


10/oct/2022

 संशोधनेन संवृद्धिः	<b>VASANTDADA SUGAR INSTITUTE</b> <b>Department of Environmental Sciences</b>	VSI/ES/FM/04 Page No.: 1 of 2 Issue No.: 01 Revision No.: 00 Date: 01.04.2015
	<b>Work Plan: Teaching</b>	

<b>Course: MSc</b> <b>Subject: Environmental Sciences</b> <b>Semester: III (June - Nov. 2022)</b>					
Course/ subject code	Subject Title/Topic	Credits/ Marks	Hours allocated	Allocated to (faculty)	Remark (if any)
EVSUT 231	ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL AUDIT	4	Total 60 Hrs.		
1.	Introduction to EIA		4	HNH	
	Concept of EIA within the frameworks of sustainable development		3 lec		Done
	History of EIA		done		-  -
	EIA - Definition, and Objective/purpose				-  -
	Reasons for using EIA				-  -
	Core Values of EIA - Comprehensive study, sustainability integrity and utility				-  -
	The Eight Guiding Principles of EIA .				Inprogress
	Operating principles of EIA				Pending
	Benefits and flaws of EIA				-  -
	Misconception about EIA and counter arguments that 1) It is expensive and delays projects 2). It is just an add-on and occurs too late to do any good 3). It is too complex and doesn't produces useful results 4). EIA will be misused to stop development. 5). We are too poor to afford EIA				

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Mid term Review Date :- 10/10/22		Semester End Review Date :-

	Key elements of EIA: Screening, scoping identifying and evaluating impacts, mitigations				
2.	<b>Law, Policy and Institutional Arrangements</b>	6	ABD		
	EIA Policy and Legislation - Linkage between EIA and International Conventions				Pending
	EIA in International (World bank, UNDP, Asian Development Bank, etc) and National Development Institutions				Pending
	EIA Policy and Legislation in India			3 lecture	Done
	Prevailing EIA notification and important provisions under the same e.g. a) terms of reference, b) categorization of projects, c) public hearing/consultation procedure, d) validity of terms of reference, environmental monitoring, public hearing, environmental clearance, etc.				-!!-
3.	<b>EIA processes</b>	4	AMM		
	Screening Procedure (as per prevailing EIA notification) including project lists for screening			2 Lec	Done
	Other types of Screening				-!!-
	Criteria for determination of the need for, and level of EIA				-!!-
	Purpose of Scoping				-!!-
	Approaches to Scoping				-!!-
	Scoping Methods				To be done
	EIA Terms of Reference				To be done
4.	<b>Baseline Environmental data collection: Methodology</b>	10	VSD		
	Ambient air quality				Done
	Water including ground and surface				
	Soil conservation				

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	Noise and vibrations				Done
	Hydrology				To be done
	Geology				-  -
	Ecology and Bio-diversity		ABD 3rec		To be done
	Socio-Economic environment				-  -
	Traffic and other data				-  -
5.	<b>Impact Analysis/Assessment, Mitigation and Management</b>		12	ABD	To be done
	Impact Identification				
	Impact Analysis/Prediction: methodology				
	Characteristics of Environmental Impacts - Activity - Impact Characterization				
	Social Impact Assessment (SIA): introduction and methodology				
	Evaluation of Impact Significance				
	Significance Criteria				
	Impact assessment for: a) Land Use, b) Air Pollution Monitoring, Prevention and Control c) Meteorology, Air Quality Modelling and Prediction d) Water Pollution Monitoring, Prevention and Control e) Ecology and Bio-diversity f) Noise and Vibrations g) Socio-Economic h) Hydrology, Groundwater and Water Conservation and Geology i) Soil Conservation j) Risk Assessment and Hazard Management k) Solid and Hazardous Waste Management				
6.	<b>Detailed Procedure for conducts of public hearing</b>		2	DSN	
	a) The Process b) Notice of Public Hearing c) Supervision and presiding over the hearing d) Proceedings e) Time period for completion of public hearing f) Arguments for and against public involvement				
7.	<b>Final Appraisal of project</b>		1	DSN	

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	a) Grant or Rejection of Prior Environmental Clearance b) Validity of Environmental Clearance c) Post Environmental Clearance Monitoring d) Transferability of Environmental Clearance				
8.	<b>Documentation of EIA</b>		12	ABD	
	EIA report / report writing - Typical Elements of an EIA Report (as per prevailing EIA notification)				VSD Done
	Case studies: for EIA report a) iron ore or bauxite mines, b) coal based thermal power plants, c) sponge iron industry, d) cement, e) infrastructure such as airport/port (sea port), road/highways, construction of dam, f) sugar, g) distillery and h) housing/township projects				<u>VSD</u> Done
	Impact assessment statement				} To be done
	Environmental management Plan				
	Post Project monitoring-				
9.	<b>Environmental Audit</b>		11	EPA	
	Definition of environmental audit and its importance for industries. Environment Compliance Audit. Basic structure of audit. Elements of an audit process and its importance with respect to Form-V. Environment Audit in India - Development of environmental auditing in India, Concept of ISO 14000, requirements of Rule 14 for environmental audit under Environmental Protection Act, 1986. Definitions -signatory, consumption audit, pollution audit, hazardous audit, solid waste audit, disposal audit, cost audit, investment audit, voluntary				<u>To be done</u>

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EVSUT- 232	REMOTE SENSING & GIS	4	Total 60 Hrs.		
Unit I	REMOTE SENSING			PSD	
1.	HISTORY OF REMOTE SENSING & INDIAN REMOTE SENSING		2		
2.	BASICS OF REMOTE SENSING: -definitions -components -active & passive -EMR spectrum -Radiation laws		4		
3.	TYPES OF REMOTE SENSING -optical, infrared, microwave, hyperspectral, LIDAR		2		
4.	RESOLUTION OF RS DATA -spectral, spatial, radiometric, temporal -Spectral signatures -Spectral reflectance curve for vegetation, soil, water		4		
5.	INTERACTION OF EMR -reflection, absorption, transmission, scattering, refraction, emission, reflectance -atmospheric windows		4		
6.	BASICS OF AERIAL PHOTOGRAPHY -Geometric features -photo interpretation elements		2		
7.	REMOTE SENSING PLATFORMS: TYPES-geosynchronous, sun synchronous polar orbit		2		
8.	REMOTE SENSING ORBITS: -SCANNING SYSTEMS-multi spectral scanning, push broom, whisk broom, overlap.		3		
9.	TYPES OF SENSORS- LISS III, LISS IV, Awifs, PAN, CARTOSAT, LANDSAT, RADAR, SRTM, IKONOS		2		

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Unit II	GIS			SAS	
1.	HISTORY OF GIS		1		
2.	COMPONENTS OF GIS		1		
3.	TYPES OF DATA IN GIS: Spatial, non-spatial Vector, raster Vector-point, line, polygon Types of non-spatial data: Hierarchical, network, relational, object oriented		4		
4.	SHAPE OF THE EARTH: Geoid, spheroid, ellipsoid concept		2		
5.	MAP PROJECTIONS & DATUM -Types of datum -types of projections		4		
6.	ACQUISITION OF SPATIAL DATA -Scanning, geo referencing, layer, digitizing		3		
7.	SPATIAL ANALYSIS: -Vector: overlay operations -Topology concept, errors in topology -Raster analysis		20		
Unit III	APPLICATIONS				
1.	SATELLITE IMAGE PROCESSING AND INTERPRETATION: -Factors governing Interpretability, -Elements of image interpretation. -Image correction, rectification techniques.		4		
2.	GPS -Concept and application -Indian navigation system IRNSS/Navic		1		
3.	DEM MODELS -DEM, DTM, DSM -applications of these models		1		

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4.	<b>Applications of RS and GIS in Environmental Sciences</b> -Land use land cover -natural hazards & disasters -hydrology -soil, water, air monitoring -geological applications -climate change -agriculture -wildlife, etc. -Case studies of analysis using RS GIS		8		
5.	<b>Latest technological advancement and trends in RS GIS</b> -wearable GIS -tracking -drone mapping and environmental survey, etc.				

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EVSUT 233	<b>RESTORATION ECOLOGY AND WATERSHED MANAGEMENT</b>	4	Total 60 Hrs.		
1.	<b>Restoration Ecology</b> Eco Restoration: definition, principles, significances, guidelines, etc.	}	4	ABD	<u>Done</u>
2.	<b>Applications of eco-restorations</b> <b>Restoration of urban eco-system</b> – e.g. ponds, lakes, river banks, avenue trees, biodiversity restoration through gardens, park, restoration of dumping grounds, restoration of eco system on hills, restoration of soil in urban areas, ground water resource – replenishment, sewage or wastewater – recycling for supporting ecosystems		6	ABD	Done
3.	<b>Eco-restoration and industrial environment</b> Eco-restoration of mines (open cast), restoration of solid waste dumping sites, Improving aesthetics by partial restoration at industrial sites		3	ABD	Partial done
4.	<b>Steps involved in Restoration</b> Identifying problem, assessment of project sites and parameters, identifying threats, methods available for restoration, selection of restoration methods, monitoring techniques for effective restoration		4	ABD	To be done
5.	<b>Restoration of other natural habitats/eco-systems</b> Mangroves, grasslands, wetlands, restoration of streams, degraded forest patches, coastal ecosystems, etc.		2	ABD	To be done

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6.	<b>Watershed Development: Concept of watershed management</b> Definition, principle, objectives, Water shed morphology and characterization (with respect to size, elevation & slope, aspects & orientation, watershed shape, drainage network)	✓	10	MASr	<u>Done</u>
7.	<b>Watershed functions and surveys</b> Collection, storage, dispersal, habitat, Attenuation response, flushing, etc. Engineering surveys involved in watershed development: Topographical survey, drainage line survey, contour survey, common instruments used for survey. Hydrological survey: Methodology for groundwater investigation, investigation of surface springs, vertical distribution of ground water		8	MASr	25% done
8.	<b>Water balance studies and harvesting methods</b> Water balance and hydrologic equation, inflow to the watershed, outflow from the watershed. Water harvesting methods: traditional water harvesting structures such as nadis, Khadin, Rapats, Lakes, etc. contour bunding, graded bunds /field bunds, land leveling or terracing, farm ponds;  <b>Water harvesting in streams:</b> Biological measures, check dam, gully plug, Gabion structure, Overflow weir, earthen dam, Underground bandhara. Soil and water conservation aspects: contour trenches, continuous contour benches, live hedges,		8	MASr	

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	infiltration pit, in situ conservation through appropriate cultivation practices				
9.	<b>Watershed Interventions</b> Watershed Features: Surface Water Yield, Soil texture, Compatibility of soil, Infiltration Capacity of soil, Run off, Slope, etc. Watershed interventions in Ridge Area, Drainage Line and On-Farm Interventions. Designing and layout: contour trench, Earthen Contour bunds, gully plugs, Gabion Structures, underground dykes, earthen dams, farm bunds and dugout farm ponds.		8	MRE	
10.	<b>Watershed management</b> Factors, problems associated with watershed management, project monitoring and result indicators, repair and maintenance, etc. Success stories of watershed management/water harvesting projects in India			MRE	

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EVSUT 234	<b>PRACTICALS RELATED TO COMPULSARY THEORY PAPERS</b>	3			
1.	<b>EIA &amp; ENV AUDIT</b> i. Baseline data collection for one season of any project ii. Case study of any one project		15 <u>3x5</u>	ABD/ VSD	
2.	<b>RS &amp; GIS</b> 1. Aerial photo image interpretation 2. Aerial photo geometry, scale, measurement of relief numerical 3. Google Earth 4. GPS: collection of field data 5. Installation and familiarization with QGIS free software 6. Browsing and downloading data: From LANDSAT, BHUVAN 7. Toposheet Geo referencing 8. Toposheet Digitization & Preparation of map and map layout 9. Satellite image registration 11. Satellite image enhancement and correction tools 12. Image classification: Supervised and unsupervised 13. Satellite image interpretation			PSD/PK  All pract. Pending	
3.	<b>RESTORATION ECOLOGY &amp; WATERSHED MANAGEMENT</b> 1. Mapping of watershed (marking of ridge areas and drainage lines), estimating area and slope. 2. Watershed Planning exercises at milli-watershed level, location specific with identifying specific Watershed interventions required. 3. Rapid site assessment and data interpretation of any degraded ecosystem (field visit) 4. Study of Restored Sites through Visit and Scientific Report writing based on visit(field visit)			ABD  All pending	

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EVSUT 236	ENVIRONMENTAL RESOURCE MONITORING	2			
1.	<b>Introduction</b> Introduction to environmental monitoring; Basics of resources to be monitored.		2	<del>HNN</del> VPP	Done
2.	<b>Air Quality Parameters</b> a. <b>weather monitoring</b> - includes light, rainfall, wind direction, wind velocity, temperature, pressure, humidity, etc. broad significance of each of the parameter, monitoring tools/instruments and its work principle, data reporting/presentation method(s), etc. b. <b>ambient air</b> - national standards for ambient air quality, site and parameter selection, monitoring of important ambient air components such as particulate matter (PM) of 10 micron or less in size and 2.5 micron and less in size, oxides of sulfur and nitrogen, etc limits/standards for these parameters under OSHA, ambient air and work zone monitoring techniques; monitoring tools/instruments used for the same and its work principle, stack gases monitoring technique; limits for different industries for stack gases, stack height determination, criteria for sampling port (Indian Standard (IS) and/or international standards linked with these elements need to be familiarized to student) c. <b>Noise &amp; vibration monitoring</b> : Introduction of noise & vibration; measuring techniques, national standard for noise, noise monitoring methods, d. <b>Noise Impact Criteria</b> : Investigation and assessment of impact of noise; Considerations In Applying the Noise Impact Criteria; Mitigation Policy Consideration; Determining the Need for Noise Mitigation e. <b>Odour monitoring</b> : basics, technique/ methodology		8	VPP	a) Done b) AAG done  To be done  -11-  -11-

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3.	<b>Methods for monitoring/sampling of water and its analysis</b> Monitoring of Water, purpose/objectives of monitoring, selection of method suitable to fulfill monitoring objective; Water Quality Monitoring Protocol, frequency and parameters for ground water & surface water, collection of sample (types of sample, chain of custody, sampling method, number of samples, sample containers, sample volume, etc), sample preservation, handling & storage guidelines/criteria, water quality monitoring on field test parameters, off-field test parameters, water quality criteria for different designated best uses; general effluent standards, drinking water standard (IS 10500 and WHO standards); Safety practices Monitoring of pollution of water bodies (rivers, streams, creeks, seas, oceans, etc), monitoring methods, tools/instruments, impact prediction and analysis	5	HNH  2 lecture	Partially done  In progress
4.	<b>Monitoring of Soil</b> Objectives of soil monitoring/testing, sampling and sample units; sample number, frequency and timing; Sampling methodology; a. Site selection b) Infield sampling technique c) Describing the soil profile d) Site description e) Setting a transect instruments / Equipments used, Quality Parameters (testing contaminants/polluting elements), important soil quality indicators - soil acidity (pH); EC; carbon (C); total nitrogen (N) and carbon to nitrogen ratio; extractable phosphorous (P); extractable potassium (K) and magnesium (Mg); micro nutrients and potentially toxic elements; useful soil microbes. Basic concepts in analysis, Guidelines for handling and storage of samples; Safety practices	5	HNH Nitin	— To be done
5.	<b>Forest resource monitoring</b> Definition and scope. Measurement of individual trees: a) Measurement of diameter and girth of trees b) Measurement of heights of trees c) Measurement of form of trees d)			To be done  — Faculty

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	Measurement of volume of felled trees e) Measurement of volume of standing trees f) determination of age of trees g) determination of increment of trees, increment percent, Sample plot, forest inventory, kinds of sampling, sampling units, sampling intensity. Wild life monitoring: scope, methods/ techniques a) census for invertebrates, fish, amphibian, reptiles, birds and mammals				
EVSUT 237	Practicals based on ENVIRONMENTAL RESOURCE MONITORING	1		HNH/VPP /ADT	
1.	1. TO BE INCLUDED				In progress

Pract. AAQ Demo - done

Water: Major para covered — PH, EC,

1) Water sampling/handling & storage — Alkalinity — done ✓

2) Soil: ———— — Done

Met station visit — IMD visit

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