

SEMESTER - I OPEN ELECTIVE - I	22PGEOO16 - 1: ENVIRONMENTAL GEOSCIENCES	CREDITS: 3 HOURS: 3 / WEEK
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COURSE OBJECTIVES

1. Students able to understand the principles of environmental geology.
2. Able to assess the environmental hazards and disasters.
3. To know about the pollution which was made by humans/natural.
4. Know what is EIA, EIS, EMP and EE and also understand management plans related to environmental hazards.
5. To know about the emerging approaches in Disaster Reduction and Management.

Unit 1

Definition, Principles and scope of Environmental Geoscience: Earth, Man and components of Environment, Ecosystem, Pathways in Ecosystems. Renewable and non-renewable resources- types of alternative renewable energy sources- their advantages. Natural hazards – Endogenic: Tectonism, Volcanoes, Earthquakes, landslides. Exogenic: atmospheric hazards, cyclones, lightning, hailstorms, drought, cold waves, heat waves, floods.

Unit 2

Assessing geological hazards and risks, types of hazards earthquakes, volcanic eruptions, floods, subsidence, landslides, hazards of oceans, and whether-preventive and precautionary measures. Environmental impacts of mining, surface blasting, etc. Impact assessment of mining; dumping of ores; mine waste and fly ash

Unit 3

Environmental Pollution - definition, causes and concepts, sources of pollution-nature of pollutants- Concept of acid rain, greenhouse effect, El-Nino, La-Nino, ozone depletion. Deforestation and erosion, global warming and climatic change concepts. Natural and anthropogenic sources of air pollution, water pollution sources and consequences of water pollution, soil/land pollution and their interactions with soil components, Sources of marine pollution and its control, causes, effect and control of solid waste. Effects of pollutants on human beings, plants, animals and climate.

Unit 4

Reclamation and Management of wastelands. Solid Waste Management Plan, Waste minimization technologies, Hazardous Waste Management. Indian environmental laws related to Water, Air and Forest conservation. Environmental Impact Assessment (EIA), general guidelines for the preparation of environmental impact statement (EIS), scope and types of Environmental Audit. Environmental Management Plan (EMP). Environmental Ethics. Environmental Education (EE)

Unit 5

Introduction: Disaster-Definition, Factors, Significance. Hazard and Disaster; Terminology in Disaster Management (vulnerability, risk, capacity building). Disaster Management Concepts: Elements of disaster management, Scope and objectives of disaster management, Approaches to disaster management, Disaster Management Cycle, its phases, and significance of disaster profile and vulnerability scenario of India. Disaster management policy, National and State Bodies for Disaster Management, Early Warning Systems

COURSE OUTCOMES

1. The students will gain knowledge on the interaction between human activities and the atmosphere, ocean and solid Earth.
2. Students can know the difference between the geological hazards which was made by nature and humans.
3. Understand the different environmental pollution, its causes and remedies.
4. Students can have broad knowledge about current rules and regulations followed by the government related to protecting the environment and nature.
5. They will gain knowledge of the disaster management plan and methods..

Text Books

1. Harsh .K. Gupta (2003), Disaster Management, University Press.
2. Ignacimuthu.S, 1998, Environmental Awareness and Protection, Phoenix PublishingHouse Pvt. Ltd., New Delhi
3. R.B Singh(Ed) (2000) Disaster Management, Rawat Publication, New Delhi.
4. Upendra Kumar Sinha, 1986, Ganga-Pollution & Health Hazard Inter-India publication, NewDelhi.
5. Sharma.R.K., Gagandeep shrma (2016) Natural Disaster APH Publications
6. Vaidyanathan.S (2011) An introduction to disaster management. IKON books.

Supplementary readings

1. Keller.E.A, 1978, Environmental Geology, A. Charles E.Merrill Pub. Co., A. Bell & HowellCo., London, 4th Ed.
2. Lawrence Lundgren, 1986, Environmental Geology, Prentice-Hall.
3. Strahler.A.N and Strahler.A.H.,1973, Environmental Geosciences, Wiley International Edition.
4. Thomas D. Schneid and Larry Collins (2001), Disaster management and preparedness:Occupational safety and health guide series, CRC Press
5. Valdiya, K.S., 1987, Environmental Geology, Indian context,

OUTCOME MAPPING

	PO1	PO2	PO3	PO4	PO5
CO1	2	1	3	1	3
CO2	2	1	2	3	3
CO3	3	2	2	3	2
CO4	2	2	3	3	2
CO5	3	2	3	2	3

SEMESTER - I OPEN ELECTIVE - I	22PGEOO16 - 2: GEOHAZARDS	CREDITS: 3 HOURS: 3 / WEEK
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COURSE OBJECTIVES

1. To explain students about the physical and geological processes causing geohazards.
2. To discuss the methods for quantifying geohazards.
3. To understand the possible consequences as well as risk and disaster management.
4. To make them aware about landslides, floods, tsunamis and earthquakes, for which the geological and physical process were to be discussed.
5. To discuss the potential interlinkages between different types of geohazards, disaster prevention and management and quantification and communication of uncertainties.

Unit 1

Natural Hazard – Definition -Earth's processes: catastrophic geological hazards: study of floods, tsunamis, Landslides, Earthquakes, Volcanism and avalanches – with a view to assess the magnitude of the problem, prediction and perception of the hazards. Laws and regulations towards hazard management.

Unit 2

Earthquakes-Definition –focus –epicenter-seismic waves-intensity and magnitude- Richter scales – Tsunami -Seismograph- seismogram-seismicity in Indian region - Seismic gaps - mitigation measures and management. Preparation of seismic hazard map.-Seismic Gap.

Unit 3

Volcanoes-Definition-structure - types –Global distribution - mitigation measures and management.Avalanche – Definition – types – mitigation.Flood-Definition - causes - vulnerable zones in India-Mitigation measures and management.Coastal erosion – its causes-mitigation measures and management.

Unit 4

Landslides- types -slow flowage, rapid flowage, sliding and subsidence – causes and mechanism - Vulnerable zones in India - mitigation measures and management. Deforestation and land degradation-Cyclone- Definition -causes - vulnerable zones in India- mitigation measures and management.

Unit 5

Mass movement – factor influencing slope stability – types of mass movement – hazards of mass movement – strategies for their reduction and the role of geology. Soil erosion – Soil formation – soil classification – factor influencing soil erosion – hazards of soil erosion – Drought – types, mitigation measures.

COURSE OUTCOMES

1. Explain the physical and geological processes causing geohazards such as landslides, floods, tsunamis and earthquakes.
2. Describe methods for quantifying hazard for the individual geohazards and factors controlling their uncertainty.
3. Explain possible consequences of geohazards as well as risk and disaster management.
4. Complete a basic hazard assessment for selected geohazards.
5. Gain an additional knowledge on possible interactions between geohazards and their consequences

Text Books

1. Geology, environment, Society K.S.Valdiya (2004) Universities Press (India) Private Limited, Hyderabad,India
2. Coping with natural hazards: Indian context K.S.Valdiya (2004) Orient Longman Private Limited, Hyderabad,India.
3. Engineering and general geology Parbin Singh (2003) S.K.Kataria and sons Delhi India

Supplementary Readings

1. General Geology V.Radhakrishnan (1996) V.V.P.Publishers, Tuticorin,India.
2. Lundgren (1986). Environment Geology, Rentice Hall Publishers, New Jersey.

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	PO1	PO2	PO3	PO4	PO5
CO1	2	1	3	1	3
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CO3	3	2	2	2	2
CO4	2	2	3	1	2
CO5	3	2	1	2	3

SEMESTER - I OPEN ELECTIVE - I	22PGEOO16 - 3: MEDICAL GEOLOGY	CREDITS: 3 HOURS: 3 / WEEK
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COURSE OBJECTIVES

1. Make the students aware of the fundamentals of medical geology.
2. Enable students to develop an understanding of different geological environment.
3. Make them to understand various hazardous parameters on the earth.
4. Enable students to know the causes to human by various elements.
5. Make them to understand the environmental toxicology and mineralogy of bones.

Unit 1

General characteristics of tropical, subtropical environments, arid zone, seasonally dry tropics and sub-tropics, humid tropics, and sub-tropics zone and mountainous zone.

Unit 2

Medical Geology- Perspectives and Prospects, Public Health and Geological Processes: An Overview of a Fundamental Relationship. Environmental Biology- Natural Distribution and Abundance of Elements, Anthropogenic Sources, Uptake of Elements on Chemical and Biological Perspective and its functions.

Unit 3

Volcanic Emissions and Health, Radon in Air and Water, Arsenic in Groundwater and the Environment, Fluoride in Natural Waters, Water Hardness and Health Effects, Bioavailability of Elements in Soil, Selenium Deficiency and Toxicity in the Environment, Soils and Iodine Deficiency.

Unit 4

Geospatial analysis as a tool in epidemiology; health hazards associated with volcanic eruptions; global dust flux and respiratory problems; impacts of radon, arsenic, selenium, mercury, iodine, and uranium on physiological function; carcinogenic associations with coal and fibrous minerals; geological effects on animal health, and geophagy (human ingestion of soil materials as a dietary supplement).

Unit 5

Environmental Toxicology, Environmental Epidemiology, Environmental Medicine, Environmental Pathology, Speciation of Trace Elements. Mineralogy of Bones, Inorganic and Organic Geochemistry Techniques, Histochemical and Microprobe Analysis in Medical Geology.

COURSE OUTCOMES

1. Students will gain knowledge on geology and medicine.
2. Students will understand various elemental concentrations on the earth.
3. Exposed to health effects of fluoride, iodine and nitrate and their effects on human health.
4. Understand the environmental toxicology, speciation of trace elements and effects.
5. Students will know about the global dust and health effect on human and animal.

Text Books

1. C.B. Dissanayake and R.Chandrajith (2009), *Introduction to Medical Geology*, Springer, London
2. H.Catherine, W.Skinner, Antony R. Berger, (2003), *Geology and Health: Closing gap*, Oxford Univ. press, New York.
3. K.S. Valdiya (2004), *Geology, environment, Society*, University Press (India), Hyderabad.
4. Lawrence K. Wang, Jiaping Paul Chen, Yung-Tse Hung, Nazih K. Shammass (2009), *Heavy Metals in the Environment*, CRS Press, Taylor & Francis Group, Boca Raton, FL
5. M.M. Komatica, (2004), *Medical Geology, Vol.2, Effects of the geological environment on Human health*, Elsevier, U.K.

Supplementary reading

1. Olle Selinus, Brian Alloway, José A. Centeno, Robert B. Finkelman, Ron Fuge, Ulf Lindh, Pauline Smedley (Ed). (2005) *Essentials of Medical Geology: Impacts of the Natural Environment on Public Health*. Elsevier Academic Press, London
2. C. B. Dissanayake and Rohana Chandrajith, (2020). *Introduction To Medical Geology: Focus on tropical environments*, Springer Nature
3. Losif F.Volfson (2010), *Medical Geology: Current Status and Perspectives*. Russian Geological Society (ROSGEO) Publisher. Moscow.
4. Scott S. Olson, (1999), *International Environmental Standards Handbook*, CRC Press, London.
5. William N.Rom, (2012), *Environmental Policy and Public Health - Air Pollution, Global Climate Change, and Wilderness*, John Wiley & Sons, Inc. Published by Jossey-Bass A Wiley Imprint. UK.

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