

CURRICULUM FOR POST GRADUATE DIPLOMA IN Waste Management and Environmental Hygiene

Course duration: 1 year (2 semesters)

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A Project for
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Mahatma Gandhi National Council of Rural Education
Ministry of Human Resource Development
Government of India

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Highlights

- It is Job-oriented.
- Involves Experiential learning.
- Encourages and Emphasises Field work.
- Focuses on Management, Swachhta Technology and Sociology.
- Open to Graduates of any stream.
- Provides Placement assistance.

1. Introduction

Gandhiji saw Swachhta as a means of spreading dignity of labour and equality in the communities. No matter what vocation one chooses, one must face the issues of 'swachhta'. The term 'swachhta' is a Hindi word meaning cleanliness. But essentially it implies environmental management as a step towards sustainability.

We are a generation at the crossroads of a major natural resource crunch and very soon we will find it difficult to sustain this burgeoning population of ours. Nature has always been kind to provide bountiful resources simply because every substance in nature follows a cycle of creation and destruction and thereby regular replenishment which has been taking place silently since eons. However, despite having learnt to utilize these natural resources through science and technology, humankind is falling prey to its over-usage causing serious depletion of resources. This is the result of human interventions causing incomplete ecological cycles. Now the key to reversing the damage caused over centuries lies in facilitating the completion of the natural cycles and restoring nature's innate balance. Yes, this is possible.

To convert this theory into reality, a large, trained cadre of focused workforce needs to be put into place. Today as the youth are facing job crunch and technology is making many of the traditional familial jobs redundant, the field of Swachhta or Cleanliness opens many doors. It has the potential to provide fulfilling, well-paying livelihoods and holds the promise to a clean, livable future. The student who chooses this line of study is opting into not just a career, but a healthy living for themselves and for society. PG Diploma in Swachhta will empower today's youth to leave an indelible mark on the sands of time.

Mahatma Gandhi National Council of Rural Education (MGNCRE) under the Ministry of Human Resource Development, in Government of India that strives to promote resilient rural India through Higher Education interventions. MGNCRE designs, develops and promotes curriculum inputs for higher education programmes offered by Universities and Autonomous Institutions in India. The higher educational streams of focus for MGNCRE include: Rural Studies, Rural Development, Rural

Management, Social Work and Education. The curriculum inputs are both theoretical and practical field-related relevant to rural India. With a vision to involve higher education curriculum in India in the process of building resilient rural India i.e., Uthkrisht Gram for Unaat Bharat, MGNCRE is involved in formulating and recognizing curricular inputs and accredit courses and higher educational institutions, which enable development of sustainable, climate and disaster resilient rural livelihoods.

As part of its constant endeavour to facilitate learning and greater awareness among the students in Higher Education Institutions (HEIs) about the surrounding environment and rational and better management of the finite resources, MGNCRE proposes the preparation of curriculum of a Post Graduate Diploma Course on Environmental Hygiene, Water and Solid Waste Management (PGD in EH-W-SWM).

While remembering Mahatma Gandhi on his 150th birth anniversary it is a bounden duty of all us to take on his ideals and present national priorities of Swachhta from this historical perspective. Gandhiji saw Swachhta as a means of spreading dignity of labour and equality in the communities. No matter what vocation one chooses, one must face the issues of 'swachhta'. Essentially it implies environmental management as a step towards sustainability. It also offers potential for entrepreneurship and employment.

2. Background

As Mahatma Gandhi rightly said, "Earth provides enough to satisfy every man's needs, but not every man's greed." We are a generation at the crossroads of a major natural resource crunch and very soon we will find it difficult to sustain this burgeoning population of ours. Earth can provide sufficiently for all its denizens due to its aptitude for recycling resources unendingly- such as through the water cycle, nutrient cycles, etc. Human interventions have caused failure in the proper cycling of resources. The solution lies in facilitating the completion of the natural cycles and restoring nature's innate balance through proper waste management. However, it is not easy to change habits and routines, especially with the advent of modern lifestyle that encourages disposable. A large, trained cadre of focused workforce is needed to bring about this change.

3. Scope

The PG Diploma in Waste Management and Environmental Hygiene is proposed as a new course with a fresh take on age-old nagging issues of the much neglected sector of Waste Management – its Reuse, Recycle and issues of Cleanliness and Sanitation. There is a burning need to motivate people to invest their time and resources in the core issues of Swachhta.

It is therefore crucial to make this one year in the students' life the most useful and enriching to their careers. The success of the first few batches could well be the turning point in the history of Indian Environment. Being a newly introduced course, it is likely that it may not be well known for attracting more students to join this course on their own accord. They may be looking at it from a career point of view. However, the majority of the others would be pressurized by family or circumstances to undertake this programme. It is also possible that the students would be of average intelligence, and low motivation. It is a challenge to teach a group of students unwilling to put in their best efforts at learning on such a subject. Hence, the new adage "I hear and I forget; I see and I remember; I do and I can do it again and I repeat it I can of course do it better" has been deployed while creating this curriculum for PG Diploma in WEH.

With this pragmatic and realistic outlook, MGNCRE has designed and created this curriculum which will hold the interest of the student and guarantee their lifelong dedication to the arena of swachhta and building a better nation – both entrepreneurially as well as personally.

At the end of the programme, our students should transform into confident, responsible, reflective, innovative individuals who are socially and intellectually engaged in environment management, i.e., Swachhta. The potential areas that such students can venture into further are annexed to this proposal.

4. Expected Outcomes of PGD

With technology supplementing and sometimes replacing human labour, it is increasingly difficult for today's youth to find rewarding jobs. The fields of Environmental Hygiene, Water and Solid Waste Management can open many doors. It has the potential to provide fulfilling, well-paying livelihoods and holds the promise to a clean, livable future. The student who chooses this line of study is opting into not

just a career, but a healthy living for themselves and for society. A Post Graduate Diploma will provide the necessary wherewithal to build a career in the fields of Environmental Hygiene, Water and Solid Waste Management.

Environmental concerns on management of our surroundings, water and waste management have been a neglected area so far, as far as the collective responsibility of society towards this issue is concerned. However its importance cannot be negated, nor overlooked any further. It is a potent lucrative case for business. Hence a specialized understanding of the subject will be essential and would pave the way for scientific handling of surroundings, and adopting safe and secure methods of disposal of inevitable domestic and industrial Wastes.

5. Transaction Approach and Teaching Methodology

The course covers a large variety of topics. It is recommended that the educational Institute offering this course collaborates with a large number of agencies working in allied sectors, during and after the course.

Through the association the Institution initiating this Course can benefit in the following manner:

- Firstly, the experts from these institutions could be invited to speak on the subject, thereby enriching classroom lectures.
- Secondly, the same experts could liaison with their parent institution for a field visit to their workplace/ institution.
- Finally, they can also guide a certain number of students during their internship within their own organization.

Transaction Resources:

Resources including Reference Books, Films, PPTs, Caselets and Case Studies, Community Project Work and Field Work; Course material and caselets will be prepared by Mahatma Gandhi National Council of Rural Education, Ground Floor Shakkra Bhavan, behind of LB Stadium, Hyderabad. Suitable video and text resource material along with case studies will be identified and a copy will be provided where they are available free of cost in open source.

Proposed Course Schedule

This PG Diploma is of one -year duration consisting of course work for two semesters:

Semester 1:Total Duration: 20 weeks, comprising of

- Two (2) days classroom interaction and problem solving exercises per week (1 hr x 5 subjects),
- One (1) day field visit/ experiment per week,
- One (1) day seminar per week,
- One (1) project work by entire class (1-3 days)

Semester 2: Total Duration: 16 weeks, comprising of

- One (1) day classroom interaction and problem solving exercises per week (1hr x 5 subjects),
- Four (4) days off-site Internship/ Project per week,

Field Visits

The course allocates 20 working days for field work or experiments in first semester and 64 days in the second semester, a total of 84 actual work days.

The Educational Institute initiating this Course should connect with a variety of institutions including the local government hospital, reputed private hospitals, 5- star hotels, local restaurants, campus canteen/ mess, a near-by Gram Panchayat, local religious institution (temple/ mosque/ church which holds at least one large scale annual event), construction sites, shopping malls, textile manufacturing units, refineries, pharmaceutical companies, etc., Local Municipality- to expose students to current solid waste management and waste water treatment facilities, a local food processing unit, a large garment manufacturing unit, glass recycling unit, glass producing unit. Unorganized sector of kabadiwalas, ship breaking, or other such entities should be included because often these have the most environmental concerns and least safeguards due to various reasons. Also plan visits to organic nursery, a local dairy farm, a local vegetable or fresh meat market and abattoir.

The purpose of the field visit is to observe the swachhta aspect at each location. Questions that must be pondered to during such visits are: How do the authorities maintain sanitation? How are the waste/ byproducts disposed off? How much of it is recycled or reused? Which of the areas would need improvement? What are the legal permissions sought and procured? What are the Standard Operating Procedures (SOPs) on such matters? Is there a Compliance and/or Non-compliance? What are some of the good practices and similarly avoidable practices etc. Students should interact with not only the staff of institution they visit, but also the community living around the area to verify and validate claims and

counter-claims through discussion and observation. For instance, look at the waste disposal trends in independent houses vs. apartments. Allow them to debate on the pros and cons of each style of living.

Working in teams, students will analyze the information gathered from their field visit and present their findings and suggestions in their weekly seminar. It is essential for students to be exposed to well-managed places as a source of inspiration as well as poorly managed places to give them an opportunity to compare and find economically viable solutions to sanitation issues. This will help them appreciate as well as examine the issue critically. If students arrive at any attainable solutions, these must be intimated to the said institution in a well-written report, suitably edited by the Teacher Concerned. If the institution visited is suitable for encouraging shramdaan (or Community labour), this must be welcomed and organized by the Department.

Practicals

The course prescribes practical activities, done in a scientific manner. These experiments should include scientific experiments to test the quality of air, water, soil and food. For instance, it is necessary to understand the concept of leaching, hardness of water, microbial growth, composition and nature of common cleaning agents. Also documenting experience on people's participation would be useful. The Indian mindset is to some extent fatalistic and pessimistic, especially in matters related to social evils. Often people ignore cleanliness issues until they become too large to tackle. Every student in class must be exposed to this mindset and be trained to persuasively counter-argue to change this mindset.

The intent of this entire curriculum is to create a well-rounded individual ready to face the challenges of Swachhta armed with the knowledge and skills to handle the issues without fear or hesitation. As the course has a heavy focus on out-of classroom teaching, it is recommended that this point should be explained at the time of admission and an appropriate fee be charged for organizing field trips. The most cost-effective mode of public transport should be selected for each field visit.

Project

Students get a chance to apply their knowledge and skills in an individual project investigating an environmental swachhta issue in the local context. They must identify a local environmental problem, which is specific, accessible and measurable. They must then analyse it from the point

of view of a natural resource, its use and progress to the impact of the activity with details of management/ mismanagement. Data collection must include a component of field work to procure some primary data using a suitable range of research techniques. Primary and secondary analysis should draw some meaningful conclusions and workable solutions. Present the report in an orderly and reasoned way, supported by a suitable range of illustrative techniques.

This project will be conducted under the guidance of a teaching faculty in association with the collaborating agency where the student completes their Internship.

At the end of the second semester, the student will submit a concise written report (of about 3,000-4,000 words, i.e., about 10 pages) and make a verbal presentation before his peers, opening their project to scrutiny and debate. The written report should be compact, with a clear title, contents page, logically ordered sections, list of sources, bibliography, acknowledgements. The sections should include aim, background information, and description of research methods, proper presentation of primary and secondary data, analysis, a reasoned conclusion, and suggestions for improvement. If a solution was tested in field, the report should contain the results of the trials and further lessons from it. Summary of raw data, questionnaires and experiments should be included in the appendix.

Guide's Role in Project Work

The faculty member will explain the scope of topic, range of research methods available, help the student to choose a project topic which is of particular interest to him/her. The topic could be original or a repeat from previous batches, but the research should be done afresh with primary data collection and a new line of enquiry so that it leads to new conclusions, analysis and improved solutions. The supervisor will discuss problems and difficulties encountered during the research and suggest appropriate presentation techniques. Guides should ensure that photographs, tables of data, etc. from other sources, should not be copied and included in their original form; instead candidates should translate such data into a form of their own. Similarly, plagiarism from library, Internet or other sources is not permitted.

6. Proposed Curriculum

First Semester

S N#	Course	Objectives	Methodology	Topics to be covered
1	Source Reduction and Waste Management	To orient in estimating the value of waste as a potential resource and the impasse caused by mixing of wastes.	Case Study Field Visit, Group Exercise, Seminar, Group Games, Assignments, Demonstration (Lab work)	Introduction to waste; Source reduction, Solid waste management: Waste Characterization; Domestic Waste, Market Waste, Food Waste, Agri-waste, Fruit-Veg Market Waste, e-Waste Industrial Inert Waste, Industrial Hazardous Waste, Bio-Medical Waste and Radioactive Waste. Environmental Audit
2	Biomedical and Hotel Waste Management	To orient in transmission of communicable diseases and to handle risks in healthcare management. To manage hotel wastes efficiently for higher profitability and also to curb pollution.	Case Study Field Visit, Group Exercise, Seminar, Group Games, Assignments, Demonstration	Sources of biomedical waste, Classification, Collection, Segregation, Pre-treatment, Transportation, Disposal, Health Hazards, Capacity Building, Management and Administration Waste from Hotels and Eateries, Treatment Methods, Managing Food waste, Hotel Waste Audit
3	Waste Management Logistics	To learn the human and technological components of waste management. Social aspects and managerial goals. To update on advancements in technology, development of thought process for simplifying waste management.	Case Study, Field Visit, Group Exercise, Seminar, Group Games, Assignments	Waste Audit, Waste Collection, Segregation, Manifest, Transport, Treatment, Preventive Maintenance, Technological Upgradation, Disposal, Composting: Types and processes Counter Current Management Recycling: Changed form Reducing: Compacting, Reusing, Incineration and pyrolysis, gasification, Landfills: Aerobic and semi aerobic, Earth Layer and HDPE liner, Capping of waste, Inventory and material management, carrying capacity, assimilation capacity, life cycle analysis, extended producer responsibility, waste reduction
4	Water Security	To orient in reducing the use of water and improving the quality of waste water, to employ advanced methods for waste water treatment To appreciate the importance of water quality monitoring, To adopt sampling techniques and laboratory techniques of water quality analysis	Films, Case Study Field Visit, Group Exercise Seminar	Water Issues, Wastewater management, Alternative Technologies for sewage treatment, solutions for clean water, testing of water, BOD, COD, wastewater, soil and solid waste

5	Community Mobilisation and Change Management	<p>To promote interdisciplinary pursuit of knowledge for community mobilization with behavior change communication.</p> <p>To provide tools that drive community effort for sustainable waste management.</p> <p>To persuade individuals and communities to change habits, sensitize public and provide mentorship for lifestyle changes</p>	Film Discussion, Case Study, Field Visit, Group Exercise Seminar, Group Games, Assignments	Urban Neighborhoods and Rural Communities and Dignity of Labour, Collectivisation, Public Health, Bio Hazard, Health care, Gender Issues, Social security schemes, Case studies of successful models across the country, Changing legal requirements. Effective communication, personality development, arbitration/negotiation/persuasion techniques. Strategies for effecting change, helping people to adapt to change.
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Curriculum: Second Semester

S #	COURSE	OBJECTIVES	METHODOLOGY	TOPICS TO BE COVERED
6	Project Management	To orient in project management techniques to create a successful business/manager of waste.	Case Study Small Group Exercise Case on Mapping of Waste and Wastewater management	Conception of Project, Changing Waste Market Survey, Market linkages, Technology Management, Common Waste Management, Redundancy, Backup Service Technological Innovation, Contracting, Sub Contracting, Out-Sourcing, In-sourcing, Demand Management. PERT, CPM, MBO, Gantt Chart(Trend analysis: Statistics) Mapping of Resource, GPS and GIS
7	Entrepreneurship in Waste Management	To provide practical experience in establishing running a WM operation or facility taking into consideration current and futuristic needs.	Case Study, Group Exercise, Seminar, Group Games, Assignments	Overview of Entrepreneurship, Classification; Qualities of an Entrepreneur; Organised and Unorganised sectors Government Schemes, Local Bodies, Case studies of successful models across the country, PPP, Community driven waste management RPs: All Waste Handlers include CBOs and NGOs, Institutions in Swachhta, Companies, Bankers, Rural case studies, Model Project Reports, Term Projects, Prototypes or Turnkey Projects
8	Environmental Costs and Risk Management	To calculate, study and report the socio-economics of neglecting waste management and environmental hygiene	Theories and class room lectures, interaction with experts	Environmental Costs, Risk Assessment, DALY Economic costs, Human Development Costs, Social costs: Vulnerability (who suffers most?), Issues of long term Sustainability; EIA, EMP
9	Reclamation and Remediation	To learn sustainable alternative methods of treatment of Soil and Liquid Waste	Field Visits	Assessment of contamination Availability of Local Choices, evolution of technologies, Eco-friendly technologies, Soil restoration, recovery, soil remediation, Phytoremediation, bioremediation

10	Legal Aspects and Mandatory Regulations	To promote eco - responsible behavior and compliance to regulatory requirements	Field Interaction with litigants, lawyers and other CSO experts Caselets, PILs	Environmental laws regarding pollution and waste management Air Act 1981, Water Act 1974, EP Act 1986 and rules thereof including Hazardous Waste Management Rules1989, BMW Rules MSW Rules 2016, Plastic Waste, C&D and e-Waste Management Rules and updates thereof, NGT and Courts; International and Local Instruments
11	Internship	To promote waste management career options To promote the pre-employment field exposure To promote industry-institution partnership	On site, company visits, field visits, short term organisational interactions	Internship projects in waste management, industry-institution relationship, job description and job specification in waste management and environmental hygiene, careers and opportunities in waste management and environmental hygiene

Assessment Pattern: The course will be modeled in the same pattern as other compulsory courses, with fifty percent (50%) marks assigned for coursework and written assessment, thirty percent (30%) for field work and twenty percent (20%) for presentations and report-writing.

Presentations and report writing: Twenty percent (20%) of total assessment for presentations and report writing is based on weekly seminars and case discussions.

Annexure- 1

Potential areas of building a Career through PGD-EH-W-SWM

On completion of the Course the student will be able to make waste management a rewarding career or a lucrative business in any of the following areas:

- Management of Collectives: which deal with different varieties of wastes, recycling as well as organic compost, or waste-to-energy facility.
- Medical bio-waste management: This includes hazardous biological waste and animal waste from slaughter houses.
- Scrap management systems: The age-old scrap business can be improved immensely through networking and collectives.
- Refuse-derived energy generation: Depending in the quality of waste, energy can be derived through anaerobic digestion or brickets, pellets.
- Waste market promotion: Waste exchange for organic and inorganic waste streams.
- Food banks: Systematic collection and redistribution of excess cooked- and raw-food, while maintaining good, hygienic standards requires round-the-clock dedication.
- Medicine Banks: For collection and redistribution of unused portions of medicines before expiry date.
 - These need to be handled responsibly to avoid misuse.
- Recycling and up-cycling: Methods to reuse resources by harvesting them from old, out-of use goods and converting them into new, useful articles. This is a more economical and environmentally sustainable process than creating fresh goods from scratch.
- Clothes, books and toys banks: The collection and redistribution of unused and gently used clothes, books and toys, while maintaining them during transfer. This provides maximum circulation of these goods, touching the lives of many more children/ families before being discarded.
- Composting: Vegetable waste, fruit waste and garden waste composting. Maintaining and managing

compost facilities and STPs in parks and residential areas is a long-term business.

- Agricultural waste management: Dairy waste and farm animal waste management and composting in the proper way can significantly reduce the dependence on chemical fertilizers while preventing land and water pollution. It will economically benefit the farmer.
- Waste recycling of paper, wood, plastic and metal, and especially glass which can be recycled endlessly if handled responsibly.
- Construction waste and building debris recycling: These can easily be processed to reuse in the construction industry.
- Hotel waste management: The scale and variety of wastes produced by the hotel and hospitality industry
 - demands individual attention; the scope of reuse, up-cycling and recycling is immense.
- Hospital waste management: A flourishing line of work, with special attention to sharps, bio-medical wastes, radioactive wastes and chemicals.
- Water Recycling and Management: Fresh water can be utilized several times if handled in a systematic manner. This area has tremendous scope in present times.
- E-waste management: A specialized area of work, subject to a separate set of stringent norms for handling e-waste.
- Research opportunities: to develop technology for waste management or recycling, or applying traditional knowledge to find new methods to alter wastes into wealth.

This list is indicative and not exhaustive. The number of institutes may be increased to cover as many different institutions as possible to give the students a wide array of experiences.