

SCHOOL OF ENVIRONMENTAL SCIENCES
MAHATMA GANDHI UNIVERSITY, KOTTAYAM
Credit and Semester System
Syllabus for
MSc. Environment Science and Disaster Management
2016 Admission onwards

Semester I

Course	Sl .No.	Course Code	Name of the Course	Credits	Credits Required	Total Credits
Core	01	SES M I C 16 01	Ecology and Environment	2	14	20
	02	SES M I C 16 02	Environmental Geosciences	3		
	03	SES M I C 16 03	Environmental Chemistry	2		
	04	SES M I C 16 04	Environmental Pollution and Control	3		
	05	SES M I C 16 05	Research Methodology and Statistics	2		
	06	SES M I C 16 06	Lab course-I (Environmental Chemistry, Geosciences and Ecology)	2		
Elective	07	SES M I E 16 07	Natural and anthropogenic disasters	2	6	
	08	SES M I E 16 08	Energy Resources	2		
	09	SES M I E 16 09	Nature Studies-Field skills and techniques	2		
	10	SES M I E 16 10	Introduction to Remote Sensing and GIS	2		

Semester II

Course	Sl .No.	Course Code	Name of the Course	Credits	Credits Required	Total Credits
Core	11	SES M I I C 16 11	Analytical Techniques and Instrumentation	2	16	20
	12	SES M I I C 16 12	Environmental Biotechnology and Waste Management	3		
	13	SES M I I C 16 13	Environmental Economics and Sustainable Development	2		
	14	SES M I I C 16 14	Environmental Microbiology	2		
	15	SES M I I C 16 15	Environmental Laws, Ethics, Education and Policy	2		
	16	SES M I I C 16 16	Biodiversity and Conservation Biology	2		
	17	SES M I I C 16 17	Lab course-II (Environmental Chemistry, Environmental	2		

			microbiology, Biotechnology, RS & GIS)			
	18	SES M II C 16 18	Field Study	1		
Elective	19	SES M II E 16 32	Social Work Approaches and Practices	2	6/4	
	20	SES M II E 16 33	Urban and Rural Community Development	2		
	21	SES M II E 16 34	Public health aspects and emergency services in disaster management	2		

Semester III

Course	Sl .No.	Course Code	Name of the Course	Credits	Credits Required	Total Credits
Core	22	SES M III C 16 24	Advanced Analytical Instrumentation	2	16	20
	23	SES M III C 16 27	Climate Change and Governance	2		
	24	SES M III C 16 35	Disaster Risk Assessment and Management	2		
	25	SES M III C 16 36	Standards in Humanitarian Aid, Relief and Rehabilitation	2		
	26	SES M III C 16 37	Governance, Law and Policies in Disaster Management	2		
	27	SES M III C 16 38	Advanced Geospatial Techniques in Disaster Risk reduction and Management	2		
	28	SES M III C 16 39	Community Based Disaster Management	2		
	29	SES M III C 16 40	Group Project/Field work	2		
	30	SES M III C 16 29	Current issues and trends in Environmental Science	0		
Open Course					4	

Semester IV

Course	Sl .No.	Course Code	Name of the Course	Credits	Credits Required	Total Credits
Project	31	SES M IV C 16 41	Internship (Community/Institution) – One month (Report – 2, Viva -2)	4	4	20
		SES M IV C 16 42	Project (Thesis – 12, Viva – 4)	16	16	

Credit for core Courses : 46

Credit for elective courses : 14

Credits for the Project & Internship : 20

TOTAL : 80

**SCHOOL OF ENVIRONMENTAL SCIENCES,
MAHATMA GANDHI UNIVERSITY , KOTTAYAM**

M.SC. Environment Science and Disaster Management 2016

FIRST SEMESTER

SES 504 B Lab course-I (Environmental Chemistry, geosciences and ecology)

Environmental Chemistry

Volumetric Analysis: Basic Principles

Acidimetry and Alkalimetry—Estimation of hydrochloric acid, sodium carbonate, oxalic acid

Permanganometry- Mohrs salt, potassium permanganate

Investigatory projects: Available chlorine in bleaching powder, analysis of tea leaves, Analysis of fertilizers

Ecology

Biodiversity assessment : Quadrature method

Plankton analysis

Environmental Geosciences

Identification of rocks and minerals

Soil analysis- Physical (Texture, Bulk density, moisture content) and chemical parameters (pH, OC/OM, EC)

Wind rose

Measuring strike and dip of rock formations. Basic map reading.

Water quality

Colour, turbidity, conductivity, TDS, TSS, TS, pH, acidity, alkalinity, chloride, salinity, hardness, DO, BOD

Noise analysis

References

APHA (1995). Standard methods for the examination of water and wastewater. 19th edition
American Public Health Association, Washington, DC

Maiti, S.K. (2003) Handbook of methods in environmental studies, Vol. 2: Air, noise, soil, overburden, solid waste and ecology. ABD Publishers, Japur.

Marc Pansu, Jacques Gautheyrou, Hand book of soil analysis- Minerological, organic and inorganic methods, Springer, New York

Maria Csuros and Csaba Csuros, Environmental Sampling and Analysis for Metals, Lewis Publishers

Miroslav Radojevic and Vladimir N Bashkin, Practical Environmental Analysis, RSC Publishing

Conklin Alfred R. Introduction to Soil chemistry, analysis and Instrumentation, Jhonwiley&Sons Newyork

NEERI , Air quality monitoring, A course manual (Photostat), NEERI Nagpur

Mamata Tomar, Quality Assessment of Water and Waste Water, Lewis Publishers London

Abbasi S A, Water quality sampling and analysis, Discovery Publishing New Delhi

Christian Gary D, Analytical Chemistry, JhonWiley & Sons NewYork

SES 532 B Ecology & Environment

The course would enable the students to:

Understand the concepts of Ecology and Environment

Study the structure, organisation and processes in ecosystem

Understand the structural and functional aspects of a population as an ecological unit

Explain the concept of biological community, changes and interactions within community

1.1 Introduction

Basic concepts of Environment –

Multidisciplinary approach

Basic concepts - Science, Matter and Energy

Evolution of earth, origin of species, diversity and distribution of species

Global environmental issues – an introduction

1.2 Ecology

Definition, History of ecology, Subdivisions, Ecology and other subjects. Fundamental ecological variables

Ecosystems: Definition, Components, Structure and function, Size of Ecosystem, Classification of ecosystems

Comparative Ecosystem Ecology

1.3 Population Ecology

Definition, Structure and Measures

Population Growth, Population regulation Strategies of species

survivability Population Genetics

Human Population

1.4 Community Ecology

Concepts, Community gradients, Characters of community

Ecological Succession and climax Community

Organization Interactions between species

Stress Ecology and Adaptation

1.5 Applied Ecology

Estimating Abundance Species diversity measures

Diversity indices

Mathematical ecology : Ecoinformatics

Museology

Taxonomy and Biosystematics

Biomass productivity and estimation techniques

References

1. Brewer, R. (1994), The Science of Ecology, Saunders College Publishing, New York.
2. Chapman, J. L. And Reiss, M. J. (1992), Ecology: Principles and Application, Cambridge University Press, Cambridge.
3. Groombridge, B. (ed) 1992. Global Biodiversity: Status of the Earth's Living Resources, Chapman and Hall, London.
4. Hughes, J, D. 2001. An Environmental History of the World. Routledge, London.
5. Michael, P. 1990. Ecological methods for Laboratory and Field Investigations, Tata McGrew Hill Publishing Company Ltd, New Delhi.
6. Odum, E. P. 1971. Fundamentals of ecology
7. Sutherland, W. J. 2004. 1997. Ecological Census Techniques - A Handbook. Cambridge University Press. P336.

SES 533 Environmental Geosciences

Objective

1. To create the awareness that geology is a process-based unified field of science
2. To enable deciphering of processes through study of earth features
3. To appreciate the concepts of geologic time and to view earth as a system
4. To build up the basic vocabulary of geology and the underlying concepts.

Unit 1 The Earth System

The Scientific Method – Earth as a System of Interacting Components - Geologic Time - The Geologic Record – Evolution of life

Plate Tectonics: Interior of the earth- – Plate mosaic – Rates of plate motion – Plate reconstruction – Mantle convection

Basic geological processes-Mountain building, volcanic eruption, seafloor spreading

Geological Time Scale, Stratigraphic time and absolute time. Origin of the solar system

Paleoenvironment and its significance

Tropical, Temperate and Polar systems –physical variations and significance

Unit 2 Materials of the earth

Minerals – Atomic structure of minerals – Rock-forming minerals – Physical properties of Minerals

Rocks: igneous, metamorphic and sedimentary - Origin – The rock cycle

Characteristics of different types of rocks

Rock deformation: folds, faults and joints

Weathering and erosion: physical, chemical weathering of Soil.

Resources and reserves - Minerals and Population - Marine minerals-

Fossil fuels – formation and significance

Unit 3 Geomorphology

Geomorphology-basics

Geomorphology of India and Kerala: Brief description of different important units

Rivers & Streams: Valley, channel, floodplain, drainage network, drainage basin.

Glaciers– types and characteristics

River morphology –morphological parameters and its environmental significance; meanders, oxbow lake etc.

Sedimentary environment

Unit 4 Oceans and coasts

Origin and composition of sea water. Ocean and coastal ecosystems – Types and formationestuaries, backwaters, coral reefs, Islands , Fjords

Ocean currents and circulation, Shoreline process – wave erosion, deposition or accretion; modification of shorelines;

Unit 5 GROUND WATER IN THE ENVIRONMENT

Hydrological cycle-

Aquifers – types and properties, water table

Ground water recharge-recharge areas-discharge areas-

Ground water movement -base flow-measurement

Effect of pumping wells on ground water table-

Methods of ground water abstraction ---undesirable side effects of over exploitation-threats to ground water system-physical destruction of aquifers-ground water depletion-degradation of ground water quality-point source of contamination-diffuse source of contamination- aquifer vulnerability-aquifer over exploitation-

Sustainable ground water development-ground water estimation-ground water management-over exploited, critical and semi critical areas-ground water act in Kerala--artificial ground water recharge

Unit 6 Lithosphere and Atmosphere

Structure and composition of the atmosphere, hydrosphere, lithosphere.

Interaction between lithosphere and atmosphere: Winds, Precipitation etc.

Wind – types and formation, role in transportation, erosion, deposition

Precipitation – rainfall, snow fall.

Humidity and radiation

Monsoon, El Nino, Droughts, Tropical Cyclones

Atmospheric stability, inversions and mixing heights, wind rose

Unit 7 Resources and the Environment

Environmental impacts of mineral resource extraction and processing,

Sand mining – river and terrestrial ; Impacts on physical and biological systems

Quarrying, Clay mining and destruction of hillocks – impacts

Geological issues in the disposal of domestic waste and industrial waste

Shoreline activities and impacts

References

1. Grotzinger et al 2007 Understanding Earth WH Freeman New York 579 p
2. Soman K 2001 Geology of Kerala Geological Society of India Bangalore 430 p
3. Fetter CW 1990 Applied Hydrogeology CBS New Delhi 592 p
4. Krishnan MS 1976 Geology of India and Burma CBS New Delhi 433 p
5. Stewart RH 2007 Introduction to Physical Oceanography 353 p

(http://oceanworld.tamu.edu/home/course_book.htm) Accessed 13 Sept

SES 534 A : Environmental chemistry

Unit I

Definition. principles and scope of Environmental Science. Chemistry and the Environment, Earth. Man and Environment. Water and the hydrosphere, Air and the atmosphere, Energy and cycles of energy, Chemical fate and transport.

Unit-II

Mass and Energy transfer across the various interfaces, material balance. First and Second law of thermodynamics. heat transfer' processes, Fundamentals of Environmental Chemistry.; Stoichiometry, Gibbs' energy. Chemical potential;. chemical equilibria, acid- base reaction. solubility product, solubility of gases in water, the carbonate system. Unsaturated and saturated hydrocarbons" radionuclide's.

Unit III

The atmosphere and atmospheric chemistry, Energy transfer in atmosphere, Global climate and microclimate, chemical and photochemical reactions in the atmosphere, reactions of atmospheric oxygen, composition of Air : Classification of elements, chemical speciation. Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matter. Chemistry of air pollutants, Photochemical smog.

Unit IV

Fundamentals of aquatic chemistry, The importance of water, The properties of water, gases in water, Calcium and other metals in water, Polyphosphates and phosphonates in water, concept of DO, BOD, COD, sedimentation, coagulation, filtration, Redox potential.

Unit V

Soil Chemistry : Nature and composition of soil, Inorganic and organic components of soil, acid base and ion exchange reactions in soils, macro and micronutrients in soil, Nitrogen pathways, NPK in soils.

Reference

Manahan Stanley E ., Environmental chemistry, Lewis Publishers London

Nyle C Brady, Nature and Properties of Soil, Macmillan

Air Pollution, M. N. Rao and H V N Rao, McGRAW HILL

[Principles of Environmental Chemistry](#), James Girard

[Green Engineering: Environmentally Conscious Design of Chemical Processes](#), David T. Allen

[Chemistry Fundamentals: An Environmental Perspective \(2nd Edition\)](#), Phyllis Buell

SES 535 A ENVIRONMENTAL POLLUTION AND CONTROL

The course would help the students to :

- *Understand the sources and impacts of pollution of various environmental matrices*
- *Explain the fate and transport of various pollutants*
- *Learn methods for the analysis of various pollutants*
- *Understand the environmental monitoring techniques and quality standards*
 - *Understand the different pollution control measures*

Unit I : Air Pollution and management

Natural and anthropogenic sources of pollution. Primary and Secondary pollutants. Transport and diffusion of pollutants. Gas laws governing the *behavior* of pollutants in the atmosphere. Indoor air pollution, Methods of monitoring and control of air pollution SO₂, NO, CO, SPM. Effects of pollutants on human beings, plants, animals, materials and on climate. Acid Rain. Smog, Air quality Standards, Air Sampling techniques. Identification of aeroallergens. Air-borne diseases and allergies.

Unit II : Water Pollution and management

Types of water pollution-surface and ground water, Origin and Sources, Nutrients and Eutrophication, Organic matter - sources and degradation, Microbial pollution, Coastal and Marine pollution-Oil spills, Thermal pollution, Movements of contaminants in ground water , Impacts of water pollution, Heavy metals and other POPs in aquatic systems cycling and interactions, Water quality parameters-physical, chemical and biological, Management of point and non-point sources of water pollution, Monitoring of quality parameters, Sampling and analysis, Water quality standards, Tracers – dyes and isotopes in pollution monitoring, water pollution control.

Unit III: Soil Pollution and management

Soil quality parameters , sampling, Physico-chemical analysis of soil quality. Soil Pollution Control. Industrial waste effluents and heavy metals, their interactions with soil components. Soil micro-organisms and their functions, Degradation of different insecticides, fungicides and weedicides in soil. Different kinds of, synthetic fertilizers (NP & K) and their interactions with different components of soil.

Unit V: Noise Pollution and Management

Characteristics of noise, sources, Effects of noise, Standards, Measurement and control

Unit VI : Radioactive pollution

Radioactivity in the environment – natural and anthropogenic, Nuclear weapons, nuclear waste, Impacts on the environment, Management of radioactive waste

Reference

Abbasi S A , Environmental pollution and its control, Cogent international Pondichery

Cunningham William P Saigo Barbara Woodworth ., Environmental science, Mcgraw Hill London

Gaur G , Noise pollution and its management, Sarup & Sons New Delhi

Helmer Richard Hespanhol Ivanildo , Water pollution control, E and FN Spon London

Kearney Philip C Roberts Terry, Pesticide remediation in soils and water, JhonWiley & Sons NewYork

Lichtfouse Eric Schwarzbauer Jan Robert Didier, Environmental chemistry, green chemistry and pollutants in ecosystems, Springer Tokyo

Lippmann Morton, Environmental toxicants human exposures and their health effects, JhonWiley & Sons NewYork

Manahan Stanley E ., Environmental chemistry, Lewis Publishers London

Mc Bride Murray B., Environmental chemistry of soils, Oxford University Press New York

Mishra P C., Soil pollution and soil organisms, Ashish Publishing New delhi

Nebel Bernard J Wright Richard T, Environmental science, Prentice Hall International

New Jersey

Neill Peter O O'Neill Peter, Environmental Chemistry, Blackie Academic London

Prabhakar V K, Toxic and Hazardous chemicals, Anmol NewDelhi

Prasad M N V, Metals in the Environment, Marcel Dekker Newyork

Rao CS, Environmental pollution control engineering, Newage Newdelhi

Sarkar Bibudhendra, Heavy metals in the Environment, Marcel Dekker Newyork

Sharma B K Kaur H , Water pollution, Krishna prakashan Meerut

Trivedi P R Gurdeep Raj , Noise pollution, Akash deep Publishing House New Delhi

Vanloon Gary W Duffy Stephen J., Environmental chemistry: a global perspective,
University Press Oxford

SES 536: Research methodology and Statistics

I. RESEARCH METHODOLOGY

1.1 **Meaning-** Objectives- motivation- Significances of research, Types of research, Research methods and methodology, Research and Scientific Method, Criteria of Good research, Problems of researcher

1.2 **Selection of the problem:** Criteria for selection of problem and evaluating problems, Statement of problem formulation and definition.

1.3 **Research design:** Meaning, need for research design, Features and important concepts relating to research design, Different research design, Basic principles of experimental design.

1.4 **Survey of literature:** Different methods of surveying literature, different sources of information, internet, search engines, web sites, recording surveying information.

1.5 **Hypothesis:** Nature, types and sources of hypothesis, characteristics of a good hypothesis.

1.6 **Sampling:** Unit of sampling, population: techniques, characteristics of good samples, sampling errors and ways to reduce them.

1.7 **Collection and analysis and interpretation of data:** Procedure of data collection, scoring of data, tabulation, editing and analysis and interpretation of data.

1.8 **Research Report:** Composition, pagination, Title pages, Systems of indicating references, Bibliography, Appendices.

1.9. **Mini project** for data analysis

II. Statistics

Unit 2: Fundamental Statistics

2.1. **Introduction** – Importance and limitation.

2.2 **Classification and Tabulation** of data

2.3 **Graphical Representation**

2.4 **Measures of Central Tendencies** – Mean, Median and Mode

2.5 **Measures of Dispersion** - Range, Standard Deviation and Co-efficient of Variation

2.6 **Moments, Skewness and Kurtosis**

2.7 **Correlation and Regression** – Scatter diagrams – Karl Pearson's Coefficient of correlation – Rank correlation – Linear and Curvilinear regressions.

2.8 **Probability** – Frequency approach- Addition and multiplication theorems- Binomial, Poisson and Normal Distribution- Probit analysis (Graphic Method only)

2.9 **Testing of Hypothesis:** Null and Alternative Hypothesis – Two types of error – Level of significance Test based on t, Z, F, Chi –square and Analysis of Variance – one-way, two-way, three-way analysis.

Unit 3 Application of Computer in Statistics

Data analysis using packages - SPSS

References

1. Ahuja Ram, Research Methods, Rawath Jaipur.
2. Babbie Earl, Research methods in sociology, Cengage Learning Australia.
3. Denscombe Martyn, The good research guide: for small scale social research projects, Viva Books New Delhi.
4. Devendra Thakur, Research methodology in social science, Deep & Deep Publications New Delhi
5. Gurumani N, Research methodology for Biological Sciences, MJP Publishers Chennai
6. Holmes Debbie Moody Peter Dine Diana, Research methods for the biosciences, Oxford Newyork.
7. Kothari C R, Research methodology: methods and techniques, Wiswa Prakashan New Delhi.
8. Mohankumar P S , Handbook on research methodology, Right Publishers Kudanechoor
9. Narwal S S Dahiya S S Singh J P, Research methods in Plant science, Allelopathy Vol 1, Soil analysis, Scientific Publishers Jodhpur.
10. Prabhakar V K, Research methodology and system analysis, Anmol NewDelhi
11. Santosh Gupta, Research methodology and statistical techniques, Deep & Deep Publications New Delhi
12. Barnett Vic, Environmental statistics, methods and applications. JhonWiley & Sons NewYork.
13. Gupta S P, Statistical methods, Sultan Chandh New Delhi
14. Jayaraman K, Handbook on statistical analysis in forestry research. Kerala Forest Research

Institute Peechi.

15. Kozak Antal Kozak Robert A Staudhammer Christina L Watts Susan B, Introductory Probability and Statistics, applications for forestry and the natural sciences, Cab International Wallingford.
16. Levin Richard I Rubin David S, Statistics for Management, Edition 7, P H I NewDelhi
17. Miller Jane, Statistics for advanced level, Ed.2, University Press Cambridge.

SES 537: Natural and Anthropogenic Disasters

Unit 1 Disaster Management Concepts and Field of Study

2.1 Introduction to key concepts, terminologies and their complexities (Hazard, vulnerability, Exposure, Risk, Crisis, emergencies, Vulnerability, Disasters, Resilience) Types and classifications of disasters-Natural and Human made, Anthropogenic, Chemical, Biological etc., Impact of disasters,

2.1 Disaster management Spectrum and its components

2.3 Scope of DM and Disaster Management Cycle

Unit 2 Disasters and Development – Introduction

1.2 Relationship between disasters and development, implications. History of disaster

Response strategies

1.2 Disasters, Poverty and Development. Global challenges and trends of Disasters

1.3 Disaster Management: The interaction of Earth system and Human System

1.4 1.Disaster Risk Management - key concerns. Mainstreaming Disaster Risk Reduction to developmental efforts.

1.5 Geography and dimensions of Disasters- global out look.

Unit 3 Environment and Disasters

3.1 Science and Facts of Natural Hazards. Earth's processes as disasters: Internal and external Characteristics.

Causal factors and characteristics of disasters.

3.2 Disaster typology and Classification.

3.3 Water and climate related disasters

3.4 Geologically related Disasters

3.5 Biologically related Disasters

3.6 Chemical, Industrial and Nuclear related Disasters

3.7 Accident related Disasters

3.8 Climate change and Disasters

Unit 4 International Disaster management System

4.1 Organizations, bodies and Finance. International Strategies and functions. United Nations role in Disaster management.

4.2 International Disaster management support system. Unified response strategy 4.3

Mapping Disasters using global datasets. National and international information networks and inventories.

Unit 5 Disaster Management in Indian Context

5.1 Major Disasters in India. National Vulnerability profile

5.2 National Disaster management Hierarchy and Institutionalisation

5.3 National Disaster Decision support system. Technological applications. Role of Research Organisations.

5.4 Challenges of disasters in India

References

Coppola D. P., 2007. Introduction to International Disaster management. Elseiver.

Butterworth-Heinemann

Peduzzi P., Dao H., and Herold C., 2005. Mapping Disastrous Natural Hazards Using

Global Datasets Natural Hazards Volume 35, Number 2, 265-289,

Shaw R and Krishnamurthy R.R., (ed.)2009. Disaster management Global Challenges and

Local solutions. University Press, India

Keller E.D., and Blodgett R. H, 2006. Natural Hazards. Pearson Printice Hall

Kapur A., Neeti, Meena, Deepthima, Roshani and Debanjali, Disastetrs in India Studies aof Grim

Relaity. Rawat Publications, New Delhi

SES: 538 Energy Resources

Unit I: Introduction

- 1.1 Fundamentals of energy, work, power and units
- 1.2 Energy transformations – laws of thermodynamics
- 1.3 Flow of energy and cycle of matter in the human ecosystem: Energy for household, industrial and agricultural uses.
- 1.4 History and geography of energy development and energy related pollution
- 1.5 Concepts of Conventional, Non-conventional, Renewable, Non-renewable and Alternate energy resources.

Unit II: Non-renewable Energy Resources

- 2.1 Fossil fuels: Coal, Petroleum, Oil, Oil shale, Tar sands, Natural gas
- 2.2 Non-fossil fuels: Nuclear power
- 2.3 Ecological and social impacts (Advantages and Disadvantages) of major thermal and nuclear power plants
- 2.4 Management of energy projects and its environmental impacts
- 2.5 Environmental impacts of non-renewable energy resources

Unit III: Renewable Energy Resources

- 3.1 Solar Energy: Technique for harvesting solar energy, direct utilization of solar energy by thermal conversion thermo-mechanical conversion, Helio-electric conversion, Photo-voltaic conversion, indirect utilization through water power Ocean Thermal Energy Conversion (OTEC), Solar ponds.

- 3.2 Wind resources: Mapping of wind resources area, wind power stations, wind turbines – types, efficiency: Betz limit
- 3.3 Geothermal sources, Tidal energy and Ocean waves- Possibilities and limitations
- 3.4 Biomass based energy- Biogas systems, petro-plants, dendrothermal energy
- 3.5 Environmental impacts of renewable resources

Unit IV: Energy Resources in India

- 4.1 Fuel wood
- 4.2 Fossil fuel- coal, oil natural gas
- 4.3 Hydropower
- 4.4 Nuclear power
- 4.5 Renewable energy resources in India: Thermal energy, solar energy, wind energy, biomass based energy and other renewable energy sources (tidal, ocean waves and geothermal)

Unit V: Energy, Environment and Development

- 5.1 Environmental pollution associated with energy generation and consumption process
- 5.2 Energy pricing techniques for controlling environmental problems (air pollution)

Unit VI: Energy Auditing

- 6.1 Types of audits- walk through energy audit, intermediate energy audit, and comprehensive energy audit
- 6.2 Recommended practices
- 6.3 Performing the energy audit- details- computer simulation, developing the report

REFERENCE

- 1 Biomass Energy Systems (1997). Tata Energy Research Institute (TERI), New Delhi
- 2 **Goldemberg, J., Johnansson, T.B., Reddy, A.K.N. and Williams, R.H.** 1988. Energy for Sustainable World. Wiely Eastern Ltd. New Delhi
- 3 **Hill, R., O'Keef, P., and Snape, C.** 1996. The future Energy use. Earthscan publication Ltd. London
- 4 Looking back to think ahead: Green India 2047. (1998). Tata Energy Research Institute (TERI), New Delhi
- 5 **McKinney, M. and Schoch, R.M.** 1998. Environmental Sciences: System and solutions.
Johnes and Bartlett publishers, Massachusetts
- 6 **Mittal, K.M. 1997.** Non-Conventional Energy Systems: Principle, progress and prospectus
- 7 TERI Energy Data Directory & Year Book (TEDDY). (1997). Tata Energy Research Institute (TERI), New Delhi

SES 548: Introduction to Remote Sensing, GNSSs and GIS

Unit 1: Geodetical aspects, mapping concepts and surveying

Earth System – Geodesy: Datum/Spheroids and coordinate systems, map projection different projections and their characteristics

Features on the earth's surface: their basic properties – discrete vs continuous and geometries of representation

Cartography: Maps – their characteristics and elements, types - Basic surveying principles and techniques: EDMs and GNSSs; GNSSs – segments, various constellations, errors, differential correction and precise positioning

Map reading and interpretation

Global, national and state mapping agencies and their authorized reference maps – general & thematic

Unit 2: Remote sensing: Introduction

Remote sensing system – components and principles – platforms, sensors, medium, target, interactions and their characteristics including various resolutions, concept of DN value, radiance, reflectance, emission

Electromagnetic spectrum - energy interaction with atmosphere and earth surface, atmospheric windows, spectral properties of various objects on the earth's surface and the concept of spectral signature, active and passive remote sensing

Space borne earth observation: various orbits and their characteristics, operations, image acquisition and various data products

Indian remote sensing programme & Other satellites and sensors like Landsat, SPOT, etc.

Unit 3 Digital Image Processing: Basics

Various image formats, loading and visualization – panchromatic and multispectral colour visualization – TCC and FCCs

Image restoration – geometric, radiometric – atmospheric errors and their correction

Image enhancements – single band, multiband operations – layer stacking, ratioing and various indices, PCT, TCT, resolution merging/image fusion

Image interpretation – visual and digital; visual interpretation elements and key

Digital image classification – unsupervised and supervised; accuracy assessment

Unit 4 Geographical Information System (GIS): Basics

Concepts, components and organisation of GIS

Representing & modelling spatial features and processes - vector and raster structures, relationship between features – topology; raster data compressions and storage formats

Non-spatial/attribute Database Management Systems (DBMS), significance of DBMS, principles, data types, models – RDBMS, data storage, query and retrieval

Basic GIS functions: data inputting methods & various data sources, data management, data manipulation and geographic analysis and output presentation

Unit 5 GIS: Geographic analysis and modelling

Exploration, query, vector spatial analysis & geoprocessing – extraction, proximity, overlay

Network analysis – route, trace, closest facility, allocation

Raster based spatial modeling and analysis – density, distance, map algebra – arithmetic & weighted overlay: multi-criteria decision making

Surface modeling and analysis: DEM creation – input sources, interpolation; slope, aspect, volume, profile, hillshade, viewshed, visibility, contouring

SECOND SEMESTER

SES 512 B Lab course- II (Environmental Chemistry, Environmental Microbiology, Biotechnology, Biotechnology, RS & GIS)

Water quality

Chemical parameters : COD, Sulphate, Sulphide, Potassium, Iron, Nutrients (Nitrite, Nitrate, TN, Phosphate), metals

Environmental microbiology

- **Preparation and sterilisation of bacteriological media – use of autoclave and hot air oven for sterilisation**
- **Isolation and enumeration of microorganisms in environmental samples (soil and water)**
- **Pure culture techniques – quadrant streaking, continuous streaking methods**
- **Use of compound microscope**
- **Staining techniques – Simple stain, Gram stain**
- **Endospore staining**
- **Detection of bacterial motility – hanging drop method, use of semi solid agar**
- **Basic biochemical test for characterisation of bacteria – Oxidase test and catalase test and oxidation/ fermentation (O/F) test**
- **Water quality testing – MPN method to detect total coliforms, faecal coliforms and faecal streptococci**
- **Membrane filter technique to detect faecal coliforms in water and Escherichia coli**
- **Indole, Methyl Red (MR), Voges-Proskauer and Citrate (IMViC) tests for the characterisation of E. coli**

Soil/sediment quality

Available Nitrogen, Total Nitrogen, Available Phosphorous, Available potassium, metals

Air quality

SO_x, NO_x, CO, SPM, RPM

Remote sensing & GIS

1. **Map reading and interpretation**
2. **Surveying and map making using various EDMs including GNSSs receivers**
3. **In-situ spectral data collection using the hand-held spectro-radiometer**
4. **Introduction to various proprietary and open source free software packages: ERDAS Imagine, IDRISI, ENVI, ILWIS, ArcGIS, QGIS**
5. **Inputting spatial data through scanning (existing conventional maps) – various resolutions (DPI) and saving in different image formats**
6. **Importing satellite images and scanned raster images**
7. **Subset creation: spatial & spectral**
8. **Georeferencing using GCPs**
9. **Projection and datum transformations**
10. **Image visualizations: panchromatic and creation of various colour composites – Std. FCC, FCCs, TCC**
11. **DN to radiance, surface reflectance and TOA reflectance conversions**
12. **Radiometric corrections: haze removal, dark pixel subtraction, pixel filling, de-striping**
13. **Atmospheric correction using FLAASH in ENVI**
14. **Geometric correction – georeferencing**
15. **Image enhancements: contrast stretching, spatial filtering, band ratioing/band math and indices, PCT, TCT**
16. **Resolution merging/ image fusion**
17. **Visual interpretation of images using Std. FCC and interpretation elements through on-screen vectorisation**
18. **Database design, Vectorization & editing and attribute encoding**
19. **Topology creation and error identification**
20. **Error correction through topological and common editing**
21. **Exploration of the database using find, identify, hyperlink tools**
22. **Querying the database using various selection tools including Boolean logic. Complex queries using various logical connectors such as OR, NOR, XOR, NOT, AND**
23. **Proximity analysis: BUFFER, NEAR, POINTDISTANCE**
24. **Overlay analysis: UNION, IDENTITY, INTERSECT, SYMDIFF, CLIP, ERASE, SPLIT**
25. **Management operations: DISSOLVE, ELIMINATE, MERGE, MOSAIC**
26. **Network analysis: ND creation including multimodal, Routing, Tracing, Allocation, Closest facility**
27. **Interpolation & surface model generation: IDW, Kriging, Spline etc., DEM/DTM, Terrain creation using TIN or GRID interpolation**
28. **Surface visualisation and visual analysis: Draping, Colour relief, Hillshade, ViewShed, Visibility**
29. **Surface analysis using DEM/DTM: Slope, Aspect, Volume – Cut/Fill, Profile, Contouring**
30. **Hydrological analysis: Flow Direction, Flow Accumulation, Stream, Basin**

31. Density analysis: point, line
32. Multi-criteria decision making: reclassification, map/raster algebra – arithmetic & weighted overlay
33. Distance analysis: Straight-line Euclidean, Cost Weighted Distance
34. Least Cost Path analysis
35. Importing and collecting data, satellite images from various open source web GIS platforms: Bhuvan, IndiaWRIS, NSDI-IndiaGeoportal, NNRMS portal, BhooSampada, IBIN, BIS, Sahyadri, GoogleEarth, NOEDA, UN Spider, WorldClim etc.

References

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- Maiti, S.K. (2003) Handbook of methods in environmental studies, Vol. 2: Air, noise, soil, overburden, solid waste and ecology. ABD Publishers, Japur.
- Marc Pansu, Jacques Gautheyrou, Hand book of soil analysis- Minerological, organic and inorganic methods, Springer, New York
- Maria Csuros and Csaba Csuros, Environmental Sampling and Analysis for Metals, Lewis Publishers
- Miroslav Radojevic and Vladimir N Bashkin, Practical Environmental Analysis, RSC Publishing
- Conklin Alfred R. Introduction to Soil chemistry, analysis and Instrumentation, Jhonwiley&Sons Newyork
- NEERI , Air quality monitoring, A course manual (Photostat), NEERI Nagpur
- Mamata Tomar, Quality Assessment of Water and Waste Water, Lewis Publishers London
- Abbasi S A, Water quality sampling and analysis, Discovery Publishing New Delhi
Christian Gary D, Analytical Chemistry, JhonWiley & Sons NewYork

SES 541: Environmental Economics and Sustainable Development

UNIT I Environmental Economics

- 1.1 From economics to Environmental Economics
- 1.2 Definition and scope of Environmental Economics
 - 1.3 Externalities- types and importance problem of second best and solution to Externality - Market failure - Solution.
- 1.4 Properties of public goods - Coase theorem-Common pool resources - Tragedy of commons.
- 1.5 Basic theories of EE - Material Balance Approach and law of entropy.
- 1.6 Welfare aspects of Environmental Economics - Principle of maximum social welfare - Pareto Criterion
- 1.7 Environment Cost- Benefit Analysis (CBA)

UNIT II Sustainable Development

- 2.1 From problems to crises- Depletion of resources and degradation of environment
- 2.2 From modern development to Sustainable Development - WCED
- 2.3 Strategies and Policies for SD.
- 2.4 Sustainable human development index, Sustainability pillars
- 2.5 Gandhian model of SD
- 2.6 Definition, Importance of sustainable production and consumption

UNIT III Sustainable Consumption

- 3.1 Definition, importance, relevance for developing countries - Difference between Sustainable Consumption from Sustainable Development and Sustainable Production - key issues -UN Guidelines Sustainable Consumption
- 3.2 Sustainable Consumption Tools
- 3.3 Sustainable living and values

UNIT IV Education for Environment and Sustainable Development

- 4.1 Environmental education
- 4.2 Education for Sustainable Development
- 4.3 Education for sustainable consumption
- 4.4 Eco – School
- 4.5 Mini project on resource consumption and conservation

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1. **Savitha Singh**, Global Concern with Environmental crisis and Gandhi's Vision (1999),APH Publishing Corporation,Delhi.
2. **Bowers, J.** (1997). Sustainability and Environmental Economics. Longman, Singapore.
3. **Brown, L. R.** (2001). Eco-Economy. Earth Scan Publications, London.
4. **Caprei, F.** (1984). The Turning Point. Flemingo Pub., London
5. **Hackett, S. C.** (1998). Environmental and Natural Resource Economics. M. E. Sharpe, London
6. **Karpagam, M.** (1991). Environmental Economics. Sterling Pub., New Delhi
7. **Owen, L** and **Unwin, T.** (Ed.). (1997). Environment Management. Backwell Pub., USA.
8. **Rosencranz, A., Divan, S.** and **Noble, M. L.** (1992). Environmental Law and Policy in India cases, materials and statutes. Tripathi Pvt. Ltd., Bombay.
9. **Schumacher, E. F.** (1990). Small is Beautiful. Rupal & Co. Pub., New Delhi
10. **Titanberg, T.** (1998). Environmental Economics and Policy (2nd Edn.). Addison Wesley Publishers.
11. **Trivedi, P. R.** and **Singh, V. K.** (1994). Environmental Protection and Law. Commonwealth Publishers.
12. **World Commission on Environment and Development.** (1987). Our Common Future.
13. **World Bank:** World Development Report (1992).
14. **Muralivallabhan T. V.,** Dimensions of Sustainable Economic Development, Unma Pub., 2005
15. **Rajyalakshmi V .,** Environment and sustainable development ,A.P.H Pub, New Delhi

16. **Natalia Mirovitskaya and William Ascher.**, Guide to Sustainable Development and Environmental policy., Duke University Press, London, 2001.

SES 513A: Environmental Microbiology

Unit I: Microorganisms in the environment (10 Hrs)

Ubiquity of microorganisms in the environment – general account of microorganisms in the environment – bacteria, fungi, protists, algae and viruses - characteristic features and their role in the environment.

Morphology and ultrastructure of bacteria – plasma membrane, cell wall, flagella , pili, capsule, slime layer, glycolcalyx, nucleoid, ribosomes, cytoplasmic inclusions. Basis of Gram staining.

Unit II: Isolation and characterisation of bacteria from the environment (Hrs.)

Isolation of bacteria from the environment – pour plate and streak plate method. Use of different media and culture techniques.

Pure culture techniques – streak plate method – quadrant streak and continuous streak methods. Maintenance of bacteria on agar slants and long term preservation as glycerol stock.

Outline of microbial taxonomy – phenetic and phylogenetic classification. Bergey's manual of determinative bacteriology

Unit III – Microbial nutrition and growth (Hrs.)

Nutritional diversity among prokaryotes – various types of autotrophy and heterotrophy among bacteria. Nutritional requirements – macronutrients, micronutrients and trace elements in microbial nutrition. Culture media – complex and synthetic media. Use of specialized media (selective media, selective and differential media) for the isolation of specific microorganisms.

Microbial growth – cytological and population growth – factors affecting growth of bacteria. Characteristic features of bacteria growth curve. Continuous culture systems – chemostat and turbidostat.

Physical and chemical control of bacterial growth – disinfectants, antibacterial agents, antibiotics and chemotherapeutic agents

Unit IV: Microorganisms and the environment

Microbial community and important microorganisms in soil, fresh water and marine environments - Role of microorganisms in biogeochemical cycles with special reference to carbon, nitrogen, phosphorus and sulphur cycles

Foreign derived microorganisms in the environment – fate and survival. Genetically modified microorganisms in the environment – fate and effects.

Microorganisms in extreme environments – Archaeobacteria – Psychrophiles, Thermophiles, Halophiles, Barophiles, Methanogenes etc.

Water borne pathogens – diseases caused and symptoms – routes of infection and control measures. Microbial indicators of water quality – coliforms, faecal coliforms, Escherichia coli and faecal streptococci. Waste water treatment

Soil microbial communities and their association with plants – bipartite and tripartite associations - rhizosphere microflora, mycorrhizae – ecto and endomycorrhizae – VAM – actinorrhizae

Unit V: Genetically engineered microorganisms and their applications in the environment

Prokaryotic DNA and its characteristic features - Recombinant DNA techniques – restriction endonucleases and cloning vectors – plasmids, cosmids, phagemids etc. Polymerase chain reaction (PCR) technique for amplification and detection of specific genes

Application of genetically engineered organisms in the clean-up of the environment – bioremediation strategies for polluted soil and water ecosystems.

References

1. Claus, W.G. 1989. Understanding microbes: A Laboratory Text book for Microbiology. W. H. Freeman and Co., New York.
2. Eweis, J.B., Ergas, S.J., Chang, D.P. Y. and Schroeder, E.D. 1998. Bioremediation Principles, McGrawHill Publ.
3. Freifelder, D. 1987. Microbial Genetics. Johns and Barlett Publishers Inc.
4. Hawkins, J.D. 1996. Gene Structure and Expression, Third edition. Cambridge University Press, Oxford.
5. Lewin, B. 1998. Genes VI. Oxford University Press, Oxford.
6. Lynch, M. and Hobbie, J.E. 1988. Microorganisms in Action - Concepts and applications of Microbial Ecology. Blackwell Scientific Publications.
7. Pelcazr, M.J., Reid, R. and Chan, E.C.S. 1996. Microbiology. Tata Mc Graw Hill Publishing Co. Ltd., New Delhi.
8. Prescott, L.M., Harley, J.P. and Klein, D.A. 2006. Microbiology. WCB Publishers.
(Latest editions available)
9. Salle, A.J. 1961. Laboratory Manual of Fundamental Principles of Bacteriology. Mc Graw Hill Book C, New York.
10. David C Sigeo 2005. Freshwater Microbiology - Biodiversity and dynamic interactions of microorganisms in the aquatic environment. John Wiley and Sons Ltd. England.
11. Abigail A Salyers and Dixie D Whitt 2001. Microbiology - Diversity, disease and the environment. Fitzgerald Science Press, Maryland, USA.
12. Jacquelyn G Black 2005. Microbiology - Prinicipes and Explorations - 6th Edition. John Wiley and Sons, USA

ANALYTICAL TECHNIQUES AND INSTRUMENTATION (3 credits)

Significant figures, Accuracy and precision, Types of errors- random and systematic errors, Standard deviation

UNIT-2

Gravimetric methods: Mechanism of formation of precipitates, Characteristics of ideal precipitate, Methods to improve filterability and minimizing adsorbed impurities, Precipitation from homogeneous solutions, Organic and inorganic precipitating agents, Application of gravimetric methods.

UNIT-3

Volumetric methods: Molarity, Normality, Standard solutions, End point, Acid-base titrations – titration curves, theory of indicators, Complexometric titrations-EDTA titrations-applications, Iodometry, Iodimetry, Colorimetric titrations.

UNIT-4

Spectrochemical methods: Microwave, IR, Electronic, Raman, NMR and ESR spectroscopy-principle; AAS, SEM, TEM- instrumentation and applications,

Wavelength selectors: Filters and Monochromators, Radiation detectors and Transducers

UNIT-5

Radiation detectors: Dosimetry, Geiger Muller Counter, Scintillation Counter; Electrochemical Methods: pH meter- Glass and reference electrodes, Conductivity meter

UNIT-6

Chromatographic Techniques: Paper Chromatography, Thin Layer Chromatography, Column Chromatography, Gas-Liquid Chromatography (GC), High Performance Liquid Chromatography (HPLC), GC-MS, LC-MS, LC-MS/MS.

References

1. APHA (1998), Standard Methods for the Examination of Water and Waste water, 20th edition, Washington DC
2. McBride, M.B. (1994), Environmental Chemistry of Soils, Oxford University Press, New York
3. Skoog, D.A. and Leary, J.J. (1992), Principles of Instrumental Analysis, 4th edition, Saunder's College Publishing, Fortworth
4. Suchla, G (Ed.) (1987) Vogel's Qualitative Inorganic Chemistry, ELBS.
5. Willard, H.H., Merrit, L.L., Deen, J.A. and Settle, F.A. (1986), Instrumental Methods of Analysis, (Indian Reprint), CBS Publishers and Distributors, New Delhi
6. Skoog, West, Holler Crouch, Fundamentals of Analytical Chemistry, 8th edition, Cengage Learning

7. J.Throck Watson, Introduction to Mass Spectrometry, 3rd edition, Lippincott-Raven publishers, Philadelphia, New York
8. Gary D. Christian. Analytical Chemistry, 5 th edition, John Wiley and Sons.

SES 542: Environmental Laws, Ethics, Education and Policy

Unit I Introduction

- 1.1 Brief History of Environmental Regulations in the World up to 1990.
- 1.2 Role of UN Environmental Policies and Laws, Stockholm Declaration – 1972:
Hague Declaration – 1989; Rio Declaration – 1992.
- 1.3 Fundamental Principles of International environmental Laws.

Unit 2 Environmental Policy in India

- 2.1 Environmental Legislation Protection Laws in India – Ancient and Pre- Independence.
- 2.2 Forest policies and Legislation in Pre – independence Period.
- 2.3 Environmental Legislation in Post – Independence Period.
- 2.4 Constitutional and Legislative Provisions in India.
 - Fundamental principle; 42nd Amendment Act; Direct Principles
 - Fundamental Rights,

· Environmental Legislations

(General) · Environmental Protection

Act of 1986

2.5 Judicial Remedies and Procedures.

· Tort Law, Public Nuisance , Public Interest Litigation, Freedom of

information 2.6 Forest Law, Public Nuisance, Public interest Litigations, Freedom of

Information **Unit 3 Laws Relating to control of Pollution and Environment in India.**

3.1 Water Act and Related Acts, Rules and Regulations.

3.2 Air Act – Related Acts, Rules and Regulations

3.3 Noise and Land Pollution Rules and Regulations

3.4 Rules and Notification made under Environmental (Protect) Act 1986 – Rules of Hazardous Microorganisms. Bio–medical waste, Recycled Plastics, Ozone Depleting Substances, Solid Waste Management, etc.

3.5 Forest and Wild Life Protection Act and Rules.

Unit 4 International Organisation, Conservations and Protocols

4.1 United Nations, GEMS, UNEP, GEF, WCN etc.

4.2 Antarctica Convention, Stockholm Convention, Rio Conference and Conventions, Ramsar

Conevention, Kyoto Protocol, Rio+10 earth Watch Green Peace etc.

Unit 5 Information, Education and Communication

5.1 Environmental education/awareness, lifestyle changes and consumerism. Values and ethics,

Gaia hypothesis

5.2 Information Networks – ENVIS Centers – INFOTERA etc.

5.3 Role of NGO's in the Implementation of Environmental Policies.

Communication and Management.

REFERENCES

1. Rosencrans, A., and divan, S. (2002), Environmental Law and Policy in India cases, Materials and Statutes, Oxford University Press.
2. Santhakumar, S., (2001), Environmental Law, Surya Publication, Chennai
3. Titanberg, T., (1998), Environmental Economics and Policy (2nd Edn.) Addison Wesley Publishers.
4. Trivedi P.R. (1996) International Environmental Law, ABH Publishing Corporation
5. Nagore, A.P., (1996) Biological Diversity & International Environmental Law ABH Publishing Corporation New Delhi.
6. Chakrabarti N.K., (1994) Environmental Protection and the Lawn Ashish Publishing House, New Delhi.
7. Simon Bill and Stuart Bill (1995) Environmental Law, Blackstone Press Ltd, London.

8. United Nations International Environmental Law (1993) Emerging Trends & Implications for Transnational Corporations, United Nations, New York.

SES 549: Biodiversity and Conservation Biology

The course would enable the students to:

Understand the concepts of Biodiversity and conservation biology

Study the structure, significance and threat of biodiversity

Understand the various initiatives for biodiversity conservation

Explain the concept of human ecology, natural history, legal and policy aspects of conservation science

Unit 1 Biodiversity - An introduction

- The evolution of biodiversity
- Theories and Concepts of Biodiversity
- Origin of species/speciation
- The distribution of biodiversity in macroscale
- Species interactions and biodiversity

Unit 2 Biodiversity

- Levels of Biodiversity
- Genetic diversity, species diversity, Eco-system diversity, alpha, beta, gamma

- Global and Regional biodiversity

- Threats to Biological Diversity – Habitat Degradation, Fragmentation, Global Climate Change, over extraction, over abundance, alien and invasive species, diseases, pollution

- Endangered and Threatened species, IUCN, Red Data Book

Unit 3 Biodiversity Conservation in Practice

- Global Conservation initiatives – Biodiversity hot spots, Conservation in South and Southeast Asia,
- National Conservation Action Plan,
- Landscape-level Conservation
- Conservation Strategies
- In situ and ex situ conservation

Unit 4 Introduction to Conservation Biology

- History, Concepts and Background
- Biogeography of India
- Western Ghats
- Wild life biology
- Restoration biology

Unit 5 Natural History

- Natural History in India
- Animal Behaviour

- General Entomology, Ornithology, Mammalogy, Ichthyology, Herpetology

- Basic understanding of common flora in Southern Western Ghats

Unit 6 Human Ecology

- Environmental History and Conservation Movements

- People and Nature: Ecosystem services

- Indigenous communities and Ethnobiology

- Human-wildlife Conflict

Unit 7 : Conservation – Legal and policy framework

- International treaties - Convention on Biological diversity, CITES, TRAFFIC - Legal aspects of conservation in India.

- Biopiracy – causes and effects

References

1. Sutherland, W. J. 2004. The Conservation Handbook, Research, Management and Policy, Blackwell Science Ltd. P278.

2. Nair, S. C. Southern Western Ghats: A biodiversity conservation Plan, INTACH, NewDelhi. P92.

3. Michael E. Soule and Bruce Wilcox, 1980. Conservation Biology: An Evolutionary- Ecological Perspective.

4. Lewis, M. 2003. Inventing Global Ecology: Tracking the biodiversity ideal in India, Orient Longman. P369.
5. Martin, G.J. 1995. Ethnobotany - A methods manual. Chapman & Hall. Madras.
6. Maxted, N., B. V. Ford-Lloyd and J. G. Hawkes. 1997. Plant Genetic conservation- the insitu approach. Chapman & Hall, Madras.
7. Ahmadullah, M and Nayar, M. P. 1987. Endemic plants of the Indian Region. Vol. I Botanical Survey of India.
8. Heywood, V. H. (ed) 1995. Global Biodiversity Assessment (UNEP), Cambridge University Press, Cambridge.

SES 581A - Social Work: Approaches and Practices

Unit 1: Social work: Theory and Practice

1.1 History of Social Work: Historical Development of Social Work and Social Work Education in India, Development of Social Work as a profession: concept of charity, philanthropy, changes in the approach from charity to social development, Social Work: Meaning, Objectives and Scope of Social Work; Roles and functions of social work.

1.2 Introductory concept of the terms - Social Welfare, Social Service, Social Reform, Social Work, Social Legislation, Social Policy, Social Defense, Social Change, Social Development, Social Security and Social Justice

1.3 Social Case Work: Meaning, scope, components, processes and client- worker relationship; Social Group Work- meaning, objectives, principles, skills and role of Social Group Worker;

1.4 Social work Methods

1.5 Group Process and Dynamics - Steps in understanding group process , Analysis of group interaction , Leadership and its development in group process , Communication in group .

Group dynamics: - group bond, sub-groups, group conflict, confrontation, apathy , and group control

Unit 2: Work with communities – Community Organization and Social Action

2.1 Concept of community: Definition, types, characteristics and basic problems of the community, Sociological, cultural and social work perspective of community - geographical and functional community, Functions of community, community and identity, The process of community integration and disintegration.

2.2 Community Participation: concept, importance and methods to achieve, Community organisation in rural and urban communities, Concepts :- Definitions of community organization : a critique, community mobilization, community participation, outreach, working with groups; community welfare, community development, community centers and services; Principles of community organization, Processes in community organization- steps and processes

2.3 Strategies and techniques in community organization: PRA and related techniques, formation and capacity building of CBOs, capacity building of community level institutions (e.g- PRI), strategies for capacity building of the marginalized groups, committee formations, leadership and cadre building and networking.

Unit 3: Strategies and Techniques in Community Organization- Participatory rural appraisal (PRA)

3.1. Understanding Participatory Rural Appraisal, Comparison of PRA and RRA

3.2 The concept and principles of Participatory Rural Appraisal

3.3 Different PRA methods and Tools – participatory mapping, participatory modeling, transects, mobility map, Venn diagrams, Flow diagrams, Timeline, Trend analysis, seasonal calendar, ranking, SWOT analysis, interviews, daily schedule, Force field analysis

Unit 4: Social Policy and Social Welfare Administration

4.1 Social Policy: Concept and Scope; distinction with economic policy, Models of Social Policy; Process of social policy formulation, Social policy relating to, Women, Children, Youth, Aged Education, Health & Family welfare.

4.2 Social Welfare: Concept of Welfare, development and Empowerment. Policy and programmes of Social Welfare in India with special reference to weaker section

4.3 Concepts and distinction between social administration, social welfare administration, Social security administration, and other forms of administration.

4.4 Concept, nature and types of Social Welfare organizations, Administration of social welfare services; Structure and functions of social welfare organizations, Principles of administration in social welfare; Monitoring and evaluation; Manpower Planning and Development of Social Welfare Personnel

Unit 7: NGOs and their Importance in Disaster Management

7.1 Non governmental organizations, Type of NGOs, General structure and working principles Public relations, Funding & Legal status, Developmental Projects through NGOs

7.2 Non Governmental Organizations and their role in Disaster Management, NGOs working exclusively in Disaster Management: International and National NGOs.

References:

1. Chahar, S., S. (2005). Governance of Grassroots Level in India. Kanishka Publishers

2. Coppola D., P. (2007). Introduction to International Disaster Management. Butterworth-Heinemann.
3. Ganapathy, R., S. et al. (1985). Public Policy and Policy Analysis in India. Sage Publications.
4. Gangrade, K., D. (1971). Community Organization in India. Popular Prakashan 5. Goel, S L & Kumar, Ram .(2001). Disaster Management, Deep and Deep Publications
6. Govt. of India: Encyclopaedia of Social work in India.
7. Hooja, Prakash and Hooja, Meenakshi .(2007). Democratic Decentralization & Planning, Rawat Publications
8. Huttman, E.,D. (1981). Introduction to Social Policy. McGraw Hill.
9. Klein Josphine. (1967). The Study of Groups, Routledge and Kegan Paul Ltd
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11. Madan, G., R. (1981). Indian Social Problems (Vol.I). Allied Publishers Pvt.Ltd.
12. Narayanasamy, N. (2009). Participatory Rural Appraisal. Sage Publications.
13. Palenithurai, G. (1966) .New Panchayati Raj System – Status and Prospects, Kanishka Publishers
14. Parson, R., J., Jorgenson, J., D. The Integration of Social Work Practice.
15. Ross, Murray & Lappin, Ben .(1967). Community Organization; Theory, Principles, and Practice, Harper & Row
16. Somesh Kumar .(2002). Methods for Community Participation: A complete guide for practitioners, Sage Publication.

17. Women as Equal Partners: Gender dimensions of Disaster Risk Management

Programme-Compilation of Good practices. 2008. GOI-UNDP DRM Programme

SES 583 A– Public Health Aspects and Emergency Services in Disaster Management

Unit 1 - Introduction to Disaster Medicine, Public Health and Disasters

1.2 Disaster Medicine, Introduction to public health, Public Health Response Cycle, Operating public health – principles to guide public health response

1.2 The role of Emergency Medical Services (EMS) in disasters

1.3 Role of Emergency Medicine in Disaster Management

1.4 The Role of Hospitals in Disaster – The effect of disaster on hospitals, Health system role in disasters, Sources of hospital vulnerability, surge capacity, Critical elements in hospital preparedness

1.5 Children and disasters – Major pillars that support the disaster response related to children

1.6 Psychological impact of disasters – Common responses to disasters, Post Traumatic Stress Disorder (PTSD), Critical Incident Stress Management (CISM) Disaster Mental Health

1.7 Ethical Issues in the provision of Emergency Medical care in Multiple Casualty Incidents and Disasters – Basic Principles

Unit 2 – Public Health Response in Disasters

2.1 Local, national and international public health response during major disasters

2.2 Mass casualty management and potential health issues in mass gatherings

2.3 Epidemics after Natural Disasters

2.4 Epidemiology of Disasters

Unit 3 - Pre-event topics

3.1 Community Hazard Vulnerability Assessment – Hazard Identification, Hazard Profiling, Threat Assessments

3.2 Healthcare facility Hazard and Vulnerability Analysis

3.3 Public Information Management – Media and Disasters, Disaster Communications, media relations

3.4 Informatics and Telecommunications in Disasters

3.5 Worker Health and Safety in Disaster Response

3.6 Surge Capacity – Surge Planning Matrix

Unit 4 - Event Response

4.1 Operations and Logistics

4.2 The Incident Command System – ICS Organization, Concepts and Principles of ICS, Hospital Emergency Incident Command system

4.3 Scene safety and needs assessment in disaster response, Use of Personal protective Equipments, surveillance systems

4.4 Managing volunteers and donations

4.5 Urban Search and Rescue and Medical care in remote areas

4.6 Triage

Unit 5 Post – Event Topics

5.1 Displaced Populations

5.2 Disaster Education and research

References

1. Ciottono, G., R. (2006). Disaster Medicine. Mosby Elsevier.

2. Veenema, T., G. (2006). Disaster Nursing and Emergency Preparedness for Chemical, Biological and Radiological Terrorism and Other Hazards. Springer Publishing Company.
3. Park, K. (2009). Preventive and Social Medicine. Bhanot Publishers.
4. Norman, N. (2006). Controlling Communicable Diseases. Tata – McGraw – Hill.
5. Youngerman, B. (2010). Pandemics and Global Health. Viva Books
6. Johnson, B., L. (2007). Environmental Policy and Public Health. CRC Press.
7. Pomerleau, J., McKee, M. (2007). Issues in Public Health. Tata – McGraw – Hill.
8. Lee, K., Collin, J. (2005). Global Change and Health. Tata – McGraw – Hill.
9. Turnok, B., J. (2009). Public Health – What it is and how it works. Jones and Barlett Publishers.
10. Fallon, F.,JR., Zgodzinski, E., J. (2009). Essentials of Public Health management. Jones and Barlett Publishers.
11. Ramani, K., V., Mavalankar, D., Govil, D. (2008). Sage Publications.
12. Adelman, S., D., Legg, T., J. (2011). Jones and Barlett Publishers.

SES 510 A: ENVIRONMENTAL BIOTECHNOLOGY AND WASTE MANAGEMENT [3 credits]

Unit I : Cell Technology and Biotechnology

1.1 Cell : Structure and function – Prokaryotes and Eukaryotes. Nucleic Acids, Central dogma - Protein synthesis, rDNA technology. Fermentation Technology.

1.2 Plant tissue culture techniques

1.3 Environmental Biotechnology: an overview.

Unit II : Biotechnological Methods in Pollution Control

2.1 Air pollution control : Bio-desulphurisation of coal, Green belts.

2.2 Water pollution control : Aerobic and Anaerobic wastewater treatment Systems.

2.3 Bioremediation : Soil / land contaminated with oil spills, PCBs, PAHs;
Bioremediation technology; Phytoremediation

2.4 Biosensors : Concept and principle ,Biosensors for environmental monitoring

Unit III : Emerging Trends in Environmental Biotechnology

3.1 Agrobiotechnology : Plant genetic engineering – role of rDNA technique; transgenic plants - GM crops, Biopesticides and Biofertilizers

3.2 Ecological Engineering : Constructed / Artificial wetlands, Nutrient Film Technique (NFT).

3.2 Biodegradable plastics – PHBs and PHAs

Unit IV : Solid Waste Management

4.1 Municipal Solid Waste : Types, sources , properties and impacts

4.2 Techniques for treatment / processing : Concept of three ' R ' s, Thermal processes – incineration, Pyrolysis, RDF. Biological processes – Anaerobic digestion, Composting and vermicomposting.

4.3 Disposal techniques : Landfills – design , operation and management.

4.4 Hazardous waste management.

4.5 Concept of Zero waste

Unit V : Ecological Sanitation

- 5.1 Conventional sanitation : a linear flow system – its limitations
- 5.2 Eco San –Circular flow and closing the loop : concept, goals and advantages
- 5.3 Eco San for human night soil management : Dry Toilets, Composting Toilets
UDDT,UDFT.
- 5.4 Grey water management
- 5.5 Eco San - Human Health and Food Security

REFERENCES

1. **Abbasi, S.A. 1998.** Environmental Pollution and its Control ,*Cogent International* ,
Pondicherry
2. **Abbasi, S.A., Ramasamy, E.V., 1999.** Biotechnological Methods of Pollution Control.
Orient Longman,

(Universities Press of India Ltd.) India, 168.
3. **Abbasi, S.A., Ramasamy, E.V., 2001.** Solid Waste Management with Earthworms.
Discovery

Publishing house, New Delhi.
4. **Davis, M.L. and Cornwell,D.A. 1991.** Introduction to Environmental Engineering, *Mc
Graw Hill*

International Edition
5. **Edwards, C.A. 2004.** Earthworm Ecology, *CRC Press,* London.
6. **Freeman, .H.M. 1998.** Standard book of Hazardous Waste Treatment and Disposal, *Mc
Graw Hill,*

New York.

7. **Hill, M.K. 2004.** Understanding Environmental Pollution, *Cambridge University Press*, Cambridge,U.K.
8. **Ismail, S.A., 1997.** Vermicology: The Biology of earthworms. *Orient Longman*, India.
9. **Ismail, S.A. 2005.** The Earthworm Book, *Other India Press*, Goa, India.
10. **Odum, E.P. 1971.** Fundamentals of Ecology, *W.B.Sounders Company*, Philadelphia.
11. **Peavy, H.S., Rowe,D.R., and Tchobanolous,G. 1985.**Environmental Engineering, *Mc Graw Hill* International Edition, Singapore.
12. **Scragg, A. 1999.** Environmental Biotechnology. *Addison Wesley Longman*, Singapore.
13. **Tchobanoglaus, G., Theisen, H and Vigil, S.A. 1993.** Integrated Solid Waste Management :
Engineering Principles and Management issues, *Mc Graw Hill* International Edition, Singapore.
14. **Winblad U and Simpson-Hébert M (editors) 2004:** Ecological sanitation –revised and enlarged edition. *SEI*, Stockholm, Sweden.

Third Semester

SES 587 A : Advanced geospatial techniques in disaster risk reduction and management

Unit 1: Applications in Environment & Disaster Management - Basic

Sampling and ecological survey design

Mapping of natural resources – minerals, soil, water and bio-resources

Modelling and analysis of ecosystems and ecological processes – marine, forest, mountain, rivers & streams, coastal areas and wetlands – global ecosystem dynamics, climate change monitoring and modelling

Detailed vegetation and built environment characterization using high spatial and spectral resolution remote sensing images and in-situ hyper-spectral data

Unit 2: Advanced Remote Sensing techniques and their applications

Active remote sensing techniques: a) LIDAR – terrestrial, airborne: available datasets and software packages b) Microwave RS: SAR principles, processing techniques, interferometric DEM – eg: SRTM, available datasets and software packages and special applications

Basics & Applications of hyper-spectral RS: principles, processing methods, use of hyperspectral indices

Thermal RS: principles and processing techniques, available datasets and applications

Photogrammetry – stereoscopy, 3D measurements and stereo DEM – eg. CartoDEM, AsterDEM; introduction to various image processing and photogrammetric software packages.

Unit 3: Applications in Environment & Disaster Management - Advanced

Identification of disaster prone priority areas from existing geospatial database

Establishment of spatial information infrastructure for priority areas

Pre-disaster preparedness: Mapping of hazard risk, vulnerable zones, planning evacuation routes and shelters, insurance scope assessment: forest fire, flood, drought, landslide, soil erosion, public health, tsunami and other coastal hazards like cyclones, multi-hazard zonation; immediate & long-term prediction using GIS based forecast models including the development periodic observation, warning and vigilance (communication) systems

Disaster occurrence identification and their periodic monitoring

Post-disaster: detailed and regional scale damage assessment, quantification & compensation distribution, preparation of relief, rehabilitation and reconstruction plans – short-term and long-term

Public emergency management: police, fire, ambulance etc – scope for real-time integration of GNSSs with GIS, location based services.

Assessing flood hazards by integrating GIS and distributed hydrological models – rainfall-runoff model for extreme hydrological events– droughts & floods; near real time flood activity monitoring using SAR

Forest fire monitoring: use of images such as MODIS

GIS based disaster decision support systems – World, Regional and Indian case studies: International Charter on Space & Major Disasters, UN Spider, Sentinel Asia, NADAMS, ISRO DMSP, IndiaWRIS, INFFRAS, NDEM, Indian Ocean Tsunami Warning System etc.

Unit 4: Participatory/crowd sourced mapping and information sharing

Web/Internet and mobile Geoservices: crowd sourced mapping, data collection and information sharing. Case studies – MANU, Bhuvan Panchayat

Use of geospatial tools in disaster management plan preparation at various levels – national, state and district

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- Peng Z. P. and Tsou M.H. 2003. Internet GIS: Distributed Geographic Information Services for the Internet and Wireless Networks. Wiley, Hoboken, NJ.
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Zeleny M. 1982. Multiple Criteria Decision Making, Mc-Graw Hill

Journals

Archives of Photogrammetry and Remote Sensing

Computers, Environment and Urban Systems

Disasters

Disaster Management

GeoJournal

International Journal of Geographical Information Systems

International Journal of Remote Sensing

Journal of Contingencies and Crisis Management

Natural Hazards – Springer International, Netherlands

Remote sensing of Environment

The Australian Journal of Emergency Management

SES 584 A – Disaster Risk Assessment and Managment

Unit 1 Disaster risk management: an overview

Disaster risk management--Disaster relief management-Disaster recovery management significant aspects of Disasters: Rising trend of disasters-Climate change and disaster vulnerability, Economic impacts of disasters-Poverty and disaster vulnerability-disaster risk: A challenge to development

Unit 2 Disaster risk reduction: global policies and practices

Evolution of disaster risk reduction-ISDR-Basic strategies of disaster risk reduction-Risk management frame work-integrated disaster risk management and post disaster response

Unit 3 Risk insurance

Insurance and Risk Management; property loss exposures; Life, health and loss of income exposures; insurance principles and policy provisions; insurance industry and regulatory framework. Insurance Policies for Disaster Management: Evaluation of risk funding and risk transfer policies; catastrophe insurance pool; Reserve funds and contingent credit policies; Role of Government and market participants, Case Studies and review of Disaster insurance models. Microfinance and disaster risk reduction - Introduction to Micro Finance: Definition of Micro finance, Evolution of Micro finance as a means of development, context of evolution and role of Micro finance institutions in poverty alleviation, food security and alternate livelihood support systems.

Unit 4. Risk communication

Introduction to risk and crisis communication, Crisis communications applications, Risk Communication in Emergency Situations, The role of risk communication in preparedness activities; challenges for risk communication in the context of preparedness. Theories to Inform Risk Communication, Case Studies in Risk Communication: Lessons Learned for Best Practices, Developing Message Maps, Covello's message mapping process to develop risk communication messages, Risk Communication and Working with Media, Disaster Risk communication – use of Early Warning technologies, Risk management information system.

Unit 5. Risk management for natural hazards

5.1 Flood risk management

Development and flood risks-Rising flood damage-climate variability and change unprecedented demographic changes-increasing environmental concerns-Assessing flood risks-flood impact assessment-flood risk analysis-managing flood risk-flood risk reduction options-risk sharing and risk transfer-Integrative flood management-adaptive management

5.2 Cyclone risk management

Killer cyclones-framework for preparedness and mitigation-risk mapping, assessment and analysis-total and acceptable risk-structural and non structural mitigation-early warning and

communication-community based disaster preparedness-risk transfer and risk financing-capacity development-awareness and education-contingency plans

5.3 Drought risk management

Drought and development-drought monitoring-issues in drought management-use of information technology in drought monitoring and capacity assessment-Hyogo framework of action-integrated disaster risk management and post disaster response

5.4 Earthquake risk management: problems and prospects

Earthquake risk and impact-Gap between perceptions of the people and administration-GESI:A tool for motivating preparedness actions-post disaster recovery experiences

5.5 Tsunami risk reduction

Types of Tsunami-Tsunamis in Japan-Features of Tsunami-Indicator of Tsunamis-propagation in deep and shallow water-prediction of Tsunamis-Community based mitigation-Hazards along Indian coast

5.6 Climate change risk reduction

Climate and climate change-climate risk-climate risk management decisions framework-mitigation-adaption-decision making frame work

Unit 6. Risk reduction for anthropogenic disasters

Major anthropogenic disasters, the link between Millennium Development Goals (MDGs) and disaster risk reduction, Civil Disturbance, Terrorism, crowd disasters, other manmade hazards.

Unit 7. Essentials of urban risk reduction

Understanding urban risk-urban population,urban structures,urban setting,urban primacy,urban built environment,urban informal settlements,urban economic imbalances,urban services,urban risk reduction

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4. Managing Disasters. Louis K. Comfort, Duke University Press, Durham, 1988.
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21. Rajib Sha,Krishnamurthy RR,*isaster Management,global challenges and local solutions*. Universities press,2009.

SES585-Standards in Humanitarian Aid, Relief and Rehabilitation

Unit 1- Humanitarian Assistance and Disaster Relief

1.1 The concept of humanitarian aid

1.2 Origin and development of humanitarian aid

1.3 Humanitarian principles

1.4 Initiatives for global standards in humanitarian assistance, Sphere project, HAP, ALNAP and People in aid.

Unit 2 – The Sphere Project

- 2.1 Introduction - The Sphere Project philosophy: The right to life with dignity, Cross cutting themes
- 2.2 The Humanitarian Charter - Common principles, rights and duties, Key documents that inform the Humanitarian Charter
- 2.3 Protection Principles - Principle I, Principle II, Principle III, Principle IV
- 2.4 The Core Standards - People-centered humanitarian response, Coordination and collaboration, Assessment, Design and response, Performance, transparency and learning, Aid worker performance
- 2.5 Minimum Standards
 - 2.5.1. Water Supply, Sanitation and Hygiene Promotion
 - 2.5.2. Food security and nutrition
 - 2.5.3. Minimum standards in shelter settlement and non- food items
 - 2.5.4. Minimum standards in health action
- 2.6. Humanitarian relief to the vulnerable groups, [International Standards relating to key vulnerable groups: Women; Children; Older People; People living with HIV/AIDS; Disabled Persons; Minorities](#)

Unit 3 - The Code of Conduct

- 3.1. Principles of Conduct for the International Red Cross and Red Crescent movement and NGOs in Disaster Response Programmes
- 3.2. Recommendations to the governments of disaster affected countries
- 3.3. Recommendations to inter-governmental organizations

Unit 4 - HAP benchmarks

- 4.1 Introduction to Humanitarian Accountability Partnership
- 4.2 The imbalance of power in humanitarian action
- 4.3 HAP services and activities
- 4.4 HAP benchmarks

Unit 5 - Operation Management in Emergencies

4. 1.Introduction to operation management, nature and scope of operation management, Current issues facing operation management, Relevance of operation management in disasters.

4.2. Supply Chain Management – Concepts, issues in supply chain management types of Intermediaries, Channel objective & constraints, Channel selection & management.

4.3. Managing supply chain in disaster situation, Commercial supply chain and humanitarian relief Chain – A comparison

4.4. Logistics framework – Concept, objective & scope, the six RIGHTS, Planning/assessment, Procurement/Donation, , Fleet management/ transportation, warehousing, tracking, reporting, Asset Management, Building Management, Security, Information management, Radio communications, Logistics Management Information Systems

4.5. Disaster Relief Logistics – strategic planning, preparedness, Pre-event response, post event response, Humanitarian logistics management during emergencies – Humanitarian Supply Chain Private sector partnership with humanitarian sector

Reference:-

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1. Walter, Jonathan, ed. 2002. World Disaster Report: Focus on Reducing Risk. ISBN 92-9139-082-8.

3. World Refugee Survey 2002: An Annual Assessment to Conditions Affecting Refugees, Asylum Seekers, and Internally Displaced Persons. US Committee for Refugees. ISBN: 0936548134.

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8. S.N. Charry.2005. “Production & Operation Management”, Tata McGraw Hill.

SES 586 - Governance, Law and Policies in Disaster Management

Unit 1 - Public Administration

1.1. Introduction. meaning, scope and significance, Evolution and Status of the discipline, comparative public administration and development administration, public and private administration

1.2. Basic concepts and principles, theories of administration, administrative behavior accountability and control, financial administration

1.3. Union Government and administration in India, state and district administration, local Government

1.4 Social welfare administration

1.5 Public administration and disaster management

Unit 2- Rules and Regulations in Disaster management

2.1 Disaster management Act, 2005 – Institutional arrangements for Disaster Management, Role of the Union and the States in Disaster Management, Role of Local self Government

2.2 Loss Assessment Standards, Public budgeting and finance systems; National, state and local finances – National, State and District Disaster Mitigation Fund; National, State and District Disaster Response fund, CMDRF(Chief Ministers Disaster Relief Fund)- Norms

2.3 International disaster response treaties

Unit 3 - Disaster Decision Making

3.1. Disaster Planning, Incident Command System, Training, Need Analysis and Human Resource Development,

3.2. Corporate/public agency coordination, Contingency Planning for business and industry,
Corporate Social Responsibility

3.3. Community Relations for Environmental and Emergency Managers

Unit 4 - Disaster Management Policies

4.1. Policies in Disasters- its significance, principles, policy options and approaches, essential components, Formulation and execution

4.2. National Disaster Management Policy

4.3. State Disaster Management Policies

Unit 5 - Disaster Management Plans

5.1. Five year Plans and Disaster Management

5.2. The Planning process- Why Plan- Legal Basis for Planning- Components of Disaster
Management Plan- risk analysis, Resource identification, vulnerability assessment

5.3 Major welfare schemes by Government of India

5.4. National, State and District Disaster Management Plans, NDMA Guidelines

5.5. Introduction to Advanced Planning Techniques-Use of Plan Evaluation Instrument,
Organizational Involvement Criteria for review of completed plans- Methods for testing and
evaluating plans- Public accountability

5.6 Community contingency planning

Unit 6 -Emergency Operation Centre and Early Warning Systems

6.1. Emergency Operation Centers and their role in IMS; EOC and command post interface, EOC location, design, layout; Secondary considerations; EOC management: organizing, staffing, coordination, communication; EOC operations: Developing and using SOPs, briefings, and financial support; 6.4. Exercising and evaluating EOC and SOPs, psychological and social considerations of EOC operations.

6.2. Communications Principles & Systems- Analog & Digital, Satellite&Terrestrial

Communications, Radio Broadcast Systems- AM Radio Systems-FM

Systemstelecommunications Networks, Effect of disasters on wire line and wireless

communication links under catastrophe, 1G,2G,3G Systems-Toll Free Nos-Hot Line-

Wireless Telephony-

WLL-Morse Code- HAM radio, Management Information Systems

Unit 7 - Simulation and exercising

7.1.Simulation theory and regulatory requirements, Types of exerciese: table top, functional, full scale, Use of exercise; case studies of saliency to preparedness, Exercise design and development, Establishing exercise objectives, The planning process, Top management support and building the exercise team, Scenario development.

References:

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2. Laxmikanth, M. 2009. Public Administration. Tata McGraw hills Ltd.

CRF and NCCF norms

3. The Disaster Management Act. 2005. Government of India.
4. National Disaster Management Guidelines, Incident Response System. 2010. National Disaster Management Authority
5. National Disaster Management Policy, Government of India, 2010.
6. National Disaster Management Plan Guidelines, Government of India, 2011

SES 588 - Community Based Disaster Management

Unit 1 - Community Based Disaster Risk Management

1.1. CBDRM frame work: Project management concept, Key Points on the CBDRM Approach

CBDRM Process, Actors of CBDRM and Outcomes of the CBDRM Process

1.2 Factors and criteria's Influencing Selection of a Community, Understanding the community: rapport building

1.3 Building disaster resilient communities

Unit 2 - Social Dimensions of Disaster Management

2.1. Gender and social Issues in Disaster Management

2.2. School safety and practices: Equipping School students, Hospital safety plans

2.3. Disaster preparedness for vulnerable groups: Social Class, Elderly and Disabled

2.4. Linking Disaster Risk Reduction and Poverty Reduction

Unit 3- Origin and development of Social Work in India

3.1 Evaluation of social work practice in India

3.2 Social work education in India

3.3 Environmental movements

3.4 Religious contributions in risk reduction

3.5 Gandhian Concepts

Unit 4 - Participatory approaches to disaster risk assessment and DRR planning

4.1. Participatory Disaster Risk Assessment (PDRA): Conceptual Frame work

4.2. PRA Tools Used in Disaster Risk Assessment:-Time line, hazard and Resource mapping,
Seasonal Calendar, Transect, Metrix ranking

4.3. Capacities and Vulnerabilities frame work, Participatory Disaster Risk Assessment Groups,
Participatory Disaster Risk Management Planning

Unit 5 - Community oriented disaster planning

5.1. Building and Training a Community Disaster Risk Management Organization

Formation, functions Participatory implementation, Disaster Risk communication at
community level

5.2. Village contingency planning: Social Surveying, Preparing Survey sheets for different hazards and different locations

5.3. Mainstreaming Disaster Risk Reduction into Community Development

Unit 6 – Businesses and disasters – vulnerability, impacts and recovery

6.1. Business vulnerability to extreme events

6.2. Disaster impacts on businesses

6.3. Business disaster recovery and longer- term impacts

6.4. Corporate Social Responsibility, Public Private Partnership

6.5. Globalization, Localization and disaster vulnerability

References

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2. Goel S.L. and Kumar Ram, Disaster Management, Deep and Deep Publications, 2001
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Compilation of Good practices. 2008. GOI-UNDP DRM Programme

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Lessons Learned. 2007. International Strategy for Disaster Reduction.

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Disaster

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Mainstreaming Disaster Risk Reduction in Development.

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Secondary

School Teachers to meet the Changing Roles" 2009, St. Joseph's Training College, Kottayam,

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