

**Programme Outcomes, Programme Specific Outcomes and Course Outcomes
For PG Programmes**

Programme Name: M.Sc. in Tea Science

Number of Semesters: Six (Semester I – Semester VI)



Department of Tea Science
University of North Bengal
West Bengal, INDIA

Programme Outcomes

- This programme has been designed to educate students on all aspects of Tea plantation and Tea industry.
- Equip the student with skills to analyze prospects and problems in Tea industry leading to its betterment.
- Prepare students for pursuing research or careers in industry in tea sciences and allied fields
- Imbibe effective scientific and/or technical communication in both oral and writing.
- Gathering relevant knowledge and skills appropriate to professional activities..
- Opening up employment opportunities of our students in tea plantations and tea research.

Programme Specific Outcomes

- Educating students in all aspects of tea
- Create employment opportunity in tea industry
- Scientific activities in tea and academic research
- Prepare and motivate students for research studies in tea and related fields.
- Provide knowledge of a wide range of tea industrial mathematical techniques and application.
- Nurture problem involving skill development, reasoning, managerial ability, creativity through assignments, project work.
- Assist students in preparing for competitive exams e.g. NET, SET, GATE, etc

Course Outcomes

SEMESTER—I		
Course Code	Course Name	Course Outcomes
	Tea Culture, Botany & Microbiology	Knowledge gained: <ul style="list-style-type: none"> • History of tea cultivation and research. • Origin and distribution of tea plants • Climatic requirements for tea cultivation. • Tea clones of different tea growing areas. • Plucking table • Physiology of tea plants.

		<ul style="list-style-type: none"> • Molecular biology of tea plant. <p>Skills gained:</p> <ul style="list-style-type: none"> • Morphological features of the basic type of cultivated tea species • Mulching of tea • Experiments on upward translocation of water, suction pressure. • Estimation of chlorophyll and other biomolecules. • Microbial culture techniques <p>Competency developed:</p> <ul style="list-style-type: none"> • Knowledge on tea plant. • Physiological experiments. • Microbiological culture maintenance.
	Breeding of Tea and Biostatistics	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Knowledge on tea breeding techniques. • Knowledge on grafting, tissue culture, recombination, genetic engineering, polyploidy, and mutation breeding • Cytogenetics of tea. • Frequency and distribution of biological variations and central tendency. • Correlation and regression. • Laws of probability; Classification and identification of probability. • Testing of significance of means and their differences <p>Skills gained:</p> <ul style="list-style-type: none"> • Preparation of clonal cuttings • Composite plant preparation • Cleft grafting • Mass selection • Hybridization techniques • Frequency distribution • Sampling • Fitting an observed distribution to a theoretical distribution <p>Competency developed:</p> <ul style="list-style-type: none"> • Working on statistical evaluation of tea related field outputs.
	Basic Principles of Physical Sciences, instrumentation and Computer Applications	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Thermodynamics • Microscopy • Radioactivity measurement • Chromatography • Electrophoresis • Sedimentation • Laser NMR • Applications Basics concepts of computers • Electronic spread sheet <p>Skills gained:</p> <ul style="list-style-type: none"> • Phase-contrast & fluorescence microscopy • Techniques of paper chromatography, thin layer chromatography and column chromatography • Gel filtration for isolation of macromolecules • Basics of computers • Using email and biological databases <p>Competency developed:</p> <ul style="list-style-type: none"> • Theoretical and practical knowledge on instrumentation and computer skills.

SEMESTER—II		
Course Code	Course Name	Course Outcomes
	Tea Propagation, Nursery and Young Tea Management	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Tea Propagation & Nursery Management • Different methods of tea propagation. • Transplanting methods • Control of diseases and pests. • Young Tea Management • Planting of shade trees and their management. • Drainage in tea plantation <p>Skill gained:</p> <ul style="list-style-type: none"> • Nursery bed preparation • Various Irrigation systems and their applications • Application of fertilizers on nursery plants • Spraying of pesticides <p>Competence developed:</p> <ul style="list-style-type: none"> • Management of Nursery and Young Tea
	Management of Mature Tea	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Objective of pruning • Physiology of pruning • Rejuvenation pruning, • Infilling • Role of maintenance foliage • Thermal time regulated plucking • Mechanical harvesting– problems and prospects • Water requirement of tea and management <p>Skill gained:</p> <ul style="list-style-type: none"> • Study of different types of pruning • Study of growth under different pruning cycles • Leaf component Analysis • Study of various types of shoot growth in the lab • Assembling and dismantling of Sprinkler and other irrigation sets • Study of plucking shears, one-man and two-men operated plucking machines • Assembling and dismantling of the plucking machines <p>Competence developed:</p> <ul style="list-style-type: none"> • Management of matured tea plants in tea plantations.
	Manufacturing of tea and Packaging of Tea	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Leaf handling and treatment of tea leaf from field to factory Production of black tea. • Principal stages of processing.. • Green and semi-fermented tea, Oolong tea, herbal tea, decaffeinated tea. • Packaging of tea. • Tea factory machineries <p>Skill gained:</p> <ul style="list-style-type: none"> • Study of general layout plan of a tea factory • Estimation of moisture content in green leaf and estimation of withering percentage • Study of methods of withering, rolling, fermentation and drying • Study of tea factory machineries and operations 8. Identification of different grades of tea • Identification of different types of packaging material <p>Competence developed:</p> <ul style="list-style-type: none"> • Knowledge on manufacturing of tea
SEMESTER—III		

Course Code	Course Name	Course Outcomes
	Integrated Pest Management	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Major pests of tea • Biology and nature of damage caused by major insect pests • Toxicity of pesticides • Weed management in tea • Spray techniques <p>Skill gained:</p> <ul style="list-style-type: none"> • Identification of insects which are prevalent in tea and detailed study on their life cycles • Spray techniques- spray of pesticides • Identification of weeds • Study of alternate hosts • Etiology of weeds • Pesticide residue analysis in tea <p>Competence developed:</p> <ul style="list-style-type: none"> • Management of pests and disesde
	Soil, Nutrient and Tea Industry Waste Management	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Edaphic requirement of tea plants • Soils of major tea growing areas • Uptake of nutrients • Use of inorganic fertilizers in tea • Organic farming • Tea Waste Management. • Utilization of by-products from tea processing industries <p>Skill gained:</p> <ul style="list-style-type: none"> • Study of soil profile • Acquaintance with various types of fertilizers, organic manures, bio-fertilizers etc. • Identification of deficiency symptoms • Study of toxic symptoms due to excessive application of fertilizers • Estimation of total nitrogen, soluble nitrogen and protein contents of food samples using Kjeldahl method and formal titration • Estimation of phosphate, sulphur, potassium, nitrate and ammonia in soil 15, Ph, organic carbon in soil • Study of irrigation systems • Production of compost/manure from tea industry wastes <p>Competence developed:</p> <ul style="list-style-type: none"> • Knowledge on soil management and utilization of tea wastes.
	Tea Chemistry, Pharmacology, Sensory Evaluation and Quality Control of Tea	<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Chemical composition of tea leaf • Flavour compounds of tea • Focus on international works regarding health values on tea • Antioxidants • Types of adulterants • Evaluation & Quality Control Sensory science <p>Skill gained:</p> <ul style="list-style-type: none"> • Estimation of moisture content of food samples • Estimation of ash content, crude fibre, caffeine in tea. <p>Competence developed:</p> <ul style="list-style-type: none"> • Knowledge and skill on Tea Chemistry, Pharmacology, Sensory Evaluation and Quality Control of Tea
SEMESTER—IV		
Course Code	Course Name	Course Outcomes

Legislation & Trade of Tea and Ethics & Intellectual Property Rights		<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Food standards and specifications • Protocols for CCP derivations, record keeping, and verification Legislation and international tea export laws • Prevention of Food Adulteration Act World tea trade; In <p>Skill gained:</p> <ul style="list-style-type: none"> • Export Quality Control and Inspection • Environment Protection • Codes of good manufacturing practice • Food Adulteration <p>Competence developed:</p> <ul style="list-style-type: none"> • Knowledge and application of tea industry related legislation, ethics and IPR.
In-garden/Industrial Training		<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Knowledge on tea garden plantation, factory and management. <p>Skill gained:</p> <ul style="list-style-type: none"> • Functioning and work environment of tea industry. <p>Competence developed:</p> <ul style="list-style-type: none"> • Ability to work in tea industry
Dissertation		<p>Knowledge gained:</p> <ul style="list-style-type: none"> • Development of research aptitude, development of research problem, designing of experiments, analysis and interpretation. <p>Skill gained:</p> <ul style="list-style-type: none"> • Experimentation and analyzing skills. <p>Competence developed:</p> <ul style="list-style-type: none"> • Research skill in tea and allied branches of science.