

BHARATHIAR UNIVERSITY: COIMBATORE – 641 046

CERTIFICATE IN CAMPUS SUSTAINABILITY

(For the candidates admitted from the academic year 2020-2021 onwards)

Certificate in Campus Sustainability is a 3 months course aimed at providing basic and comprehensive knowledge in theoretical as well as practical level to the students. This course will touch upon energy conservation, emissions reduction, water conservation, waste management and biodiversity enrichment of any campus. The focus of the course is to nurture environmentally responsible administrative professionals.

Programme Objectives

1. Understanding the essential skills required to integrate sustainability in the operations of any institution / Industry / Facilities.
2. Evaluate fundamental sustainability parameters for baselining and optimizing the environmental impact of the campus operations.
3. Demonstrate the ecological management of landscapes and green cover to support urban biodiversity.

Programme Outcomes

1. Discover the functional knowledge of the best practices with a focus on sustainability as focus in campus operations.
2. Evaluate the basic parameters of Energy Usage, Carbon Emission, Waste Management, Water Management, Biodiversity Enrichment and Environmental Awareness in the Campus.
3. Design solutions for the campus sustainability focus areas.

Programme Highlights

The courses will be conducted in the evenings/ weekends/ blocks to enable students who are pursuing undergraduate degree program to undergo the diploma program. Lectures, Group discussions, presentations, practice, guest talks, project-based learning will be enable the learners to gain wider and engaged perspective of learning.

The program will include visits to Sewage Treatment Plants, Waste Segregation Yards, Biodiversity Enrichment Parks.

Eligibility for Admission

Candidates for admission to the Certificate course shall be required to have passed the Higher Secondary examinations (Academic or Vocational) conducted by the Government of Tamilnadu or any other examination accepted as equivalent thereto by the syndicate.

Duration of the course

The course shall extend over a period of 3 months comprising of one semester.

Medium of instruction and examinations

The medium of instruction and examinations shall be in English.

SCHEME OF EXAMINATION

	TITLE OF THE PAPER	Instruction Hours / Week	Exam Duration	Total Marks
Theory 1	Campus Energy ,Emissions And Water Management	2	3 Hours	100
Theory 2	Campus Waste Management And Biodiversity Enrichment	2	3 Hours	100
Project 1	Energy , Emission And Water Audit	2	Project and Viva	50
Project 2	Waste and Biodiversity Audit	2	Project and Viva	50
Maximum Marks				300

Distribution of Marks - Theory				
Total Marks	External		Internal (Max Marks)	overall Passing minimum (Internal + External)
	Maximum	Passing Minimum for external alone		
100	75	30	25	40
Distribution of Marks – Project*				
50	-	-	Report - 25	20
	-	-	Viva - 25	

*Continuous Internal Assessment only

QUESTION PAPER PATTERN

Maximum 100 Marks			
Section A	Answer all the questions (10 questions of one-word answer)	10X1=10	10 questions
Section B	Answer all the questions Internal Choice - either - or type (5questions)	5X6 =30	5 questions
Section C	Open Choice Answer 5 questions out of 8	5X12 = 60	5 questions

Passing Minimum

- a) A candidate shall be declared to have passed in a paper if he or she obtains not less than 40% of marks in that paper.
- b) A candidate failing to secure the minimum marks prescribed shall be required to reappear for the examination in that paper and obtain not less than the minimum marks required for passing the paper.

Examinations

- A candidate will be permitted to appear for the University Examination for any year if he / she secures minimum 75% of attendance in the number of instructional days.
- Examination shall be conducted at the end of course.

Classification of Successful Candidates

Candidate qualifying for the Diploma with not less than 60% of the aggregate marks shall be declared to have passed the examinations in FIRST CLASS provided they have passed the examinations in every paper at the first appearance. Other successful candidates shall be declared to have passed the examination in SECOND CLASS

Theory 1 - CAMPUS ENERGY, EMISSIONS AND WATER MANAGEMENT

Course Objective: To expose students to the basics of energy, energy audit and water conservation techniques.

Learning Outcomes: Students will acquire knowledge and skill to do energy and waste audit and recommend best practices for management.

Unit I - Basics of Energy - Introduction - Work, Energy and Power, Electricity Basics, Thermal Energy basics, Energy Units and Conversions, Environmental aspects associated with energy utilization.

Unit II - Energy Audit - Energy Audit Definition: Need for Energy Audit, Types of Energy Audit and Approach, Understanding Energy Cost, Benchmarking, matching Energy Usage to Requirements, Maximizing System Efficiencies, Optimizing Input Energy Requirement, Instruments for energy auditing.

Unit III -Water Management - Introduction - Water Conservation Strategies - Best Water Management Practices - Public Information and Education Programs, Distribution System Audit, Leak Detection and Repair, Water Efficient Landscaping, Toilets and Urinals, Showerheads and Faucets, Boilers and Steam Systems, Cooling Tower Management, Miscellaneous high water using processes, Water Reuse and Recycling.

Unit IV -Rain Water Harvesting - What is Rain Water Harvesting, Why Rain Water Harvesting, how to Harvest Rainwater, Surface Runoff Harvesting, Roof TOP Rain Water Harvesting, Catchment, Transportation, First Flush, Filter - Sand Gravel Filter, Charcoal Filter, PVC Pipe Filter, Sponge Filter. Methods of Roof Top Rain Water Harvesting - Storage for Direct USE, Recharging Ground Water - Recharge Bore Wells, dug wells, pits, trenches, percolation ponds.

Unit V - Water Quality - Water and water quality standards: Desirable limits, Permissible limit, PPM, PPB. Drinking Water Specifications: Physical parameters (Color, taste-odor, Turbidity, suspended solids, Temperature. Chemical parameters (TDS Alkalinity, Hardness, salts, acids and alkalis, chlorides, fluorides, proteins, carbohydrates, organics, fats oil & grease, Hazen units, NTU, BOD, COD, DO, TDS, Trace metals, Heavy metals, tests on quality parameters. Drinking Water Standards of BIS, International water quality standards, BIS (Bureau of Indian Standards).

Reference Books: Abu Zahrim Yaser Green Engineering and Campus sustainability, Springer

M. K. Ghosh Roy (2019), Sustainable Development: Environment, Energy and Water Resources

Theory II - CAMPUS WASTE MANAGEMENT AND BIODIVERSITY ENRICHMENT

Course Objective: To expose the students to the basics and importance of waste management and biodiversity enrichment.

Learning Outcomes: Students will acquire knowledge and skill to do biodiversity and waste audit and recommend best practices for management.

Unit I

Types of Waste - Sources and types of municipal solid wastes-waste generation rates-factors affecting generation, characteristics-methods of sampling and characterization; Effects of improper disposal of solid Wastes-Public health and environmental effects. Elements of solid waste management –Social and Financial aspects – Municipal solid waste (M&H) rules

Unit II

Solid Waste Collection - Collection of Solid waste – collection services – collection system, equipment's – time and frequency of collection – labour requirement – factors affecting collection – analysis of collection system – collection routes – preparation of master schedules.

Unit III

Organic Waste Composting - Introduction -What is a Compost, Types of Composting, Factors Affecting Composting Process - Organisms, Use of Culture, Moisture, Temperature, Carbon-Nitrogen Ratio Aeration, Properties of Compost, Usage of Compost.

Unit IV

Biodiversity Enrichment - Importance of Biodiversity in Urban Landscapes - Documenting Trees - Birds - Butterflies - Lesser Fauna - Methods to Enrich Campus Biodiversity - Nature friendly landscape maintenance - Providing safe habitats for other life forms inside the campus.

Unit V

Sewage - Introduction of Sewage-Systems of sewerage, Physical and chemical characteristics of sewage, Sewer materials, Importance of sewage, Generation of sewage, Sanitary works: Definitions, sanitary works, Types of sanitary systems, septic tanks, community systems, objectives of sewage disposal, Methods of collection, conservancy systems, collection system, water carriage system, sewerage system.

Books Recommended

1. Rajaram Vasudevan, Siddiqui Faisal Zia, Agrawal Sanjeev, Solid and Liquid Waste Management Waste to Wealth Paperback – 2016
2. Jagbir Singh, Solid Waste Management: Present and Future Challenges

**Project I - ENERGY, EMISSION AND WATER AUDIT
(Practical)**

Course Objective: To equip the students to do basic level of energy and water audit

Learning Outcomes: Campus Energy and Water Audit Report

1. Data Collection to benchmark Campus Energy Usage and Water Usage
2. Observation and Analysis
3. Exploration of Energy and Water Conservation Measures
4. Report Preparation

**Project 2 - WASTE AND BIODIVERSITY AUDIT
(Practical)**

Course Objective: To equip the students to do basic level of Waste and Biodiversity Audit

Learning Outcomes: Campus Waste and Biodiversity Audit Report

1. Data Collection to benchmark Campus Waste and Biodiversity
2. Observation and Analysis
3. Exploration of Waste Management and Biodiversity Enrichment Measures
4. Report Preparation