M.Sc. (Agri.) Agronomy
Teaching Scheme & Curriculum
Semester 1

Subjects				Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Name	Type	Credit	Lect	Tut	Lab	T	T	P	P	
1	Modern Concepts in Crop Production	Major	3	3	-	0	50	50	-	-	100
2	Principles and Practices of Water Management	Major	3	2	-	2	50	50	-	-	100
3	Dry land Farming and Watershed Management	Major	3	2	-	2	50	50	-	-	100
4	Soil, water and air pollution	Minor	3	2	-	2	50	50	-	-	100
5	Analytical technique and instrumental methods in soil and plant analysis	Minor	2	0	-	4			-	100	100
6	Experimental Designs	Supporting	3	2	-	2	50	50	-	-	100
7	Library and Library Information Services	Non-Gradial	1	0	-	2			-	100	100
8	Basic Concepts in Laboratory Techniques	Non-Gradial	1	0	-	2			-	100	100
		Total	**19**	**11**	**-**	**16**					**800**

Lect *- Lecture,* ***Tut*** *- Tutorial,* ***Lab*** *- Lab,* ***T*** *- Theory,* ***P*** *- Practical*
Theory Passing % : *60* ***Practical Passing % :*** *60*

Prerequisite	Students should have foundational knowledge of crop production, soil science, agricultural meteorology, and basic agronomic practices at the undergraduate level.
Rationale	Modern crop production emphasizes efficient utilization of natural resources, precision farming, sustainable soil and nutrient management, and advanced production technologies. Understanding crop growth, plant-environment interactions, and innovative agricultural approaches is essential for enhancing productivity, sustainability, and climate resilience in modern agriculture.
Course Title	**Modern Concepts in Crop Production***
Credits	3 (3+0)
Objectives of the course	1. To impart knowledge on crop growth and development in relation to environmental factors. 2. To explain modern quantitative and physiological principles governing crop production and yield. 3. To develop understanding of scientific crop production practices, resource conservation, and stress management. 4. To familiarize students with precision agriculture, integrated farming systems, and advanced crop production technologies such as hydroponics, aeroponics, and protected cultivation.
Syllabus	
Theory	**Unit I** Crop growth analysis in relation to environment; geo-ecological zones of India. **Unit II** Quantitative agro-biological principles and inverse yield nitrogen law; Mitscherlich yield equation, its interpretation and applicability; Baule unit. **Unit III** Effect of lodging in cereals; physiology of grain yield in cereals; optimization of plant population and planting geometry in relation to different resources, concept of ideal plant type and crop modeling for desired crop yield. **Unit IV** Scientific principles of crop production; crop response production functions; concept of soil plant relations; yield and environmental stress, use of growth hormones and regulators for better adaptation in stressed condition. **Unit V** Integrated farming systems, organic farming, and resource conservation technology including modern concept of tillage; dry farming; determining the nutrient needs for yield potentiality of crop plants, concept of balance nutrition and integrated nutrient management; precision agriculture. Modern crop production concepts: soilless cultivation, aeroponic, hydroponic, robotic and terrace farming; use of GIS, GPS and remote sensing in modern agriculture, precision farming and protected agriculture.
Course Outcomes	**CO1**: Explain crop growth and development processes in relation to environmental and geo-ecological conditions. **CO2**: Interpret quantitative agro-biological principles, yield equations, and nutrient response relationships for crop productivity enhancement.

	CO3: Analyze physiological and agronomic factors influencing crop yield, plant population, lodging, and stress adaptation in cereals and other crops. **CO4**: Evaluate modern crop production technologies including integrated farming systems, precision agriculture, resource conservation techniques, and soilless cultivation methods for sustainable agriculture.
Suggested Readings	1. Balasubramaniyan P and Palaniappan SP. 2001. *Principles and Practices of Agronomy*. Agrobios. 2. Fageria NK. 1992. *Maximizing Crop Yields*. Marcel Dekker. 3. Havlin JL, Beaton JD, Tisdale SL and Nelson WL. 2006. *Soil Fertility and Fertilizers*. 7th Ed. Prentice Hall. 4. Paroda RS. 2003. *Sustaining our Food Security*. Konark Publ. 5. Reddy SR. 2000. *Principles of Crop Production*. Kalyani Publ. 6. Sankaran S and Mudaliar TVS. 1997. *Principles of Agronomy*. The Bangalore Printing & Publ. 7. Singh SS. 2006. *Principles and Practices of Agronomy*. Kalyani Publ. 8. Alvin PT and Kozlowski TT (Ed.). 1976. *Ecophysiology of Tropical Crops*. Academia Publ., New York. 9. Gardner PP, Pearce GR and Mitchell RL. 1985. *Physiology of Crop Plants*. Scientific Publ., Jodhpur. 10. Lal R. 1989. "Conservation tillage for sustainable agriculture: Tropics versus Temperate Environments." Advances in Agronomy 42: 85–197. 11. Wilsie CP. 1961. Crop Adaptation and Distribution. Euresia Publ., New Delhi.

Prerequisite	Students should have foundational knowledge of agronomy, crop production, herbicides, and basic weed management practices at the undergraduate level.
Rationale	Weed management is essential for sustainable crop production and resource conservation. Understanding weed biology, crop-weed interactions, herbicide chemistry, and integrated weed management practices enables effective control of weeds, reduction in crop losses, and improvement in agricultural productivity with environmental safety.
Course Title	**Principles and Practices of Weed Management***
Credits	3(2+1)
Objectives of the course	1. To impart knowledge on weed biology, ecology, and crop-weed interactions. 2. To explain the classification, mode of action, and application of herbicides. 3. To develop understanding of integrated weed management and herbicide resistance management strategies. 4. To provide practical exposure on weed identification, herbicide application, and weed control techniques in different cropping systems.
Syllabus	
Theory	**Unit I** Weed biology, ecology and classification; crop-weed competition including allelopathy; principles and methods of weed control and weed management; weed indices; weed shift in different ecosystems. **Unit II** Herbicides: introduction and history of development; classification based on chemical nature, physiological action, application and selectivity; mode and mechanism of action of herbicides. **Unit III** Herbicide structure-activity relationship; factors affecting herbicide efficiency; herbicide formulations, herbicide mixtures, sequential application and rotation of herbicides; weed control through nano-herbicides, bio-herbicides, myco-herbicides, bio-agents and allelochemicals; movement and degradation of herbicides in soil and plants; herbicide resistance, residue, persistence and management; development of herbicide resistance in weeds and crops and their management through herbicide combinations and rotations. **Unit IV** Weed management in major crops and cropping systems; alien, invasive and parasitic weeds and their management; weed shifts in cropping systems; aquatic and perennial weed control; weed management in non-crop areas. **Unit V** Integrated weed management; recent developments in weed management including robotics, use of drones and aeroplanes, organic weed management approaches; cost-benefit analysis of weed management.
Practical	➢ Identification of important weeds of different crops ➢ Preparation of weed herbarium ➢ Weed survey in crops and cropping systems ➢ Crop-weed competition studies

	➢ Weed indices calculation and interpretation using data ➢ Preparation of spray solutions of herbicides for high and low-volume sprayers ➢ Use of various types of spray pumps and nozzles and calculation of swath width ➢ Economics of weed control ➢ Herbicide resistance analysis in plant and soil ➢ Bioassay of herbicide residue and resistance Calculation of herbicide requirement
Course Outcomes	**CO1**: Explain weed biology, ecology, classification, and crop-weed interactions affecting crop productivity. **CO2**: Identify herbicides based on their chemical nature, selectivity, mode of action, and application methods for effective weed management. **CO3**: Evaluate integrated weed management approaches including herbicide resistance management, biological weed control, and modern weed management technologies. **CO4**: Perform weed identification, herbicide application calculations, weed survey techniques, and economic analysis for efficient weed management in cropping systems.
Suggested Readings	1. Böger P, Wakabayashi K and Hirai K (Eds.). 2002. Herbicide Classes in Development: Mode of Action, Targets, Genetic Engineering, Chemistry. Springer. 2. Chauhan B and Mahajan G. 2014. Recent Advances in Weed Management. Springer. 3. Das TK. 2008. Weed Science: Basics and Applications. Jain Brothers, New Delhi. 4. Fennimore SA and Bell C. 2014. Principles of Weed Control. 4th Ed. California Weed Science Society. 5. Gupta OP. 2007. Weed Management: Principles and Practices. 2nd Ed. 6. Jugulan M. (Ed.). 2017. Biology, Physiology and Molecular Biology of Weeds. CRC Press. 7. Monaco TJ, Weller SC and Ashton FM. 2014. Weed Science: Principles and Practices. Wiley. 8. Powles SB and Shaner DL. 2001. Herbicide Resistance and World Grains. CRC Press. 9. Walia US. 2006. Weed Management. Kalyani Publishers. 10. Zimdahl RL. (Ed.). 2018. Integrated Weed Management for Sustainable Agriculture. B.D. Science Publications.

Prerequisite	Students should have foundational knowledge of agronomy, soil science, agricultural meteorology, and crop production under rainfed conditions.
Rationale	Dryland agriculture plays a crucial role in food production in rainfed regions. Understanding moisture conservation, drought management, watershed management, and climate-based crop planning is essential for sustainable crop production under water-limited environments.
Course Title	**Dryland Farming and Watershed Management**
Credits	3(2+1)
Objectives of the course	1. To impart knowledge on dryland farming concepts and rainfed agricultural systems. 2. To explain drought management strategies, moisture conservation, and crop planning techniques. 3. To develop understanding of watershed management and efficient utilization of water resources. 4. To provide practical exposure on estimation of evapotranspiration, water balance, and drought assessment techniques.
Syllabus	
Theory	**Unit I** Definition, concept and characteristics of dryland farming; dryland versus rainfed farming; significance and dimensions of dryland farming in Indian agriculture. **Unit II** Soil and climatic parameters with special emphasis on rainfall characteristics; constraints limiting crop production in dryland areas; types of drought; characterization of environment for water availability; crop planning for erratic and aberrant weather conditions. **Unit III** Stress physiology and drought resistance; adaptation of crop plants to drought; drought management strategies; preparation of crop plans for dryland areas; contingent crop planning for aberrant weather conditions. **Unit IV** Tillage, tilth, frequency and depth of cultivation; soil compaction and conservation tillage; tillage in relation to weed control and moisture conservation; techniques of soil moisture conservation including mulches and antitranspirants; soil and crop management practices; seeding and efficient fertilizer use. **Unit V** Concept of watershed resource management, problems, approaches and components.
Practical	➢ Seed priming methods ➢ Determination of moisture content and germination of dryland crops ➢ Determination of Relative Water Content and Saturation Deficit of leaves ➢ Study of moisture stress effects and recovery behavior of crops ➢ Estimation of potential ET by Thornthwaite method ➢ Estimation of reference ET by Penman-Monteith method ➢ Climate classification by Thornthwaite and Koppen methods ➢ Estimation of water balance by Thornthwaite and FAO methods ➢ Drought assessment techniques ➢ Estimation of length of growing period

	➢ Rainfall probability analysis and crop planning ➢ Application of antitranspirants and their effects ➢ Water use efficiency studies ➢ Visits to dryland research stations and watershed projects
Course Outcomes	**CO1**: Explain the principles, characteristics, and importance of dryland farming and watershed management. **CO2**: Analyze drought conditions, crop adaptation mechanisms, and moisture conservation practices for sustainable dryland agriculture. **CO3**: Evaluate crop planning, water balance, evapotranspiration, and watershed resource management strategies under rainfed conditions. **CO4**: Perform practical applications related to drought assessment, climate classification, water use efficiency, and dryland crop management.
Suggested Readings	1. Dryland Agriculture Principles and Practices. 2018. Kalyani Publishers. 2. Tillage and Crop Production. 2007. Scientific Publishers. 3. Agrotechnology for Dryland Farming. 2002. Scientific Publishers. 4. Soil and Water Conservation Research in India. 2002. ICAR. 5. Production and Improvement of Crops for Drylands. 1995. Oxford & IBH. 6. Research for Rainfed Farming. 1995. CRIDA. 7. Challenges and Strategies of Dryland Agriculture. 2007. Scientific Publishers. 8. Technologies for Food Security and Sustainable Agriculture. 2005. Agrotech Publications. 9. Improved Agronomic Practices for Dryland Crops. 1988. CRIDA. 10. Sustainable Development of Dryland Agriculture in India. 2005. Scientific Publishers. 11. Arid Land Irrigation and Ecological Management. 1998. Scientific Publishers. 12. Rainfed Agriculture in India: Research and Development Scenario. 2004. ICAR.

Prerequisite	Students should possess foundational knowledge of soil science, environmental science, chemistry, and agricultural practices. Familiarity with soil-water-plant relationships and agrochemical usage will support understanding of environmental pollution and remediation processes.
Rationale	The course provides comprehensive understanding of soil, water, and air pollution associated with agricultural and industrial activities. It emphasizes the sources, behavior, and impacts of pollutants on soil health, crop productivity, environmental quality, and human health. The course also focuses on risk assessment, remediation technologies, and modern monitoring approaches for sustainable environmental management.
Course Title	**Soil, Water and Air Pollution**
Credits	3 (2+1)
Objectives of the course	To impart knowledge on the sources, nature, and extent of soil, water, and air pollution in agricultural ecosystems. To explain the behavior and impact of pollutants, pesticides, and toxic elements on soil properties, plants, animals, and human health. To develop understanding of pollutant transport, greenhouse gas emissions, and contamination of natural resources. To enhance competency in pollution assessment, remediation techniques, and remote sensing applications for environmental management.
Syllabus	
Theory	**Unit** I Soil, water and air pollution problems associated with agriculture, nature and extent. **Unit II** Nature and sources of pollutants – agricultural, industrial, urban wastes, fertilizers and pesticides, acid rains, oil spills etc.; air, water and soil pollutants- their CPC standards and effect on plants, animals and human beings. **Unit III** Sewage and industrial effluents–their composition and effecton soil properties/ health, and plant growth and humanbeings; soil as sink for waste disposal. **Unit IV** Pesticides–their classification, behaviour in soil and effecton soil microorganisms. **Unit V** Toxic elements–their sources, behaviour in soils, effect on nutrients availability, effect on plant and human health. **Unit VI** Pollution of water resources due to leaching of nutrients and pesticides from soil; emission of green house gases–carbondioxide, methane and nitrous oxide. **Unit VII** Risk assessment of polluted soil, Remediation/ amelioration of contaminated soil and water; remote sensing applications in monitoring and management of soil and water pollution.
Practical	Sampling of sewage waters, sewage sludge, solid/ liquid industrial wastes, polluted soils and plants and their processing, Estimation of dissolved and suspended solids, chemical oxygen demand (COD), biological demand (BOD), measurement of coliform (MPN), nitrate and ammoniacal nitrogen and phosphorus, heavy metal content in effluents, Heavy metals

	in contaminated soils and plants, Management of contaminants in soil and plants to safe guard food safety, Air sampling and determination of particulate matter and oxides of sulphur, NO2 and O2 conc. Visit to various industrial sites to study the impact of pollutants on soil and plants.
Course Outcomes	**CO1:** Explain the sources, characteristics, and impacts of agricultural, industrial, and urban pollutants on soil, water, air, and living organisms. **CO2:** Analyze the behavior of pesticides, toxic elements, sewage, and industrial effluents in soils and their influence on soil properties, nutrient availability, and environmental quality. **CO3:** Apply concepts of pollution monitoring, risk assessment, and remediation techniques for management of contaminated soil and water resources. **CO4:** Evaluate the environmental consequences of nutrient leaching, pesticide contamination, greenhouse gas emissions, and the use of remote sensing tools for sustainable pollution management.
Suggested Readings	1. Lal R, Kimble J, Levine E and Stewart BA. 1995. Soil Management and Greenhouse Effect. CRC Press. 2. Middlebrooks EJ. 1979. Industrial Pollution Control. Vol. I. Agro-Industries. John Wiley Interscience. 3. Ross SM. Toxic Metals in Soil Plant Systems. John Wiley & Sons. Vesilund PA and Pierce 1983. Environmental Pollution and Control. Ann Arbor Science Publ.

Prerequisite	Students should possess basic knowledge of soil science, analytical chemistry, plant nutrition, and laboratory techniques. Familiarity with chemical analysis, instrumentation, and sample preparation methods will support understanding of advanced analytical procedures in soil and plant analysis.
Rationale	The course provides comprehensive training in analytical techniques and laboratory methods used in soil, water, and plant analysis. It emphasizes principles of instrumental analysis, nutrient estimation, ion exchange measurements, and elemental characterization essential for soil fertility evaluation and research. The course also develops practical skills in sample handling, laboratory safety, and interpretation of analytical data for sustainable soil and crop management.
Course Title	**Analytical Technique and Instrumental Methods in Soil and Plant Analysis**
Credits	2 (0+2)
Objectives of the course	1. To impart knowledge on preparation of standard solutions, sampling techniques, and analytical procedures for soil, water, and plant analysis. 2. To explain the principles and applications of spectroscopic, chromatographic, electrochemical, and X-ray analytical techniques. 3. To develop competency in determination of nutrient status, ion exchange properties, and elemental composition of soils and plants. 4. To enhance analytical and interpretative skills for evaluating soil fertility, nutrient dynamics, and laboratory data in agricultural research.
Syllabus	
Theory	
Practical	**Unit I** Preparation of solutions for standard curves, indicators and standard solutions for acid-base, oxidation reduction and complexometric titration; soil, water and plant sampling techniques, their processing and handling. **Unit II** Determination of nutrient potentials and potential buffering capacities of soils for phosphorus and potassium; estimation of phosphorus, ammonium and potassium fixation capacities of soils. **Unit III** Principles of visible, ultra violet and infrared spectrophotometery, atomic absorption, flame-photometry, inductively coupled plasma spectrometry; chromatographic techniques, mass spectrometry and X-ray defractometery; identification of minerals by X-ray by different methods, CHNS analyzer. **Unit IV** Electrochemical titration of clays; estimation of exchangeable cations (Na, Ca, Mg, K); estimation of root cation exchange capacity. **Unit V** Wet digestion/fusion/extraction of soil with aquaregia with soil for elemental analysis; triacid/di-acid digestion of plant samples; determination of available and total nutrients (N, P, K, S, Ca, Mg, Zn, Cu, Fe, Mn, B, Mo) in soils; determination of total nutrients (N, P, K, S, Ca, Mg, Zn, Cu, Fe, Mn, B, Mo) in plants Unit VI Drawing normalized

	exchange isotherms; measurement of redox potential.
Course Outcomes	**CO1:** Explain the principles of solution preparation, sampling procedures, titration methods, and analytical techniques used in soil, water, and plant analysis. **CO2:** Analyze soil and plant samples using spectrophotometric, chromatographic, electrochemical, and instrumental methods for nutrient and elemental determination. **CO3:** Apply laboratory techniques for estimating nutrient fixation capacities, exchangeable cations, redox potential, and elemental composition of soils and plants. **CO4:** Evaluate analytical data, normalized exchange isotherms, and nutrient status of soils and plants for soil fertility assessment and research applications.
Suggested Readings	1. Hesse P. 971. Textbook of Soil Chemical Analysis. 2. William Clowes & Sons. 3. Jackson ML. 1967. Soil Chemical Analysis. Prentice Hall of India. Keith A Smith 1991. Soil Analysis; Modern Instrumental Techniques. Marcel Dekker. 4. Kenneth Helrich 1990. Official Methods of Analysis. Association of Official Analytical Chemists. 5. Page AL, Miller RH and Keeney DR. 1982. Methods of Soil Analysis. Part II. SSSA, Madison. 6. Piper CE. Soil and Plant Analysis. Hans Publ. 7. Singh D, Chhonkar PK and Pandey RN. 1999. Soil Plant Water Analysis - A Methods Manual. IARI, New Delhi. 8. Tan KH. 2003. Soil Sampling, Preparation and Analysis. CRC Press/Taylor & Francis. 9. Tandon HLS. 1993. Methods of Analysis of Soils, Fertilizers and Waters. FDCO, New Delhi. 10. Vogel AL. 1979. A Textbook of Quantitative Inorganic Analysis. ELBS Longman.

Prerequisite	Students should have basic knowledge of statistics, data analysis, and elementary mathematical concepts at the undergraduate level.
Rationale	Experimental design is a fundamental component of scientific research in agricultural and allied sciences. Proper planning, layout, and statistical analysis of experiments improve precision, reduce experimental error, and ensure reliable interpretation of research findings. This course provides essential knowledge of experimental designs and analysis techniques widely used in agricultural research.
Course Title	**Experimental Designs**
Credits	3(2+1)
Objectives of the course	1. To impart knowledge on the principles and importance of experimental design in scientific research. 2. To explain different experimental designs and their statistical analysis procedures. 3. To develop understanding of factorial experiments, confounding, covariance analysis, and incomplete block designs. 4. To provide practical exposure in layout planning, analysis, and interpretation of experimental data.
Syllabus	
Theory	**Unit I** Need for designing experiments; characteristics of a good design; basic principles of experimental design – randomization, replication and local control. **Unit II** Uniformity trials; size and shape of plots and blocks; analysis of variance; Completely Randomized Design (CRD), Randomized Block Design (RBD) and Latin Square Design (LSD). **Unit III** Factorial experiments (symmetrical as well as asymmetrical); orthogonality and partitioning of degrees of freedom; concept of confounding. **Unit IV** Split plot and strip plot designs; analysis of covariance and missing plot techniques in randomized block and Latin square designs; transformations; Balanced Incomplete Block Design (BIBD), resolvable designs and their applications; lattice design and alpha design – concepts, randomization procedures, analysis and interpretation of results; response surface methodology; combined analysis.
Practical	➢ Analysis of uniformity trial data ➢ Formation of plots and blocks ➢ Fairfield Smith Law ➢ Analysis of data obtained from CRD, RBD and LSD ➢ Analysis of factorial experiments ➢ Analysis with missing data ➢ Analysis of split plot and strip plot designs
Course Outcomes	**CO1**: Explain the need, principles, and characteristics of experimental designs used in agricultural and applied science research. **CO2**: Apply appropriate experimental designs such as CRD, RBD, LSD, factorial, split plot, and strip plot designs for research experiments. **CO3**: Analyze experimental data using ANOVA, covariance analysis,

	confounding techniques, and incomplete block designs. **CO4**: Interpret experimental results and perform practical data analysis for scientific research and decision-making.
Suggested Readings	1. Experimental Designs. 1957. 2nd Ed. John Wiley. 2. Design and Analysis of Experiments. 1999. Springer. 3. Design and Analysis of Experiments. 2012. 8th Ed. John Wiley. 4. Experimental Designs. 1985. MacMillan. 5. Design and Analysis of Experiments. 1953. Oliver & Boyd. 6. Handbook on Analysis of Agricultural Experiments. 1979. IASRI Publications. 7. The Agricultural Field Experiment. 1983. John Wiley. 8. ICAR Directorate of Research Services

Prerequisite	Students should possess basic knowledge of academic communication, information resources, and computer applications. Familiarity with internet usage and elementary research methodology will facilitate effective understanding of library systems and information retrieval techniques.
Rationale	The course is designed to acquaint students with modern library systems, information sources, and digital resource management essential for higher education and research. It enables learners to develop competencies in literature search, referencing, citation practices, and utilization of electronic information resources. The course also promotes information literacy skills necessary for academic writing, research documentation, and efficient access to scientific knowledge in the digital era.
Course Title	**Library and Information Services**
Credits	1(0+1)
Objectives of the course	1. To familiarize students with the structure, functions, and services of libraries in education and research. 2. To develop understanding of various information sources, indexing, and abstracting services used in scientific research. 3. To enhance skills in literature survey, citation techniques, bibliography preparation, and information retrieval. 4. To enable students to effectively use digital library resources, online databases, internet tools, and e-resources for academic purposes.
Syllabus	
Theory	-
Practical	Introduction to library and its services; Role of libraries in education, research and technology transfer; Classification systems and organization of library; Sources of information- Primary Sources, Secondary Sources and Tertiary Sources; Intricacies of abstracting and indexing services (Science Citation Index, Biological Abstracts, Chemical Abstracts, CABI Abstracts, etc.); Tracing information from reference sources; Literature survey; Citation techniques/ Preparation of bibliography; Use of CD-ROM Databases, Online Public Access Catalogue and other computerized library services; Use of Internet including search engines and its resources; resources access methods.
Course Outcomes	**CO1:** Explain the role, functions, and organization of libraries and classify different sources of scientific information. **CO2:** Describe abstracting, indexing, and citation services and interpret their significance in academic and research activities. **CO3:** Apply literature survey methods, reference management techniques, and bibliography preparation in scholarly work. **CO4:** Demonstrate the use of digital library tools, online databases, internet search engines, and e-resource access methods for efficient information retrieval.
Suggested Readings	-

Prerequisite	Students should possess basic knowledge of laboratory practices, elementary chemistry, biology, and plant sciences acquired at the undergraduate foundation level. Familiarity with common laboratory instruments, solution preparation, and safety protocols will facilitate effective understanding of practical laboratory operations and experimental techniques.
Rationale	This course is designed to develop essential laboratory competencies and technical skills required in agricultural and biological sciences. It provides hands-on training in laboratory safety, handling of chemicals and instruments, preparation of solutions and media, sterilization techniques, and basic biotechnological procedures. The course enhances students' practical proficiency, accuracy in experimentation, and scientific handling of laboratory resources necessary for research and field applications.
Course Title	**Basic Concepts in Laboratory Techniques**
Credits	1(0+1)
Objectives of the course	1. To familiarize students with laboratory safety procedures and proper handling of chemicals, glassware, and scientific instruments. 2. To develop practical skills in preparation of solutions, buffers, media, and agro-chemical formulations for laboratory and field applications. 3. To impart knowledge and hands-on training in sterilization techniques, viability testing, and tissue culture methods in crop plants. 4. To enable students to apply standard laboratory methodologies and botanical terminology in scientific experimentation and plant description.
Syllabus	
Theory	-
Practical	➢ Safety measures while in Lab; ➢ Handling of chemical substances; ➢ Use of burettes, pipettes, measuring cylinders, flasks, separatory funnel, condensers, micropipettes and vaccupets; ➢ Washing, drying and sterilization of glassware; ➢ Drying of solvents/ chemicals; ➢ Weighing and preparation of solutions of different strengths and their dilution; ➢ Handling techniques of solutions; ➢ Preparation of different agro-chemical doses in field and pot applications; ➢ Preparation of solutions of acids; ➢ Neutralisation of acid and bases; ➢ Preparation of buffers of different strengths and pH values; ➢ Use and handling of microscope, laminar flow, vacuum pumps, viscometer, ➢ thermometer, magnetic stirrer, micro-ovens, incubators, sandbath, waterbath, oilbath; ➢ Electric wiring and earthing; ➢ Preparation of media and methods of sterilization;

	➢ Seed viability testing, testing of pollen viability; ➢ Tissue culture of crop plants; ➢ Description of flowering plants in botanical terms in relation to taxonomy.
Course Outcomes	**CO1:** Explain laboratory safety measures, chemical handling procedures, and the operational principles of common laboratory instruments and equipment. **CO2:** Demonstrate the preparation, dilution, neutralization, and handling of chemical solutions, buffers, acids, and agro-chemical doses using standard laboratory techniques. **CO3:** Apply sterilization methods, media preparation techniques, seed and pollen viability testing, and tissue culture practices in laboratory experiments. **CO4:** Analyze and interpret botanical characteristics of flowering plants using standard taxonomic terminology and scientific laboratory practices.
Suggested Readings	1. Furr AK. 2000. *CRC Hand Book of Laboratory Safety*. CRC Press. Common Academic Regulations for PG and Ph.D. Programmes Restructured and Revised Syllabi of Post-graduate Programmes Vol. 2 2. Gabb MH and Latchem WE. 1968. *A Handbook of Laboratory Solutions*. Chemical Publ. Co.