



VASANTDADA SUGAR INSTITUTE
Department of Environmental Sciences

VSI/ES/FM/04
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Issue No.: 01
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Work Plan: Teaching & Review

COURSE: M. SC.
SUBJECT: ENVIRONMENTAL SCIENCES
SEMESTER: IV (PERIOD: JAN-MAY 2024)

Course/ subject code	Subject Title/Topic	Credits/ Marks	Hours allocated	Faculty Allocated	Mid-term review	Semester end review
EVSUT 241	SOLID & HAZARDOUS WASTE MANAGEMENT	4	60	-	-	-
	Introduction: Definition, Historical development, Source and type based classification, chemical and physical composition, Environmental and health impacts due to solid waste and its handling of it. Characterization: physical & chemical characteristics, implications for solid waste management. Factors affecting solid waste management: Climate, financial, cultural constraint, quality and quantity of waste.		6	HNH		Done
	Municipal Solid Waste management in India: Generation, Collection, segregation, Transportation, Transfer stations, processing and disposal. Assessment of existing situation & possible areas for improvement		8	HNH		Done
	Industrial solid waste management: Pulp and paper, Sugar, thermal power station, textile, food processing, mining, agriculture, etc.		8	HNH		Done
	Treatments and disposal: Waste processing, Recovery of biological and chemical conversion products composting, biomethanation, RDF system, hydrolysis, Pyrolysis, plasma gasification, incineration, sanitary landfills. Resource conservation and recycling		10	AS		Done

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Control Status

Reviewed and Approved by:

Implementation Committee Member

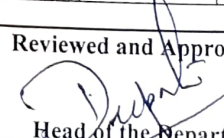
Head of the Department

Date of Mid-Term Review:

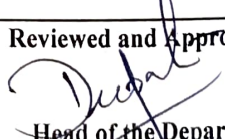
15/04/2024

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	Biomedical waste management: Define, scope, categorization, segregation, packaging/colour coding and container used, treatment, transport and disposal, status in India.		6	NUH		done
	Hazardous waste management: Identification and sources, characteristics and categorization, Collection, segregation, packaging, labelling, transportation, processing (3R), risk assessment and waste management treatment and disposal, storage and leak detection, Site selection criteria, manifest system and records, Indian scenario, Responsibilities of various authorities		14	PBK		done
	Radioactive waste management		4	NBB		done
	Electronic waste management: A growing problem, sources, segregation, collection, recovery of valuable materials, treatment and disposal methods		4	HNH		done
	Plastic waste management- types of plastic, sources, the problem of plastic waste, degradation of plastics, recycling & alternatives to plastic, Maharashtra Plastic Ban notification 2018		4	AMM		done
	Construction and demolition waste management		2	NUH		done
EVSUT 242	RENEWABLE & NON RENEWABLE ENERGY	4	60	-	-	-
	Energy and Environment Energy indicator for development: human development index, UN definitions. Comparison of energy consumption by different nations. Human energy requirement, Energy use pattern in different parts of the world and its impact on the environment; Energy use pattern in India. Sources of		8	DSN & VPP		done

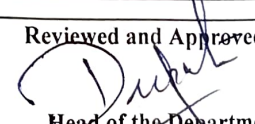
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<p>energy and their classification; Energy forms and transformation. Impact of Energy Systems on environment.</p>					
<p>Fossil Fuels Classification, composition, physiochemical characteristics; Energy content of coal, petroleum and natural gas; Formation, reserves, exploration/ mining and uses of Coal, Oil and Natural gas; Environmental problems associated with exploration / mining, processing, transportation and uses</p>		10	DSN		done
<p>Bio-energy Biomass composition and types; Conversion processes – pyrolysis, charcoal production, compression, gasification and liquefaction; Energy plantation; Biogas– production and uses, anaerobic digestion; Environmental constrains; Energy from solid Wastes – Sources, types, energy production. Bio-energy and Waste to Energy Conversion Systems, Energy Conservation and Management and Energy Laboratory.</p>		8	NBB		done
<p>Nuclear energy Fission and fusion, Nuclear fuels, – Mining and processing of Uranium – concentration, refining, enrichment, fuel fabrication and fuel cycle; Nuclear reactors and radioactive waste; Environmental implications.</p>		6	VPP		done
<p>Solar Energy Sun as source of energy: Source of sun’s energy, solar spectrum, solar radiation – absorption, reflection, scattering and diffusion in the atmosphere, Renewable Energy Integration and Decentralized Generation Systems. Harnessing of solar energy, Photovoltaics, Solar collectors and concentrators, Solar thermal energy, Solar electricity generation, Solar heaters, dryers, and</p>		8	NBB		done

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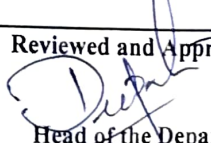
	cookers; Energy Storage Systems and Fuel Cells, Energy in Buildings, Energy Planning and Economics and Energy Field Visits/Industrial Training.					
	Wind energy Wind power, Harnessing of wind energy, Power generation – wind mills, concentrators, wind characteristics and siting, environmental considerations; Wind energy potential in India. Numerical Methods and Computational Techniques, Wind Energy Conversion. Impact of wind energy systems on environment.		6	DSN		Done
	Hydroelectricity Principles of generation of hydroelectric power, hazard related to hydropower generation and distribution, environmental impact		8	DSN		Done
	Geothermal and Hydrothermal energy Sources – crust, high temperature aquifers, low temperature aquifers, reserves; Harnessing of geothermal energy – problems and prospects; Geothermal energy prospect in India. Hydrothermal energy; Tidal and wave energy, Problems and prospects. Small-Hydro and Other Renewable Energy Systems		7	DSN		Done
EVSUT 243	PRACTICALS BASED ON COMPULSORY THEORY PAPERS (EVSUT 241 & 242)	2	30	-	-	-
EVSUT 244	ENVIRONMENTAL TOXICOLOGY HEALTH & SAFETY	2	30	-	-	-
	Safety and Health Hazards Meaning and importance of safety, identification of potential safety and health hazards in industrial and development projects. Reduction strategies, policies and legislation, international and national perspective.		7	EPA & KAU		Done

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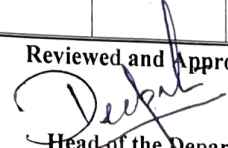
<p>Safety standards and management systems, OSHAS 18001, ISO 45001:2018, Industrial health safeguards and implementation mechanisms. Environmental & Safety policy and its implementation</p>					
<p>Health and Safety Risk Management Risk identification, allocation and mitigation strategies, responsibilities and authority. Potential of health risks in industrial and development processes, local and national policies. Public awareness and participation in prevention procedures. Industrial environmental conditions, emissions and noise abatement.</p>		8	VSD		done
<p>Toxicology (2 lectures) Fundamental of toxicology, Basic concepts, toxicity and its impacts. Nature of toxic effects, Acute and Chronic. Industrial toxicants and hazardous materials.</p> <p>Measurement of toxicity (4 lectures) Measurement of toxicity- LD50, LC50, Nature of dosage-response relationship. Use of dosage-response information, Factors influencing toxicity. Lethality studies, physiological and metabolic effects on flora and fauna.</p> <p>Evaluation of toxicity (6 lectures) Physiological and metabolic effects of toxicants on human being; such as VOC and organic solvents, used in industry, heavy metals such as Hg, As, Cr, Cu, Pb, Al, Zn etc. Effects of Mutagenic, carcinogenic compound and Anti-cancer drugs on human health.</p>		12	DSN		done

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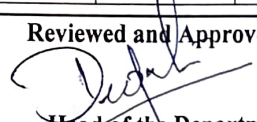
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	<p>Water and Airborne Diseases Human immune-system and its vulnerability to bacteria and viruses, preventive and curative measures, epidemics and their containment.</p> <p>Potential and widespread effects of water and airborne bacteria and viruses.</p> <p>Biological warfare and protective measures.</p> <p>Safeguarding water sources and ambient air quality affected by biological disaster and its management.</p> <p>Role of WHO, NGOs & government</p>		3	PBK		Done
EVSUT 246	PRACTICALS RELATED TO ENVIRONMENTAL TOXICOLOGY HEALTH & SAFETY	1	15	-	-	-
EVSUT 248	CLIMATE CHANGE, POLICY & SUSTAINABILITY	2	30	-	-	-
	<p>Understanding Climate Dynamics-</p> <p>Earth's Palaeoclimatic history: Earth-Life Evolution, Mass Extinctions, Ongoing 6th Extinction</p> <p>Climate Forcing's: Volcanism, Plate Tectonics, Solar Cycles, Magnetic Storms, Glaciation and Inter-glaciation, Global Conveyor belt, Climatic teleconnections, Urbanization & Industrialization</p> <p>Proxies of climate change: Tree rings, microfossils, oxygen-carbon isotopes, speleothems, spores and pollen, trace elements, corals, geochemical proxies</p> <p>Climate Elements and Effects: Green House Gases, Sources and Sinks of GHGs, Role and impact of GHGs, Atmospheric Life of GHGs, Global Warming Vs. Global Dimming, Pre- and Postindustrial emissions</p>		10	ABD / VF		Done
	<p>Climate Change impacts and Protection policies</p> <p>Sectorial impacts of climate change: Impacts of CC on Health,</p>		10	ABD		Done
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15/07/2029						

	<p>Agriculture, Water Resources, Biodiversity, Coastal Areas</p> <p>Regional Vs. Global changes</p> <p>Sector-wise Adaptation & Mitigation Measures</p> <p>History of Global Action Plans: Stockholm Declaration 1972, Nairobi Declaration 1982, 1st Earth Summit Rio 1992, Kyoto Protocol 1997, Copenhagen Summit 2008, Durban Summit 2011, Paris Agreement 2015</p> <p>Intergovernmental Panels working towards mitigating Climate Change: IPCC, UNFCCC</p>					
	<p>Climate Economics:</p> <ul style="list-style-type: none"> Carbon Sequestration; Role of agricultural land in carbon sequestration; Concept of Carbon footprint, carbon credits and carbon trading Concept of water footprint, water trading and its relationship to climate change India's take on Climate Change; Stakes of Developing and Developed Nations Mitigation measures at different scales – global, National, organizational, Individual 		10	ABD		done
EVSUT 249	PRACTICALS BASED ON CLIMATE CHANGE, POLICY & SUSTAINABILITY	1	15	-	-	-
EVSUT 250	<p>DISSERTATION- FINAL ASSESSMENT</p> <p>Students are expected to spend a minimum of 120 days working on a Master's thesis based on research, development of technique, data collection and/or analysis, and work towards a problem that involves goal setting, previous literature survey, systematic laboratory work, reporting results and discussing it in context to existing knowledge.</p> <p>The assessments should be based on</p>	4	-	-		done

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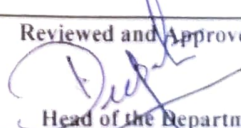
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	supervisor's feedback, continuous progress assessments by departmental faculty, submission of a master's dissertation thesis and a open presentation and Viva voce.						
-	SKILLED DEVELOPMENT- II (Circular No 144/2014 Dt. 04/07/2014)	2	-	VSD			done
-	CYBER SECURITY- IV (Circular No. BCUD/176 Dt. 18/03/2015)	1	-	AVP			done
Signature – Head of the Department							

FACULTY LIST:

DSN- Dr. Deepali Nimbalkar
ABD- Dr. Amol Deshmane
VPP- Dr. Vivek Patil
EPA- Dr. Eknath Alhat
VPP- Dr. Vivek Patil
HNH- Dr. Hemlata Hingane
VSD- Mr. Vikram Deshmukh
KAU- Mr. Kapil Upadhye
PBK- Ms. Priyanka Kad
AMM- Mr. Aftab Momin
NUH- Mr. Nitin Harkar
AS- Mr. Arpit Sawarkar
NBB- Ms. Nishita Bhosale

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