system (IIFS),
- Low input sustainable agriculture (LISA).
- Soil organic- matter - Source Composition and energy of matter, decomposition of organic compounds, recycle of Humus,
- Influence of organic matter on soil properties as well as higher plants,
- Carbon / Nitrogen ratio and its significance
- Organic Soils: - classification, physical and chemical characteristics & their management
- Organic farming Vs. Traditional farming.

**M.Sc. (Ag.) Agronomy 4<sup>th</sup>Sem.**  
**DRY - LAND AGRONOMY (J-4005)**

- Definition, concept, characteristics of dry lands and rain-fed farming;
- Significance and dimension of dry land farming in Indian agriculture;
- Constraints limiting crop production in dry land areas:
- Characterization of environment from water availability;
- Types of droughts, adaptation of crop plants to droughts;
- Drought management strategies,
- Predation of appropriate crop plants for dry land areas;
- Mid-season corrections for aberrant weather conditions;
- Water-harvesting concepts, techniques and practices; use of mulches,
- Kinds, effectiveness and their economics, antitranspirants;
- Soil and crop management techniques, tillage, seeding, fertilizer use, crop and varietal choice;
- Concept of watershed management and its application in India.

**PRACTICAL:**

- Rainfall probability analysis for crop planning;
- Measurement of soil and water losses: in situ soil moisture conservation practices; mulches, including live mulches for minimizing evaporation losses;
- Measures to manage prolonged drought during crop season;
- Dry seeding practices due to delayed monsoon rains;
- Visit to a dry land research center;
- Study of on-going watershed management programs and agroforestry systems.
- Measurement of infiltration rate and percolation rate.

**M.Sc. (Ag.) Agronomy 4<sup>th</sup>Sem.**  
**AGRO FORESTRY & SUSTAINABLE AGRICULTURE**  
**(J-4006)**

- Definition,
- Concept scope: historical perspective,
- Agroforestry systems agri silviculture, silvipasture, agri-silvipature,
- Agri-horticulture,
- Aqua-silviculture;
- Alley cropping and energy plantation;
- Agroforestry systems for forage and fuel wood production,
- Resource conservation; improvement of degraded lands' biological diversity and sustainable agriculture and environmental protection;
- Associative influence in relation to above-ground and underground interferences,
- Allelopathy in various agroforestry systems/direct and indirect effect;
- Efficient agroforestry design/models for different agroclimatic conditions;
- Tree-crop-animal relationship;
- Food-fodder-fuel systems;
- Productivity and sustainability: alternate land use systems through agroforestry;
- Social acceptability and economic viability: agroforestry interventions with multipurpose tree species;
- Nutritive value of tree leaf,
- Economics of AF systems.

**PRACTICAL:**

- Identification of various tree species and their planting methodology and techniques,
- Study of litter fall and biomass deposits, organic matter and nutrient
- Conservation; pole Roding and defoliation, coppicing: light and temperature

**M.Sc. (Ag.) Agronomy 4<sup>th</sup> Sem.**  
**CROP ECOLOGY AND GEOGRAPHY (J-4007)**

- Principles of Crop ecology;
- Ecosystem concept determinants of productivity of ecosystem,
- Physiological limits of crop yield and variability in relation to ecological optima.
- Crop adaptation; Climate shift and its ecological implication,
- Green House effect
- Agro ecological and agro-climatic - Regions of India,
- Geographical distribution of cereals, legumes oilseeds,
- Fodder and forage and commercial Crops (Sugarcane, Potato & Tobacco).
- Adverse climatic Factors and crop productivity, Physiological stress in crops
- Remote sensing.

**PRACTICAL:**

- Crop distribution in different agro climatic and agro ecological zones.
- Phenological studies in different crops.
- Studies on photo and Thermiperiodism.
- Management of weather parameters, recording and interpretation.
- Visit to Agro met - observatory and research institutions related to Ecology.

**M.Sc. (Ag.) Agronomy 4<sup>th</sup> Sem.**  
**SEED PRODUCTION AGRONOMY (J-4007)**

- Seed production techniques and agronomical practices for important crops - cereals, pulses, oilseeds, fiber crops and fodder crops.;
- Seed industry in the country and role of various agencies
- Seed morphology,
- Seed multiplication chain,
- Seed purity
- Seed health,
- Dormancy.
- Seed vigor ;
- Hybrid seed production,
- Seed treatments,
- Seed viability
- Seed quality,
- Physiology of seed germination;
- Seed testing for germination and seeding evaluation;
- Seed certification ·
- Processing. Grading and storage
- Distribution and marketing store grain pests

**PRACTICALS:**

- Seed quality on the basis of purity and germination;
- Rouging; DE-tasseling and familiarization with seed processing equipment's,
- Materials and precautions for seed storage:
- Comparison of farmer saved seed with certified seed.