# MAHATMA GANDHI UNIVERSITY

**Kottayam, Kerala**

**Undergraduate Programmes (HONOURS)**
**2024 Admission Onwards**

| SYLLABUS | | | | | | |
|---|---|---|---|---|---|---|
| **SIGNATURE COURSE** | | | | | | |
| **Name of the College** | Catholicate College, Pathanamathitta | | | | | |
| **Faculty/ Discipline** | Botany | | | | | |
| **Programme** | BSc (Hons) Botany | | | | | |
| **Course Coordinator** | Dr. Deepthi A S | | | | | |
| **Contributors** | Hima K.S.,Dr. Gokul G. Nair | | | | | |
| **Course Name** | Introduction to Agrotechnology | | | | | |
| **Type of Course** | DSE | | | | | |
| **Specialization title** | Agrotechnology | | | | | |
| **Course Code** | MG3DSEBOTA07 | | | | | |
| **Course Level** | 200 | | | | | |
| **Course Summary** | This course provides an introduction to agriculture and organic farming. Students will also learn about various farm machineries and green technology to understand the application of agricultural machineries in a sustainable manner by conserving resources and fostering renewable energy systems. Students will be equipped with practical skills and knowledge on advanced farming techniques and practices. It also covers the modern aspects such as Agri-nanotechnology and precision farming. | | | | | |
| **Semester** | 3 | **Credits** | | | 4 | **Total Hours** |
| **Course Details** | **Learning Approach** | Lecture | Tutorial | Practical | Others | |
| | | 4 | 0 | 0 | 0 | 60 |
| **Pre-requisites, if any** | Basic botanical learning. | | | | | |

**Course Outcomes (CO)**

| **Number of COs** | | **4** | |
|---|---|---|---|
| **CO No.** | **Expected Course Outcome** | **Learning Domains *** | **PO No** |
| 1 | Gain knowledge on importance of agriculture and farming techniques | K | PO1, PO3, PO7 |
| 2 | Compare environmentally friendly practices in agriculture | A | PO1, PO6 |
| 3 | Acquire knowledge on sustainable food production systems | U | PO2, PO7 |
| 4 | Analyse machinery applications and modern technologies practiced for improving productivity in organic farming | AN | PO1, PO6, PO10 |

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

**CO-PO Articulation Matrix**

| CO/PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | - | 2 | - | - | - | 1 | - | - | - |
| CO 2 | 2 | - | - | - | - | 3 | - | - | - | - |
| CO 3 | - | 3 | - | - | - | - | 3 | - | - | - |
| CO 4 | 3 | - | - | - | - | 2 | - | - | - | 1 |

*'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).*

**Course Content**

Content for Classroom transaction (Units)

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 1 | Introduction to Agriculture and its importance | | | |
| | 1.1 | Agriculture and its scope and importance in the national economy, National & International agricultural research institutes in India. Agroclimatic zones of India, Agro-ecological zones of India and revolutions in agriculture.<br>Crop stand establishment and planting geometry and their effect on crops. | 5 | ["1"] |
| | 1.2 | Modern concepts of tillage and conservation agriculture. Land capability classification, Alternate land use and Agro forestry systems, objectives and components of agroforestry. Shifting cultivation; Concept of sustainable agriculture, Secondary agriculture, Zero Budget Natural Farming (ZBNF) | 5 | ["1"] |
| | 1.3 | Organic farming- Definition and Basic Principles, advantages of organic farming, Organic farming and biodiversity. Farm designing and layout, Field preparation, Choice of crops and varieties.<br>Organic matter in soil fertility, Soil fertility evaluation- techniques used for evaluation, Production of organic manures- Vermiwash, Panchagavya. | 5 | ["2"] |
| 2 | Renewable Energy and Green Technology | | | |
| | 2.1 | Classification of energy sources - renewable and non-renewable energy, Properties of different types of renewable energy sources, Contribution of these sources for agricultural operations. | 5 | ["3"] |
| | 2.2 | Energy from agricultural bio-mass– types, principles of combustion, pyrolysis and gasification of biomass. Biogas production and utilization, types and construction of biogas plants. Bio-alcohol, bio-diesel and bio-oil production and their utilization as bio-energy resources. | 5 | ["3"] |
| | 2.3 | Solar energy, solar collectors - flat plate and focussing plate collectors and their application. Solar energy gadgets in agriculture- Solar air heaters, solar space heating and cooling, solar drying, solar pond, solar distillation, solar photovoltaic system and their application.<br>Introduction to wind energy, wind mills -types and applications. | 5 | ["3"] |
| 3 | Farm Machinery and Agricultural Economics | | | |
| | 3.1 | Status of farm power in India and Kerala- sources of farm power, Farm mechanization-scope of farm mechanization-present status of mechanization. | 5 | ["4"] |
| | 3.2 | Familiarization with- primary and secondary tillage implements, implements of intercultural operations, sowing and planting equipments, plant protection equipments, harvesting and threshing equipments. | 5 | ["4"] |
| | 3.3 | Farm management- scope, importance and objectives, market agencies, economic holding, marginal and small farmers.<br>Concept of farming system and farm business, agribusiness institutions & entrepreneurship development in India. Role of KVKs in dissemination of agricultural technology. | 5 | ["4"] |

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 4 | Agri-nanotechnology and Precision Farming | | | |
| | 4.1 | Nanotechnology, definition, brief introduction about nanoscale effects, nano-particles, nano-pesticides, nano-fertilizers, nano-sensors, Use of nanotechnology in seed, water, fertilizer, plant protection for scaling up farm productivity | 5 | ["3"] |
| | 4.2 | E-Agriculture, and its applications. Smart phone applications in agriculture for farm advices, market price, post-harvest management. | 5 | ["4"] |
| | 4.3 | Remote sensing concepts and application in agriculture. Crop discrimination and yield monitoring, soil mapping; fertilizer recommendation using geospatial technologies. | 5 | ["4"] |

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| **Teaching and Learning Approach** | **Classroom Procedure (Mode of transaction)**<br>Lectures, Group discussion, Field based collection and interactions, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry- Based Learning, Online Learning, Blended Learning, and other innovative learning approaches. |

| | |
|---|---|
| **Assessment Types** | **MODE OF ASSESSMENT**<br>Mode of Assessment: Theory<br><br>**A. Continuous Comprehensive Assessment (CCA)**<br>**• Theory – 30 Marks**<br>● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article (<5 years) related to the course ● Any other method as may be re<br><br>**B. End Semester Evaluation (ESE)**<br>**• Theory – 70 Marks**<br>Assessment Methods – Written Examination<br>Duration of Examination – 2.00 Hrs<br>Pattern of examination for Theory – Non-MCQ<br>Different parts of written examination – Part - A , B , C<br>Answer Type:<br>◦ PART - A<br>◦ One or two Sentences - (10 out of 12 ) – 10 × 2 = 20<br>◦ PART - B<br>◦ Short answer - (8 out of 10 ) – 8 × 5 = 40<br>◦ PART - C<br>◦ Essays - (1 out of 2 ) – 1 × 10 = 10 |

## References


- Chhonkar, P.K. and Dwivedi, B.S. 2004. Organic farming and its implications on India’s food security. Fertil. News 49(11): 15-18,21-28,31&38.
- Chrisman.N.R. 1997. Exploring Geographic information systems, Johny wiley and sons, Newyork.
- Rathore N. S., Kurchania, A. K., Panwar, N. L. 2007. Renewable Energy, Theory and Practice, Himanshu Publications.
- Rattan Lal and Stewart. B.A..2015. Soil specific farming-Precision Agriculture.CRC Press.
- Reddy, A.M.2006.Text book of Remote sensing and Geographical Information Systems ,BS Publications. Hyderabad.
- Sukhatme, S.P. and Nayak, J.K. 2012. Solar Energy: Principles of Thermal Collection and Storage, Tata Mc-Graw Hill Education Pvt. Ltd., New Delhi
- Tiwari, G.N. and Ghoshal, M.K. 2005. Renewable Energy Resources: Basic Principles and Applications. Narosa Pub. House. Delhi.

## Suggested Readings


- KAU (Kerala Agricultural University) 2017. Package of practices recommendations (Organic) crops (2nd Ed.). Kerala Agricultural University, Thrissur, 328p
- Kumar, U. 2012. Hand book of Nano Technology. Agrobios (India), Jodhpur.
- Kumar, S., Kumar, V. and Sahu, R.K. 2016. Fundamentals of Agricultural Engineering. Kalyani Publishers, New Delhi.


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**Kottayam, Kerala**

**Undergraduate Programmes (HONOURS)**
**2024 Admission Onwards**

| SYLLABUS | | | | | | |
|---|---|---|---|---|---|---|
| **SIGNATURE COURSE** | | | | | | |
| **Name of the College** | Catholicate College, Pathanamathitta | | | | | |
| **Faculty/ Discipline** | Botany | | | | | |
| **Programme** | BSc (Hons) Botany | | | | | |
| **Course Coordinator** | Dr. Deepthi A S | | | | | |
| **Contributors** | Tinu Thomas | | | | | |
| **Course Name** | Principles of Agronomy and Horticulture | | | | | |
| **Type of Course** | DSE | | | | | |
| **Specialization title** | Agrotechnology | | | | | |
| **Course Code** | MG4DSEBOTA07 | | | | | |
| **Course Level** | 200 | | | | | |
| **Course Summary** | This course provides a comprehensive overview of agronomy, agricultural practices, and heritage, integrating traditional knowledge with modern scientific advancements. It is structured to give students foundational knowledge and practical insights into soil management, crop production, horticulture, and sustainable agricultural practices | | | | | |
| **Semester** | 4 | **Credits** | | | 4 | **Total Hours** |
| **Course Details** | **Learning Approach** | Lecture | Tutorial | Practical | Others | |
| | | 4 | | | | 60 |
| **Pre-requisites, if any** | | | | | | |

**Course Outcomes (CO)**

| **Number of COs** | | **4** | |
|---|---|---|---|
| **CO No.** | **Expected Course Outcome** | **Learning Domains *** | **PO No** |
| 1 | Understand the fundamentals of agronomy, agricultural heritage, and traditional and modern cultivation practices | K, U | PO2, PO10 |
| 2 | Apply knowledge of soil fertility, manures, fertilizers, and irrigation methods for sustainable crop production | A | PO2, PO10 |
| 3 | Demonstrate techniques in horticulture, fruit and vegetable production. | C | PO1, PO2, PO3 |
| 4 | Evaluate crop for enhanced productivity and sustainability | E, C | PO1, PO3, PO9 |

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

**CO-PO Articulation Matrix**

| CO/PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | - | 3 | - | - | - | - | - | - | - | 3 |
| CO 2 | - | 3 | - | - | - | - | - | - | - | 3 |
| CO 3 | 1 | 3 | 3 | - | - | - | - | - | - | - |
| CO 4 | 1 | - | 3 | - | - | - | - | - | 2 | - |

*'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).*

**Course Content**

Content for Classroom transaction (Units)

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 1 | Fundamentals of Agronomy and Agricultural Heritage | | | |
| | 1.1 | Definition, Scope and importance of agronomy<br>Branches of agriculture and role in food security<br>Historical development of agriculture in India -Prehistoric to modern developments<br>Green Revolution, White Revolution, current trends in agricultural policies and practices | 8 | ["1"] |
| | 1.2 | Agricultural heritage of India: traditional systems (Vedic agriculture, zero budget natural farming) and indigenous practices, role of agronomy in sustainable farming | 7 | ["1"] |
| 2 | Soil Fertility: Manures and Fertilizers | | | |
| | 2.1 | Soil types (Alluvial, black, red, laterite, desert, and hill soils) and their properties (Texture, structure, fertility, pH, water-holding capacity) principles and objectives of tillage, land preparation techniques: ploughing ,leveling,bunding | 5 | ["2"] |
| | 2.2 | Concepts of soil fertility and productivity<br>Organic and inorganic manures: compost, vermicompost, green manure<br>Chemical fertilizers: types, methods of application, dose calculation | 5 | ["2"] |
| | 2.3 | Integrated nutrient management (INM), Soil testing and deficiency symptoms. Application methods for fertilizers and manures | 5 | ["2"] |
| 3 | Fundamentals of Horticulture | | | |
| | 3.1 | Fundamentals of horticulture: scope, classification of crops. Nursery techniques and transplanting. | 5 | ["3"] |
| | 3.2 | Propagation methods: cutting, layering, grafting, budding | 5 | ["3"] |
| | 3.3 | Basics of ornamental horticulture -ornamental gardens, indoor gardens; garden adornments; garden components - lawns, shrubs and trees, borders, hedges, edges, drives, walks, topiary, trophy, rockery. | 5 | ["3"] |
| 4 | Crop Production and Improvement | | | |
| | 4.1 | Crop production technology for major fruits (banana, mango) .<br>Introduction to exotic fruit varieties suitable for tropical climate (Dragon fruit, Abiu, Rambutan, Mangosteen, Sapota- Botanical names and best cultivars. | 5 | ["4"] |
| | 4.2 | Crop production technology for vegetables (tomato, brinjal, chili, cucumber, okra) | 5 | ["4"] |
| | 4.3 | Principles of plant breeding and crop improvement- Introduction and hybridization<br>Introduction to biotechnology in crop improvement- Micropropogation, GM crops | 5 | ["4"] |

| | |
|---|---|
| **Teaching and Learning Approach** | **Classroom Procedure (Mode of transaction)**<br>Lectures, Group discussion, Field based collection and interactions, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry- Based Learning, Online Learning, Blended Learning, and other innovative learning approaches. |

| | |
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| **Assessment Types** | **MODE OF ASSESSMENT**<br>Mode of Assessment: Theory<br><br>**A. Continuous Comprehensive Assessment (CCA)**<br>**• Theory – 30 Marks**<br>● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article (<5 years) related to the course ● Any other method as may be re<br><br>**B. End Semester Evaluation (ESE)**<br>**• Theory – 70 Marks**<br>Assessment Methods – Very Short Answer (10 out of 12) : 2 x 10=20 Marks • Short Answer ( 8 out of 10) : 8 x 5= 40 Marks • Essay (1 out of 2): 1x 10= 10marks<br>Duration of Examination – 2.00 Hrs<br>Pattern of examination for Theory – Non-MCQ<br>Different parts of written examination – Part - A , B , C<br>Answer Type:<br>∘ PART - A<br>∘ One or two Sentences - (10 out of 12 ) – 10 × 2 = 20<br>∘ PART - B<br>∘ Short answer - (8 out of 10 ) – 8 × 5 = 40<br>∘ PART - C<br>∘ Essays - (1 out of 2 ) – 1 × 10 = 10 |

## References


- o Agrawal, P. K. (1999). Principles of Seed Technology. ICAR.
- o Balasubramaniyan, P and Palaniappan, S.P.. 2001. Principles and Practices of Agronomy. AgroBios(India)Ltd., Jodhpur.
- o Bose, T. K., & Som, M. G. (1990). Vegetable Crops (Vol. 1 & 2). Naya Prokash.
- o Bose, T. K., Mitra, S. K., & Rathore, D. S. (1999). Fruits: Tropical and Subtropical (Vol. 1 & 2). Naya Udyog.
- o Brady, N. C., & Weil, R. R. (2016). The Nature and Properties of Soils (15th ed.). Pearson Education.
- o Das, D. K. (2015). Introductory Soil Science (4th ed.). Kalyani Publishers.
- o Havlin, J. L., Tisdale, S. L., Nelson, W. L., & Beaton, J. D. (2013). Soil Fertility and Fertilizers (8th ed.). Pearson Education.
- o KAU (Kerala Agricultural University). Practical Manuals for Horticultural Crops. KAU Press
- o Reddy, Y., & Reddy, S. (2009). Fundamentals of Agronomy. Kalyani Publishers.
- o Sankaran, S. and Subbiah Mudaliar, V.T. 1991.Principles of Agronomy. The Bangalore Printing & Publishing Co., Bangalore
- o Singh, S.S. (2015). Principles and Practices of Agronomy (6th ed.). Kalyani Publishers.
- o Yawalkar, K. S., Agarwal, J. P., & Bokde, S. (2008). Manures and Fertilizers (9th ed.). Agri-Horti Publishing House.


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# MAHATMA GANDHI UNIVERSITY

**Kottayam, Kerala**

**Undergraduate Programmes (HONOURS)**
**2024 Admission Onwards**

| SYLLABUS | | | | | | |
|---|---|---|---|---|---|---|
| **SIGNATURE COURSE** | | | | | | |
| **Name of the College** | Catholicate College, Pathanamathitta | | | | | |
| **Faculty/ Discipline** | Botany | | | | | |
| **Programme** | BSc (Hons) Botany | | | | | |
| **Course Coordinator** | Dr. Deepthi A S | | | | | |
| **Contributors** | Dr. Nisha Joseph, Hima K.S | | | | | |
| **Course Name** | Plant Protection Strategies- Management of Insect Pest, Weeds and Pathogens | | | | | |
| **Type of Course** | DSE | | | | | |
| **Specialization title** | Agrotechnology | | | | | |
| **Course Code** | MG5DSEBOTA07 | | | | | |
| **Course Level** | 300 | | | | | |
| **Course Summary** | This course provides a comprehensive understanding of plant protection strategies, equipping students with the knowledge and skill to identify the pests and pathogens affecting common agricultural and horticultural crops. Students will earn fundamental knowledge in pest and pathogen management techniques. The course will familiarise students in identification of weeds and different weed management methods. Exploring integrated pest management techniques can contribute to eco-friendly pest management to enhance crop productivity while minimizing environmental impact. | | | | | |
| **Semester** | 5 | **Credits** | | | 4 | **Total Hours** |
| **Course Details** | **Learning Approach** | Lecture | Tutorial | Practical | Others | |
| | | 4 | 0 | 0 | 0 | 60 |
| **Pre-requisites, if any** | | | | | | |

**Course Outcomes (CO)**

| **Number of COs** | | **4** | |
|---|---|---|---|
| **CO No.** | **Expected Course Outcome** | **Learning Domains *** | **PO No** |
| 1 | Identify and diagnose common insect pests, weeds, and plant pathogens affecting crops. | AN | PO1, PO2, PO3, PO7 |
| 2 | Understand and apply different pest control methods, including integrated approaches | A | PO1, PO6, PO7 |
| 3 | Develop sustainable and eco-friendly plant protection strategies | C | PO2, PO10 |
| 4 | Implement IPM techniques to optimize crop health and productivity | C | PO2, PO3, PO6, PO7 |

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

**CO-PO Articulation Matrix**

| CO/PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | 3 | 3 | 2 | - | - | - | 2 | - | - | - |
| CO 2 | 3 | - | - | - | - | 3 | 3 | - | - | - |
| CO 3 | - | 3 | - | - | - | - | - | - | - | 2 |
| CO 4 | - | 3 | 3 | - | - | 2 | 2 | - | - | - |

*'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).*

**Course Content**

Content for Classroom transaction (Units)

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 1 | Insect Pests of Crop Plants | | | |
| | 1.1 | Definition and scope of Agricultural Entomology. Basic concept of host plant resistance. Pesticides, Regulatory control and Plant quarantine. | 5 | ["1"] |
| | 1.2 | Newer trends in insect pest management – pheromones, Insect Growth Regulators, Chitin synthesis Inhibitors, biotechnological methods. | 5 | ["1"] |
| | 1.3 | Insect pests - control measures and their management in Rice, Coconut, Cow pea, Bitter gourd, Mango, Banana, Guava<br><br>Activity 1. Visit to farm lands- identification and documentation of pests and symptoms in crop plants. | 5 | ["2"] |
| 2 | Weed management | | | |
| | 2.1 | Scope and principles of weed management; Weed classification, biology, ecology and allelopathy; Weed seed dormancy and crop weed competition. | 5 | ["3"] |
| | 2.2 | Herbicide classification, formulations, mode of action, selectivity and resistance; Persistence of herbicides in soils and plants; Application methods and equipments. | 5 | ["3"] |
| | 2.3 | Weed Control: Cultural, Physical, chemical and biological weed control, Bio-herbicides; Integrated weed management; Special weeds, parasitic and aquatic weeds and their management in cropped and non-cropped lands.<br><br>Activity 2. Identification of weeds in the field. | 5 | ["3"] |
| 3 | Fundamentals of Plant Pathology | | | |
| | 3.1 | Plant pathology- Importance of plant diseases<br>Important plant pathogenic organisms and symptoms caused by their infection- Fungi, bacteria, virus, viroids, phytoplasma, nematodes, phanerogamic parasites.<br>Diseases due to abiotic causes. | 7 | ["1"] |
| | 3.2 | Causative agents and Control measures for Plant diseases in Cereals- Rice (bacterial blight); Fruits crops – Banana (bunchy top); Vegetable crops -Tomato (bacterial wilt), Chilli (Damping off), Amaranthus (leaf spot); Tuber crops -Tapioca (Mosaic disease); Plantation crops – Rubber (Abnormal leaf fall), Coconut (Root wilt).<br><br>Activity 3. Collection and preservation of plant disease specimen | 8 | ["2"] |

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 4 | Concepts of Integrated Pest Management | | | |
| | 4.1 | Introduction to integrated pest management (IPM)<br>Principles, Importance, Components, Benefits, Challenges, Strategies and tools | 10 | ["4"] |
| | 4.2 | Plant science Industry and IPM: Plant Health Innovations, Precision Agriculture in IPM,<br>Biological Control Methods, Climate-Smart Agriculture. | 5 | ["4"] |

| | |
|---|---|
| **Teaching and Learning Approach** | **Classroom Procedure (Mode of transaction)**<br>Classroom Procedure (Mode of transaction) Lectures, Group discussion, Field based collection and interactions, Experiential Learning, Peer Teaching, invited lecture, group discussions, Discussion-based Learning, Inquiry- Based Learning, Online Learning, Blended Learning, and other innovative learning approaches. |

| | |
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| **Assessment Types** | **MODE OF ASSESSMENT**<br>Mode of Assessment: Theory<br><br>**A. Continuous Comprehensive Assessment (CCA)**<br>**• Theory – 30 Marks**<br>● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article (<5 years) related to the course ● Any other method as may be re<br><br>**B. End Semester Evaluation (ESE)**<br>**• Theory – 70 Marks**<br>Assessment Methods – Written Examination<br>Duration of Examination – 2.00 Hrs<br>Pattern of examination for Theory – Non-MCQ<br>Different parts of written examination – Part - A , B , C<br>Answer Type:<br>◦ PART - A<br>◦ One or two Sentences - (10 out of 12 ) – 10 × 2 = 20<br>◦ PART - B<br>◦ Short Essays - (8 out of 10 ) – 8 × 5 = 40<br>◦ PART - C<br>◦ Essays - (1 out of 2 ) – 1 × 10 = 10 |

## References


- 1. Agrios, G.N. 2005. Plant Pathology. (5 th Ed.). Elsevier Academic Press.882p.
- 2. Balasubramaniyan, P and Palaniappan, S.P. 2001. Principles and Practices of Agronomy.AgroBios (India) Ltd., Jodhpur.
- 3. Brady, N.C. and Well, R.R. 2002.The Nature and Properties of Soils (13th ed.). Pearson Education, Delhi.
- 4. De, G.C.1989.Fundamentals of Agronomy. Oxford & IBH Publishing Co., New Delhi.
- 5. Dhaliwal GS and Arora R. 2003. Integrated Pest Management – Concepts and Approaches.Kalyani Publishers, New Delhi.
- 6. Gour, T. B. and Sridevi, D. 2012. Chemistry, toxicity and mode of action of insecticides.Kalyani publishers, Bangalore, 316 p.
- 7. Gupta, O.P. 2000. Weed Management - Principles and Practices. Agrobios (India) Ltd.,Jodhpur.
- 8. Ignacimuthu SS and Jayaraj S. 2007. Biotechnology and Insect Pest Management. Elite Publ., New Delhi.


## Suggested Readings


- 1. Metcalf, R. L. and Luckman, W. H. 1994. Introduction to Insect Pest Management. John Wiley and sons, New York, 605 p.
- 2. Prakasam,V., Reguchander,T. and Prabakar,K. 1998. Plant diseases management. A.E. Publication, Coimbatore.
- 3. Rao, V.S. 2000. Principles of Weed science. Oxford & IBH Publishing Co. New Delhi.

- 4. Thomas, C.G. and Abraham, C.T. 2007.Methods in Weed Science. Kerala Agricultural University, Thrissur


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**Kottayam, Kerala**

**Undergraduate Programmes (HONOURS)**
**2024 Admission Onwards**

| SYLLABUS | | | | | | |
|---|---|---|---|---|---|---|
| **SIGNATURE COURSE** | | | | | | |
| **Name of the College** | Catholicate College, Pathanamathitta | | | | | |
| **Faculty/ Discipline** | Botany | | | | | |
| **Programme** | BSc (Hons) Botany | | | | | |
| **Course Coordinator** | Dr. Deepthi A S | | | | | |
| **Contributors** | Dr. Thomas V.P. | | | | | |
| **Course Name** | Post-harvest Management, Value Addition and Marketing of Horticultural Crops | | | | | |
| **Type of Course** | DSE | | | | | |
| **Specialization title** | Agrotechnology | | | | | |
| **Course Code** | MG6DSEBOTA07 | | | | | |
| **Course Level** | 300 | | | | | |
| **Course Summary** | This course provides an in-depth understanding of harvesting, post-harvest management, value addition, and marketing of horticultural crops to minimize losses and enhance product quality. It covers harvesting techniques, storage methods, and value-added processing such as drying, canning, and packaging to improve shelf life. Students will also learn about agricultural marketing, price determination, and international trade to understand market trends and export opportunities. By the end of the course, students will be equipped with practical skills and knowledge to improve the efficiency and profitability of horticultural produce. | | | | | |
| **Semester** | 6 | **Credits** | | | 4 | **Total Hours** |
| **Course Details** | **Learning Approach** | Lecture | Tutorial | Practical | Others | |
| | | 3 | | 1 | | 75 |
| **Pre-requisites, if any** | Basic botanical learning | | | | | |

**Course Outcomes (CO)**

| **Number of COs** | | **4** | |
|---|---|---|---|
| **CO No.** | **Expected Course Outcome** | **Learning Domains *** | **PO No** |
| 1 | Learn proper harvesting, handlingtechniques to reduce losses and maintain quality. | K | PO2, PO10 |
| 2 | Understand post-harvest handling, food preservation methods, and processing techniques for key plantation crops. | U | PO2, PO10 |
| 3 | Application of different storage, packaging, value addition, and quality standards to enhance shelf life, reduce losses, and ensure food safety and certification compliance. | A | PO1, PO2, PO3 |
| 4 | Enabling students to analyze market trends and explore export opportunities for horticultural produce. | AN | PO1, PO3, PO9 |

**Remember (K), Understand (U), Apply (A), Analyse (An), Evaluate (E), Create (C), Skill (S), Interest (I) and Appreciation (Ap)*

**CO-PO Articulation Matrix**

| CO/PO | PO 1 | PO 2 | PO 3 | PO 4 | PO 5 | PO 6 | PO 7 | PO 8 | PO 9 | PO 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| CO 1 | - | 3 | - | - | - | - | - | - | - | 3 |
| CO 2 | - | 3 | - | - | - | - | - | - | - | 3 |
| CO 3 | 1 | 3 | 3 | - | - | - | - | - | - | - |
| CO 4 | 1 | - | 3 | - | - | - | - | - | 2 | - |

*'0' is No Correlation, '1' is Slight Correlation (Low level), '2' is Moderate Correlation (Medium level) and '3' is Substantial Correlation (High level).*

**Course Content**

Content for Classroom transaction (Units)

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 1 | Harvesting and Handling Techniques | | | |
| | 1.1 | Introduction to Harvesting and Post-Harvest Management, Importance of harvesting at the right maturity stage: Physiological and horticultural maturity, impact of premature and delayed harvesting on quality. Factors affecting post-harvest losses: Environmental factors: Temperature, humidity, mechanical injury. Biological factors: pests, diseases, respiration rate. | 5 | ["1"] |
| | 1.2 | Harvesting and Handling Techniques. Maturity indices and harvesting methods for fruits: Mango, banana. Vegetables: Okra (ladies' finger), tomato. Flowers: Orchids, Gerbera. | 5 | ["1"] |
| | 1.3 | Pre-harvest factors affecting post-harvest quality, cultivar selection and agronomic practices. Role of irrigation, fertilization, and pest management.<br>Activity 1: Hands-on demonstration of sorting and grading. | 5 | ["1"] |
| 2 | Post-harvest handling and Processing | | | |
| | 2.1 | Post-harvest handling processes: Pre-cooling, sorting, grading, and washing, importance of temperature management, methods of sorting and grading and their impact on marketability, hygiene and sanitation in post-harvest handling (Brief study only).<br>Methods of food preservation- sun drying, hot air drying, freeze drying, freezing methods: slow vs. rapid freezing. Canning methods, irradiation methods;advantages and limitations. | 5 | ["2"] |
| | 2.2 | Introduction to Processing: Safety and regulatory concerns, importance of hygiene and sanitation, HACCP principles in food processing. | 5 | ["2"] |
| | 2.3 | Processing of important plantation crops: steps in processing of Rubber, Coconut, Tea, Coffee and Cardamom.<br>Activity 3: prepare an account on the entire processing technique any plantation crop mentioned in the syllabus. | 5 | ["2"] |

| Module | Units | Course Description | Hrs | CO No. |
|---|---|---|---|---|
| 3 | Storage to Marketing | | | |
| | 3.1 | Storage methods: cold storage, controlled atmosphere storage, and zero-energy cool chambers, principles of storage and temperature management, role of packaging in reducing post-harvest losses, types of packaging materials (plastic, paper, biodegradable), common post-harvest diseases and their control (short account only) | 5 | ["3"] |
| | 3.2 | Value-added products from Jack fruit and Banana-wet and dry preparations, novel value added products, non-edible products | 5 | ["3"] |
| | 3.3 | Quality Standards and Certification: FSSAI guidelines for processed food, organic certification and Good Agricultural Practices (GAP), shelf-life enhancement techniques: use of preservatives.<br>Introduction to Agricultural Marketing: Types of Markets: Local, wholesale, retail, and export markets. Structure and function of Agricultural Produce Market Committees (APMCs), role of APMC and e-NAM in marketing horticultural crops, factors affecting prices of horticultural produce, Minimum Support Price (MSP) and government policies, functions of the Agricultural and Processed Food Products Export Development Authority (APEDA)<br>Activity 3: Entrepreneurship activity focuses on creating value-added products like jams, sauces, and snacks from locally available fruits and vegetables to enhance shelf life, increase market value, and support sustainable local businesses. | 5 | ["3", "4"] |
| 4 | Practical | | | |
| | 4.1 | Conduct a one day industrial visit: value added product manufacturing industry in your near vicinity. Prepare a detailed report on functioning, products and marketing with the support of proper evidence and Geo-tagged photographs (Mandatory) | 10 | ["4"] |
| | 4.2 | Identify and prepare notes on important food preservatives and components used in value added food products and processing of plantation crops. | 5 | ["1"] |
| | 4.3 | Any one<br>1. Analysis of Ascorbic acid content from given fruit using volumetric/colorimetric method<br>2. Analysis of TSS (brix %) from different fruits using refractometer method | 5 | ["3"] |
| | 4.4 | Prepare and submit two value added products from locally available fruits or vegetables. | 5 | ["3"] |
| | 4.5 | Prepare a report on sorting and grading horticultural crop products | 5 | ["3"] |

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| **Teaching and Learning Approach** | **Classroom Procedure (Mode of transaction)**<br>Classroom Procedure (Mode of transaction) Field based collection and interactions, Interactive lectures, flipped classroom, Lecture-based Learning, Project-Based Learning, Experiential Learning, Peer Teaching, invited lecture, Discussion-based Learning, Inquiry-Based Learning, Online Learning, Blended Learning, and other innovative learning approaches. |

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| **Assessment Types** | **MODE OF ASSESSMENT**<br>Mode of Assessment: Both<br><br>**A. Continuous Comprehensive Assessment (CCA)**<br>**• Theory – 25 Marks**<br>● Involvement and responses in class room transactions ● Home Assignments ● Oral presentation/ Viva/Quiz/Open book test ● Field study, Group discussion on a recent research or review article(<5 years) related to the course Any other method as may be requ<br>**• Practical – 15 Marks**<br>● Lab involvement and practical skills ·Record/Any other method as may be required for specific course / student by the course faculty<br><br>**B. End Semester Evaluation (ESE)**<br>**• Theory – 50 Marks**<br>Assessment Methods – Written Examination<br>Duration of Examination – 1.50 Hrs<br>Pattern of examination for Theory – Non-MCQ<br>Different parts of written examination – Part - A , B , C<br>Answer Type:<br>◦ PART - A<br>◦ One or two Sentences - (10 out of 12 ) – 10 × 1 = 10<br>◦ PART - B<br>◦ Short Essays - (6 out of 8 ) – 6 × 5 = 30<br>◦ PART - C<br>◦ Essays - (1 out of 2 ) – 1 × 10 = 10<br>**• Practical – 35 Marks**<br>Assessment Methods – Practical<br>Duration of Examination – 2.00 Hrs |



## References


- 1. Kader, A.A. (2002). "Postharvest Technology of Horticultural Crops." University of California, Agriculture and Natural Resources.
- 2. Thompson, J.F., & Singh, R.P. (2012). "Postharvest Technology and Food Process Engineering." CRC Press.
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- 5. Potter, N.N., & Hotchkiss, J.H. (1998). "Food Science." Springer.
- 6. Manay, S., & Shadaksharaswamy, M. (2004). "Foods: Facts and Principles." New Age International.
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- 9. Ranganna, S. (2007). "Handbook of Analysis and Quality Control for Fruit and Vegetable Products." Tata McGraw-Hill.
- 10. Acharya, S.S., & Agarwal, N.L. (2011). "Agricultural Marketing in India." Oxford & IBH Publishing.
- 11. Kohls, R.L., & Uhl, J.N. (2002). "Marketing of Agricultural Products." Pearson Education.
- 12. Kotler, P., Keller, K.L., & Jha, M. (2022). "Marketing Management: A South Asian Perspective." Pearson.

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