MURSHIDABAD UNIVERSITY

CURRICULUM FOR FOUR YEARS

UNDER-GRADUATE COURSE IN SERICULTURE

[NEP 2020]

W.E.F. 2025

Course Structure

Semester	MAJOR (4 Credits Each)	MINOR (4 Credits Each)	IDC/MDC (3 Credits Each)	AEC-Language (4 Credits Each)	SEC (3 Credits Each)	VAC (2 Credits Each)	Internship/ Dissertation (4 Credit Each)	TOTAL CREDIT
I	1 Course	1 Course	1 Course	1 Course	1 Course	1 Course		**20**
II	1 Course	1 Course	1 Course	1 Course	1 Course	1 Course	INTERNSHIP (Additional For Certificate)	**20/24**
III	2 Courses	1 Course	1 Course		1 Course	1 Course		**20**
IV	4 Courses	1 Course					INTERNSHIP (Additional For Diploma)	**20/24**
V	4 Courses	1 Course						**20**
VI	4 Courses	1 Course						**20**
VII	4 Courses	1 Course						**20**
VIII	1 Course Or 4 Courses (Honours Without Research)	1 Course					Research Project (Honours With Research) (12 Credits)	**20**
TOTAL	**21/24 Courses (84/96 Credits)**	**8 Courses (32 Credits)**	**3 Courses (9 Credits)**	**2 Courses (8 Credits)**	**3 Courses (9 Credits)**	**3 Courses (6 Credits)**		**160/164**

Detailed Course Structure

Sem	Major	Minor	SEC	MDC	VAC	AEC
I	Silkworm Biology & Rearing Technology		Vermicompo sting And Its Application	Entrepreneurial Opportunities In Sericulture		English Communication
II	Biology Of Mulberry And Soil Science		Organic Farming	Entrepreneurial Opportunities In Sericulture		
III	Disease & Pest Of Mulberry And Silkworm			Entrepreneurial Opportunities In Sericulture		
IV	Breeding & Genetics Of Mulberry And Silkworm					
V	Seed Cocoon And Post Cocoon Technology					
VI	Non Mulberry Silk Production And Crop Management					
VII	Sericulture Extension Management And Economics Biostatistics					
VIII	Entrepreneurship Development Preparation Of Sericulture Project					

* Students Have To Study Any One Of The SEC Papers Offered By The Department In Semester I, II And III.

1st Semester

Course Code	Subject	Marks	Credits	Hours/Week
Major Course: SER-M-101 (T)	**Silkworm Biology & Rearing Technology**	60	**03**	**03**
SER-M-101 (P)	**Silkworm Biology & Rearing Technology Practical**	20	**01**	**02**
Minor Course: SER-Mi-101 (T)		60	**03**	**03**
SER-Mi-101 (P)		20	**01**	**02**
Skill Enhancement Course: SER-SEC-101 (T)	**Vermicomposting And Its Application**	40	**02**	**02**
SER-SEC-101 (P)	**Vermicomposting And Its Application Practical**	20	**01**	**02**
Multidisciplinary Course: SER-MDC-101	**Entrepreneurial Opportunities In Sericulture**	60	**03**	**03**
Value Added Course: VAC-101		40	**02**	**02**
Ability Enhancement Course AEC-101		80	**04**	**04**
Total		**400**	**20**	**23**

2nd Semester

Course Code	Subject	Marks	Credits	Hours/Week
Major Course: SER-M-201 (T)	**Biology of Mulberry And Soil Science**	60	**03**	**03**
SER-M-201 (P)	**Biology of Mulberry And Soil Science Practical**	20	**01**	**02**
Minor Course: SER-Mi-201 (T)		60	**03**	**03**
SER-Mi-201 (P)		20	**01**	**02**
Skill Enhancement Course: SER-SEC-201 (T)	**Organic Farming**	40	**02**	**02**
SER-SEC-201 (P)	**Organic Farming Practical**	20	**01**	**02**
Multidisciplinary Course: MDC-201	**Entrepreneurial Opportunities In Sericulture**	60	**03**	**03**
Value Added Course: VAC-201		40	**02**	**02**
Ability Enhancement Course AEC-101		80	**04**	**04**
Total		**400**	**20**	**23**

Examination pattern

Paper(s)	Internal Assessment	End Semester
Major Paper	**20** (15 internal assessment + 5 class attendance)	**60** 40 (theory) + 20 (Practical)
Minor Paper	**20** (15 internal assessment + 5 class attendance)	**60** 40 (theory) + 20 (Practical)
MDC Paper	**15**	**45**
SEC Paper	**15**	**45** 30 (theory) + 15 (Practical)
AEC Paper	**20**	**60**
VAC Paper	**10**	**30**

Question Pattern

<table>
<tr><th colspan="3">Major and Minor papers</th></tr>
<tr><th>Internal assessment (20)</th><th colspan="2">Semester end term</th></tr>
<tr><td rowspan="2">15 marks
2 x 5 = 10 marks (out of 8)
+
5 x 1 = 5 marks (out of 2)
Or
Viva/ project submission

class attendance = 5 marks</td><td>For written tests
40 marks
2 x 5 marks (out of 8)
5 x 2 marks (out of 4)
10 x 2 marks (out of 4)</td><td>For written tests
60 marks
2 x 5 marks (out of 8)
5 x 6 marks (out of 8)
10 x 2 marks (out of 4)</td></tr>
<tr><td colspan="2">For Practical tests
20 marks
Experiment - 10 marks
LNB + Viva voce – 5+5= 10 marks</td></tr>
</table>

<table>
<tr><th colspan="3">SEC Paper</th></tr>
<tr><th>Internal assessment (15)</th><th colspan="2">Semester end term</th></tr>
<tr><td rowspan="2">For written tests
10 marks
2 x 5 marks (out of 8)

class attendance = 5 marks</td><td>For written tests
45 marks
2 x 5 mark (out of 8)
5 x 3 marks (out of 5)
10 x 2 marks (out of 4)</td><td>For written tests
30 marks
2 x 5 mark (out of 8)
5 x 2 marks (out of 4)
10 x 1 marks (out of 2)</td></tr>
<tr><td colspan="2">For Practical tests
15 marks
Experiment - 10 marks
LNB + Viva voce – 2+3= 5 marks</td></tr>
</table>

<table>
<tr><th colspan="2">MDC Paper</th></tr>
<tr><th>Internal assessment (15)</th><th>Semester end term (45)</th></tr>
<tr><td>For written tests/Viva/ project submission
10 marks
1 x 10 = 10 marks (out of 15)

class attendance = 5 marks</td><td>For written tests
45 marks
1 x 45 marks (MCQ) (Out of 50)</td></tr>
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<table>
<tr><th colspan="2">VAC Paper</th></tr>
<tr><th>Internal assessment (10)</th><th>Semester end term (30)</th></tr>
<tr><td>For written tests
10 marks
1 x 10 = 10 marks (out of 15)</td><td>For written tests
30 marks
1 x 30 marks (MCQ) (Out of 35)</td></tr>
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Semester I

MAJOR COURSE: SER-M-101 (T):

Silkworm Biology & Rearing Technology **Credit 03 Marks: 60**

Course Objectives: This course aims to provide students with a comprehensive understanding of sericulture, covering its historical development, global and Indian perspectives, and its economic, ecological, and social significance. It introduces the biology of silkworms, including taxonomy, life cycle, anatomy, physiology, and the biochemical basis of silk production. The course also imparts practical knowledge of rearing technology, from incubation and chawki management to late-age rearing, cocoon harvesting, and assessment. By integrating scientific, technological, and institutional aspects, the course prepares students to analyze challenges, explore sustainable practices, and apply modern sericulture techniques for improving productivity and contributing to rural development.

Unit 1: General Sericulture

1. Introduction to Sericulture: Definition, characteristics, and scope of sericulture, Economic and ecological significance of silk production.

2. Historical Development: Origin and history of sericulture, The Silk Route: Trade, cultural exchange, and its modern relevance.

3. Global Silk Industry: World silk production statistics, Comparison of natural fibers (silk, cotton, wool) vs. synthetic fibers, Unique properties and advantages of silk among natural fibers.

4. Silk Production Across the World: Leading silk-producing countries: China, India, Uzbekistan, Brazil, Japan, Republic of Korea, Thailand, Vietnam. Trends, innovations, and challenges in global sericulture.

5. Silk Industry in India: Major silk-producing states: Karnataka, West Bengal, Tamil Nadu, Andhra Pradesh, Jammu & Kashmir. Regional variations in sericulture practices. Contribution to employment and rural economy.

6. Challenges and Opportunities: Prospects: Growing international demand, sustainable practices. Problems: Labor shortages, land constraints, environmental factors, high production costs. Competitive edge of silk over other fibers.

7. Institutional Framework: Role of Government of India, Central Silk Board (CSB), State Sericulture Departments. Policies, subsidies, and research initiatives supporting the industry.

8. **Mulberry Silkworm & Cultivation:** Biology of mulberry silkworm (*Bombyx mori*). Classification by origin (Chinese, Japanese, European races) and voltinism (uni-, bi-, multi-voltine). Mulberry cultivation practices.

9. Non-Mulberry Sericulture: Types: Eri, Tasar, Muga, Oak tasar. Host plants and geographical distribution. Comparative advantages and niche markets.

Unit 2: Silkworm Biology

1.Taxonomy & Distribution: **Systematic position**: Kingdom, phylum, class, order (*Lepidoptera*), family (*Bombycidae*). Salient features of the order (e.g., scaly wings, proboscis). Geographical distribution: Global hotspots for serigenous insects (wild and domesticated).

2. Life Cycle of *Bombyx mori* Stages: Egg → Larva (instars) → Pupa → Adult (moth). Morphology:Egg: Structure, diapause.Larva: Segmented body, prolegs. Pupa: Cocoon formation. Adult: Sexual dimorphism, non-feeding stage.

3. Organ Systems: **Digestive System**: Mouthparts (mandibles, spinneret), gut structure, silk secretion pathway. Reproductive System: Male/female anatomy, mating behavior, egg-laying. Excretory System:Malpighian tubules, waste elimination.

4. Silkgland & Silk Proteins: **Morphology**: Paired glands, spinneret anatomy. Biochemistry: Fibroin (core filament), sericin (gummy coating). Role in cocoon spinning and commercial silk quality.

5. Moulting & Hormonal Control: **Types of moulting**: Uni-, bi-, multi-voltine silkworms. **Hormones**:Ecdysone (moulting), juvenile hormone (larval retention).

6. Metamorphosis: Pupal-adult transition: Histolysis, histogenesis. Hormonal interplay: PTTH (brain hormone), ecdysteroids.

7. Nutrition: **Dietary needs**: Young larvae (tender mulberry leaves). Late instars (high-protein leaves for silk synthesis).

8. Growth Factors: **Environmental**: Temperature, humidity, photoperiod. Nutritional: Leaf quality, feeding frequency.

Unit 3: Rearing Technology

1. Rearing House: Requirements for ideal rearing house, Site selection, Size of rearing house, Orientation, Model rearing house, Advantages and disadvantages of rearing houses.

2. Rearing Appliances: Design and cost requirements of rearing appliances for 100 DFLs.

3. Disinfection: Importance, Different disinfectants – types, Effective concentration, Method of preparation, Usage, Time of disinfection, Requirement - disinfections per unit area, Estimation of surface area of rearing house.

4. Selection of Silkworm Races/Breeds: Advantages and disadvantages of: Bivoltine, Multivoltine and their hybrids.

5. Estimation of Leaf Quality: Time for estimation of leaf yield, Calculation of brushing capacity based on yield.

6. Incubation: Environmental conditions required for incubation, Their influence in egg development, Incubation methods: Low cost incubation devices:Earthen pot, Double brick wall chamber, Black boxing.

7. Brushing: Methods: Loose eggs and short eggs, Tapping and net Method, Selection of Leaf brushing, Advantages and disadvantages of: Cellular brushing and Mass brushing.

8. Harvesting of Leaf: Method: Time and Transportation and storage of leaf for chawki.

9. Chawki Rearing: Importance, Environmental conditions required, Leaf requirement

Selection of different chawki, Different Chawki rearing Methods with merits and demerits, Use of nets and feeding schedules, Spacing, Chawki rearing centers, Labour requirements.

10. Moulting: Symptoms, Care during: Pre-moulting, Moulting and Post-moulting periods

11. Late Age Rearing: Spacing, Leaf requirement, Environmental conditions required, Different Late age rearing methods with merits and demerits, Frequency of feeding, Bed cleaning schedule.

12. Preparation of Mounting: Methods: Manual, Shelf, Jobrai methods, Advantages and disadvantages. Types of mountages: Bamboo, Plastic, Revolving, Rotary collapsible brush mountages Advantages and disadvantages of their use, Spinning - environmental conditions required for spinning.

13. Harvesting of Cocoons: Time of harvesting, Hybrid crop of cocoons, Preservation and transportation of cocoons.

14. Cocoon Assessment: Significance, Cost of cocoon production, Leaf-Cocoon ratio, Maintenance of rearing records

Course Outcomes: On successful completion of this course, students will be able to explain the scope, history, and global relevance of sericulture; analyze the biology of mulberry and non-mulberry silkworms with emphasis on their life cycle, anatomy, physiology, and silk secretion; and apply scientific principles in silkworm rearing technology, including housing, disinfection, incubation, chawki management, late-age rearing, mounting, and cocoon harvesting. They will also be able to evaluate leaf quality, cocoon yield, and rearing economics, understand institutional and policy frameworks supporting the industry, and critically assess challenges, innovations, and opportunities for sustainable sericulture development at national and global levels.

MAJOR COURSE: SER-M-101 (P):

Silkworm Biology & Rearing Technology Practical **Credit 01 Marks: 20**

1. General Sericulture: Sericulture Maps: Major silk-producing countries, Silk production regions in India; Line Graph: Trends in silk yarn & textile fiber production (5-year analysis); Bar Diagrams: Single & multiple bar diagrams for silk/textile trends (5-year analysis); Pie Charts: Share of different silk types in India.

2. Silkworm Biology: Morphology: Mouthparts of silkworm, External features of egg, larva, pupa, moth; Anatomy: Digestive system, silk gland, nervous system, reproductive system; Non-Mulberry Cocoon Identification.

3. Rearing Technology: Model Rearing House Study, Rearing Appliances: Types, designs, and uses. Room Disinfectants: Preparation & industrial application; Bed Disinfectants: Preparation & industrial application. Surface Area & Disinfectant Calculation. Leaf Yield & Brushing Capacity: Estimation per acre of mulberry land.

Skill Enhancement Course:

SER-SEC-101(T): Vermicomposting and its Application **Credit 02 Marks: 40**

Course Objectives: This course introduces the principles of vermiculture with emphasis on its ecological and economic role in sustainable waste management and soil fertility improvement. It aims to provide knowledge on the biology of composting earthworms, particularly Eisenia fetida, and their reproductive and environmental requirements. The course further develops skills in small-scale and commercial vermicomposting techniques, vermiwash production, and effective management of challenges. It also highlights practical applications of vermiculture in recycling agricultural, sericultural, and dairy residues for sustainable resource utilization.

Unit 1: Introduction to Vermiculture

1. Fundamentals of Vermiculture: Definition, historical background, and economic significance, Role in soil health maintenance, The "Four R's" principle: Reduce, Reuse, Recycle, Restore.

2. Biotransformation & Organic Fertilizers: Conversion of human-generated residues into organic fertilizers, Humus cycle: Products, qualities, and transformation processes.

3. Earthworm Species: Local vs. exotic species, Identification keys and complementary auto-evaluation activities

Unit 2: Biology of *Eisenia fetida*

1. Reproductive Biology: Reproduction mechanisms in Lumbricidae family.

2. Life Cycle & Environmental Factors: Feeding habits, fecundity, and reproductive potential, Limiting factors: **Physical**: Temperature, humidity, light; **Chemical**: pH, gases; **Climatic**: Seasonal variations.

3. Auto-Evaluation Activities: Practical exercises to assess understanding

Unit 3: Vermicomposting Techniques

1. Small-Scale Vermicomposting: Methods for home gardens

2. Commercial Vermicomposting: Systems: Pit, brick, heap, and Kadapa slab, Step-by-step processing:Earthworm farming, Harvesting vermicompost, Vermiwash collection and applications.

3. Challenges & Solutions: Common enemies (e.g., ants, birds) and diseases, Preventive measures and troubleshooting

Unit 4: Applications of Vermiculture

1. Benefits of Vermicompost: Nutrient profile (N-P-K, micronutrients), Soil structure improvement

2. Ideal Earthworm Traits: Characteristics of species suitable for composting

3. Problem-Solving: Issues in vermicomposting (e.g., odor, moisture imbalance), Case studies: Sericultural waste (mulberry residues, silkworm excreta), Dairy waste (manure management)

Course Outcomes: On completion of the course, students will be able to explain the fundamentals and significance of vermiculture, understand the biology and life cycle of composting earthworms, and apply scientific methods in vermicomposting at household and commercial levels. They will gain the ability to harvest and evaluate vermicompost and vermiwash, troubleshoot common rearing and composting problems, and assess the benefits of vermicompost in soil health improvement. Students will also be able to analyze real-world case studies on organic waste recycling and propose eco-friendly solutions for sustainable agriculture and environmental management.

Skill Enhancement Course: SER-SEC-101 (P):

Vermicomposting and its Applications Practical **Credit 01 Marks: 20**

1. Earthworm Identification: Distinguish *Perionyx excavatus* (local) vs *Eisenia fetida* (exotic).

2. Vermicompost Setup: A. Small-scale (kitchen waste in bin) B. Kadapa slab (dairy waste).

3. Vermiwash Production: Leachate collection → Filtration → Storage.

4. Troubleshooting: **Problems**: Odor/pest infestation, **Solutions**: Lime for pH correction, Neem for pest control.

5. Quality Check: **Tests**: pH, Moisture.

Multidisciplinary Course: SER-MDC-101:

Entrepreneurial Opportunities in Sericulture **Credit 03 Marks: 60**

Course Objective: This course aims to provide students with a foundational understanding of sericulture, including its scope, types of silk, and its contribution to the rural economy and global market. It introduces the entire sericulture value chain from cocoon production to silk fabric manufacturing, highlights entrepreneurial opportunities in different sectors of the industry, and familiarizes learners with government schemes, subsidies, and quality standards. The course also equips students with knowledge of business planning, market research, branding, and sustainable practices necessary for establishing and managing successful sericulture enterprises.

Unit 1: Introduction to Sericulture: Definition and scope of sericulture, Types of silk (Mulberry, Tasar, Eri, Muga), Global and Indian sericulture industry overview, Role of sericulture in rural economy and employment generation.

Unit 2: Sericulture Value Chain: Cocoon production and rearing techniques, Silk reeling and yarn production, Silk weaving and fabric manufacturing, By-products of sericulture (Silkworm pupae, sericin, etc.).

Unit 3: Entrepreneurial Opportunities in Sericulture: Starting a silkworm rearing unit, starting a silkworm seed production unit, starting a Silk yarn production unit and marketing of silk, Handloom & power loom-based silk fabric business, Export potential of silk products and obligations related to import of silk and silk products.

Unit 4: Government Schemes and Support: Central Silk Board (CSB) initiatives, Subsidies and loans for sericulture entrepreneurs, Training programs and skill development, Certification and quality standards (Silk Mark, GI tags).

Unit 5: Business Planning and Marketing: Preparing a business plan for sericulture enterprise, Market research and demand analysis, Digital marketing and e-commerce for silk products, Branding and sustainability in sericulture

Course Outcome: On completion of the course, students will be able to explain the fundamentals of sericulture and its economic importance, describe cocoon production and silk processing techniques, and analyze the role of by-products in value addition. They will gain the skills to identify and evaluate entrepreneurial opportunities across the sericulture value chain, understand government policies and support systems, and apply business planning and marketing strategies. Students will also be able to assess export potential, use digital platforms for promoting silk products, and integrate sustainability and branding practices into sericulture-based enterprises.

Semester II

MAJOR COURSE: SER-M-201 (T):

Biology of Mulberry and Soil Science **Credit 03 Marks: 60**

Course Objective: This course aims to provide students with comprehensive knowledge of mulberry biology and cultivation, including taxonomy, morphology, propagation methods, garden establishment, and management practices for optimizing leaf yield and quality. It also introduces the fundamentals of soil science with emphasis on soil formation, classification, physical and chemical properties, soil-water relationships, organic matter, and plant nutrition. Special focus is given to soil types of India, their suitability for mulberry, and soil testing and reclamation practices, thereby preparing students with the scientific and practical foundation needed for sustainable mulberry cultivation.

Unit 1: Biology of Mulberry

1. **Taxonomy & Morphology of Mulberry:** Taxonomy: Classification of mulberry (*Morus* spp.) Popular cultivars of South India, WB, Hilly areas. Morphology: Stem, root, and leaf structure. Floral Biology: Flower, fruit, and seed development.

2. Agroclimatic Zones for Mulberry: Suitable agroclimates (tropical, subtropical, temperate). Regional adaptability in India.

3. Propagation Techniques: Seedlings: Seed collection, viability tests, nursery raising. Saplings: Selection/preparation of cuttings (anatomical & physiological criteria). Grafting: Stock/scion selection, types (stem, root, bud grafting). Layering: Methods (air, trench, mound). Nursery Management: Bed preparation, soil mix, drainage. Growth regulators (IBA, NAA) in propagation.

4. Establishing Mulberry Gardens: Strategies: Intensive vs. extensive cultivation. Cropping Patterns: Monocropping vs. intercropping. Site Selection & Preparation: Soil testing, land clearing. Varietal Selection: Cultivars for different agroclimates. Planting Systems: Row, pit, contour planting (advantages/disadvantages). Spacing: Impact on leaf yield/quality (e.g., 90 cm × 90 cm for irrigated). Initial Harvests: Timing, methods (e.g., stem-cutting vs. leaf-picking).

5. Cultivation Practices: Irrigation: Water requirements, systems (drip, sprinkler). Water Quality: Effects of saline/sewage water (treatment methods). Dryland Management: Contour bunding, mulching (organic/synthetic). Manures: FYM, compost preparation, vermiculture. Fertilizers: NPK ratios, soil-test-based application. Weed Control: Common weeds (e.g., *Cyperus*), herbicides vs. manual weeding. Pruning/Training: Methods (coppicing, pollarding), seasonal timing. Harvesting: Shoot vs. leaf harvest, post-harvest handling

6. Mulberry Management: Leaf-Cocoon Ratio: Optimization for silkworm rearing. Soil Productivity: Crop rotation, green manuring. Chawki Gardens: Specialized plots for young silkworms. Labor & Records: Workforce allocation, farm diaries.

7. Practical & Review: Demo: Grafting/pruning techniques: Case studies: Best practices in irrigated vs. rainfed gardens

Unit 2: Soil Science

1. Fundamentals of Soil Science: Definition of soil, Soil-forming factors (climate, parent material, organisms, topography, time), Soil-forming agents (weathering, erosion, biological activity), Soil classification systems, Major soil types globally and in India.

2. Physical Properties of Soil: Volume constitution of soil (phases: solid, liquid, gas), Soil texture: separates (sand, silt, clay) and textural classes, Soil structure: types, importance, improvement methods, Soil color and its significance, Soil permeability: bulk density, particle density, porosity, Relationship between texture, structure, and permeability, Soil air: composition, aeration, and its role in root health.

3. Soil Water Management: Importance of water in soil, Classification of soil water (gravitational, capillary, hygroscopic), Measurement of soil moisture content, Water requirements for mulberry cultivation, Factors affecting water-holding capacity (texture, organic matter), Capillary action and leaching effects, Soil water conservation techniques (mulching, drip irrigation).

4. Soil Organic Matter & Microbiology: Composition of organic matter, Importance in soil fertility and structure, Carbon-to-nitrogen (C:N) ratio and decomposition
Soil microorganisms: types (bacteria, fungi) and roles in nutrient cycling.

5. Plant Nutrition & Mulberry Growth: Essential nutrients: macro/microelements and their functions, Nutrient uptake mechanisms, Deficiency and toxicity symptoms in mulberry, Soil nutrient sources (organic/inorganic fertilizers).
6. Indian Soils & Mulberry Cultivation: Alluvial, black, red, and lateritic soils: characteristics and suitability for mulberry, Soil-specific challenges and management practices.

7. Soil Testing & Reclamation: Soil sampling methods and precautions, Physical/chemical analysis (pH, NPK, salinity), Soil improvement techniques (liming, gypsum application, organic amendments).

Course Outcome: On completion of this course, students will be able to classify mulberry species and cultivars, explain their morphology and agroclimatic adaptability, and apply appropriate propagation and cultivation techniques for establishing and managing mulberry gardens. They will also be able to analyze soil-forming factors and properties, assess soil-water dynamics, evaluate nutrient requirements and deficiencies in mulberry, and apply soil management practices such as manuring, fertilization, and reclamation. Students will gain the ability to integrate knowledge of soil and mulberry management for improving productivity, maintaining soil fertility, and supporting sustainable sericulture practices.

Major Course: SER-M-201 (P):

Biology of Mulberry and Soil Science Practical **Credit 01 Marks: 20**

1. Mulberry Variety Identification: Morphological study of West Bengal varieties (e.g., S1,S1635, C-2038, TR-10, TR-23, BC259)

2. Nursery Bed Preparation: Cutting Propagation: Selection of 20-25cm cuttings, Planting at 45° angle (3/4th buried)

3. Grafting Techniques: Demonstration of: Whip grafting (stem), Crown grafting, Wedge grafting, Patch budding / ring budding, Flute budding, T budding.

4. Planting Methods: Pit (60cm³) vs. trench planting, Spacing demonstration (90cm × 90cm)

5. Irrigation Calculations: Water requirement formula: Volume = Area (m²) × Depth (m) × 1000.

6. Fertilizer Handling: Urea, DAP, MOP identification, Dose calculation (e.g., 300kg N/ha = ? kg urea/ha)

7. Soil Type Identification: Study of sandy, loamy, clayey soils

8. Soil pH & EC Analysis: pH meter calibration and measurement, Electrical conductivity using EC meter

9. Organic Carbon (Walkley-Black Method): Dichromate oxidation titration, Calculation of % organic carbon

Skill Enhancement Course: SER-SEC-201 (T):

Organic Farming **Credit 02 Marks: 40**

Course Objective: This course aims to provide students with scientific and practical knowledge of organic nutrient management, including the fundamentals of organic farming, types and enrichment of organic manures, and composting techniques. It introduces concepts of green manuring, organic residue recycling, and microbial bio-fertilizers with special emphasis on their application in mulberry and sericulture-based systems. The course also familiarizes students with organic input preparation from agricultural and industrial residues, along with national schemes, policies, and certification frameworks supporting organic farming and sustainable agriculture.

Unit-1: Organic Manures

1. Fundamentals of Organic Farming: Definition, historical evolution, and global scope, Comparison with conventional farming.

2. Nutrient Management: Essential nutrients for organic systems, Strategies to minimize nutrient losses (e.g., crop rotation, cover cropping).

3. Types of Organic Manures: Bulk Organic Manures (BOM): FYM, sheep/goat manure; Concentrated Organic Manures (COM): Oilcakes, bone meal; FYM Enrichment: Methods to enhance nutrient content.

4. Composting Techniques: *Bangalore* (Anaerobic), *Indore* (Aerobic with turning), *NADEP* (Brick-pit with air vents)

Unit-2: Green Manures

1. Green Manuring Concepts: Definition and classification (*in-situ* vs. *ex-situ*), Examples: *Sesbania*, *Crotalaria.*

2. Nutrient Profiles: N-P-K content of common green manures (e.g., *Glyricidia*)

3. Benefits & Selection Criteria: Soil health improvement (humus addition, erosion control), Ideal traits: Fast growth, high biomass, nitrogen fixation.

4. Organic Residue Recycling: Categories: Agricultural, industrial, urban waste, Safe reuse protocols.

Unit-3: Bio-Fertilizers

1. Microbial Inoculants: Potash/Sulfur Mobilizers: *Bacillus mucilaginosus*, Mycorrhizae: *Glomus* spp. (enhances P uptake)

2. Nitrogen-Fixing Microbes*: Azotobacter*, *Azospirillum*: Application rates (200g/ha)

3. Growth-Promoting Microbes: *Pseudomonas* sp. (IAA production), **Application Methods**: Seed treatment, soil application.

4. Mulberry-Specific Use: Case study: Bio-fertilizers in sericulture (e.g., 25% yield increase with *Azotobacter*)

Unit-4: Organic Preparations & Policies

1. Compost Preparation: Industrial Waste: Press mud (sugar industry), coir pith; Step-by-Step: Raw material mixing, moisture control.

2. Government Schemes: **NPOF**: National Project on Organic Farming, **RKVY**: Subsidies for organic inputs, **APEDA**: Export certification for organic produce.

Course Outcome: On completion of this course, students will be able to differentiate between conventional and organic farming systems, explain the role of organic manures and composting techniques, and evaluate the nutrient contribution of green manures and recycled residues to soil health. They will gain practical skills in the use of bio-fertilizers and growth-promoting microbes, particularly for mulberry cultivation, and be able to apply methods of seed treatment, soil inoculation, and integrated nutrient management. Students will also be able to analyze government schemes and certification policies, enabling them to integrate sustainable organic practices into sericulture and agricultural enterprises.

Skill Enhancement Course: SER-SEC-201(P): Organic Farming Practical Credit 01 Marks: 20

1. Compost Preparation: Demonstration of Organic waste composting

2. Bio-Fertilizer Application with *Azotobacter*

3. Vermicompost Quality Check (pH test , Moisture)

Multidisciplinary Course: SER-MDC-201:

Entrepreneurial Opportunities in Sericulture **Credit 03 Marks: 60**

Course Objective: This course aims to provide students with a foundational understanding of sericulture, including its scope, types of silk, and its contribution to the rural economy and global market. It introduces the entire sericulture value chain from cocoon production to silk fabric manufacturing, highlights entrepreneurial opportunities in different sectors of the industry, and familiarizes learners with government schemes, subsidies, and quality standards. The course also equips students with knowledge of business planning, market research, branding, and sustainable practices necessary for establishing and managing successful sericulture enterprises.

Unit 1: Introduction to Sericulture: Definition and scope of sericulture, Types of silk (Mulberry, Tasar, Eri, Muga), Global and Indian sericulture industry overview, Role of sericulture in rural economy and employment generation.

Unit 2: Sericulture Value Chain: Cocoon production and rearing techniques, Silk reeling and yarn production, Silk weaving and fabric manufacturing, By-products of sericulture (Silkworm pupae, sericin, etc.).

Unit 3: Entrepreneurial Opportunities in Sericulture: Starting a silkworm rearing unit, starting a silkworm seed production unit, starting a Silk yarn production unit and marketing of silk, Handloom & power loom-based silk fabric business, Export potential of silk products and obligations related to import of silk and silk products.

Unit 4: Government Schemes and Support: Central Silk Board (CSB) initiatives, Subsidies and loans for sericulture entrepreneurs, Training programs and skill development, Certification and quality standards (Silk Mark, GI tags).

Unit 5: Business Planning and Marketing: Preparing a business plan for sericulture enterprise, Market research and demand analysis, Digital marketing and e-commerce for silk products, Branding and sustainability in sericulture

Course Outcome: On completion of the course, students will be able to explain the fundamentals of sericulture and its economic importance, describe cocoon production and silk processing techniques, and analyze the role of by-products in value addition. They will gain the skills to identify and evaluate entrepreneurial opportunities across the sericulture value chain, understand government policies and support systems, and apply business planning and marketing strategies. Students will also be able to assess export potential, use digital platforms for promoting silk products, and integrate sustainability and branding practices into sericulture-based enterprises.