ENVIRONMENTAL SCIENCE SYLLABUS

M.Sc. SEMESTER – I 2010

Course	Title of the Paper	Course Credit
ENV 401	**NATURAL ENVIRONMENTAL RESOURCES AND CONSERVATION**	4
ENV 402	**NATURAL BIOLOGICAL ENVIRONMENT**	4
ENV 403	**CURRENT ENVIRONMENTAL ISSUES**	4
ENV 404	**ENERGY PRODUCTION AND MANAGEMENT**	4
ENV 405 PR	**PRACTICALS**	4
ENV 406 S	**SEMINARS**	4

M.Sc. SEMESTER – I

ENV 401 NATURAL ENVIRONMENTAL RESOURCES AND CONSERVATION

UNIT-1 Forest Resources

Forest Resources-Uses, Forest Type and Management, World Forest Cover, Forest Resources of India, Deforestation, Effect of Deforestation on Tribal People, Effect of Dams on Forest, Forest Degradation in India, Sustainable Forest Management.

UNIT-2 Water Resources

Introduction, Worldwide Supply, Renewal and Distribution, Indian Water Resources, Hydrological Cycle, Surface Water, Ground Water, World Water Resources Distribution, Use and over Use of World Water Resources, Water Resources – Indian Scenario, Methods for Managing Water Resources, Solutions : Supplying More Water-Dams, Environmental Impacts of Large Dams, Problems Associated with Rehabilitation of Displaced People / Tribal due to Major Dams, Ecologically Sound, Economically Viable Engineering Alternatives to Large Dams, River Water Disputes (Krishna Water Disputes), Water Pollution.

UNIT-3 Mineral, Land and Food Resources

Introduction, Exhaustibility, Localized Occurrence, Uses and Exploration of Mineral Resources, Environmental Effects of Mineral Exploration and Usage, World Food Problems and Production, Pesticides in Modern Agriculture and Environmental Problems, Environmental Limits for Increasing Food Production, Solutions : Sustainable Agriculture, Impact of Irrigation on Environmental Quality-Water Logging, Salinity, Land as a Resources, Land Degradation, Soil Degradation, Soil Conservation.

UNIT-4 Conservation of Natural Resources and Environmental Management

Conservation of Natural Resources, Role of Individuals in Sustainable Environmental Management, Value System and Equitable Resources Use for Sustainable Life System, Role of Individuals in Conservation and Prevention of Pollution.

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ENV 401 NATURAL ENVIRONMENTAL RESOURCES AND CONSERVATION

REFERENCES

1) Y. Anjaneyulu, "***Introduction to Environmental Science"***, BS Publications, Hyderabad, India, 2004.
2) H. Kaur, "***Environmental Studies"***, Pragati Prakashan, 2006.
3) Andrew R.W., Jackson & Julie M. Jackson, "***Environmental Science – The Natural Environment and Human Impact"***, Addison Wesley Longman Limited, 1996.
4) S.C. Santra, "***Environmental Science"***, 2nd Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
5) Richard T. Wright, ***"Environmental Chemistry",*** Pearson Education Inc., South Asia, 2007.
6) Sharma B.K., "***Environmental Chemistry"***, Goel Publ. House, Meerut, 2001.
7) Wanger K.D., "***Environmental Management"***, W.B. Saunders Co. Philadelphia, USA, 1998.

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ENV 402 NATURAL BIOLOGICAL ENVIRONMENT

UNIT-1 Cellular Basis of Life

Introduction, Prokaryotes and eukaryotes, A comparison between the ultrastructure of eukaryotic plant and animal cells, Mitochondria and the process of cell respiration, Chloroplasts and the process of photosynthesis, The structure of DNA and RNA, Protein synthesis, Chromosomes and cell division, The study of genetics, Recombinant DNA technology.

UNIT-2 Biological Communities and Ecosystem

Introduction, Interactions between species, Natural selection, Species richness, Ecological succession, Food chains and food webs, Primary production, Energy flow in ecosystems, Secondary productivity, Decomposition, Ecosystem stability.

UNIT-3 Bioelement Cycling

Introduction, The Oxygen cycles, The Carbon cycles, The Nitrogen cycles, The Phosphorous cycles, The Sulfur cycles, Sodium, Potassium, Calcium and Magnesium cycles.

UNIT-4 Terrestrial and Aquatic Biomes

Introduction, Tundra and Taiga, Temperate deciduous forest, Mediterranean vegetation, Temperate and tropical grasslands, Desert and tropical rainforest, The marine and the freshwater biome.

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ENV 402 NATURAL BIOLOGICAL ENVIRONMENT

REFERENCES

1) Andrew R.W., Jackson & Julie, M. Jackson, "***Environmental Science – The Natural Environment and Human Impact"***, Addison Wesley Longman Limited, 1996.
2) Lawrence E., "***A Guide to Modern Biology : Genetics, Cells and Systems"***, Harlow : Longman Publ., 1989.
3) Krebs J.R., Davies N.B., "***Behavioral Ecology : An Evolutionary Approach"***, 3rd Edition, Oxford : Blackwell Scientific, 1991.
4) Ricklifs R.E., "***Ecology"***, 3rd Edition, W.H. Ereeman, New York, 1990.
5) Buckman H.o., Brady N.C., "***The Nature and Properties of Soils"***, 9th Edition, Collier MacMillan, New York, 1984.
6) O' Neill P., "***Environmental Chemistry"***, 2nd Edition, Chapman & Hall, London, 1993.
7) Bunce N. J., "***Environmental Chemistry"***, Wuerz, Winnipeg, 1990.

M.Sc. SEMESTER – I

ENV 403 CURRENT ENVIRONMENTAL ISSUES

UNIT-1 Global Warming, Greenhouse Effect and Global Ozone Problems

Introduction, Greenhouse Gases and Global Climate Changes, Global Warming Potential, Possible Impact of Global Warming, Greenhouse Effect – Policy Response, Kyoto Protocol, EI NINO- Climate Cycle, Ozone in the Atmosphere, Ozone Depletion Process, Ozone Hole, Worldwide Ozone Trends, The Montreal Protocol, Consequence of Ozone Depletion.

UNIT-2 Acid Rain, Atmosphere Turbidity and Nuclear

Introduction, Nature and Development of Acid Rain, Acid Rain and Geology, Acid Rain and Aquatic Environment, Acid Rain and Terrestrial Environment, Acid Rain and Build Environment, Acid Rain and Human Health, Mitigation of Acid Rain Problems, Aerosol types, Production and Distribution, Atmospheric Turbidity – Natural and Man-made Sources, Nuclear Winter.

UNIT-3 Global Carbon Dioxide-Rise and Impact on Biosphere Vehicle Pollution

Introduction, Consequences of global CO_2 changes, Strategies for Conservation of Environmental Changes Induced by CO_2 Rise, Automobile Emission Characteristics, Impact of Automobile Pollutants, The Indian Scenario, Automobile Pollution Abatement.

UNIT-4 Radiation Hazardous and Environmental Degradation

Introduction, Atomic Radiation, Natural Background Radiation, Measurement of Radio Activity, Effects of Radiations, Radioactivity and Effects on Man, Impact of Radioactive Radiation, Radioactive Waste, Ionizing Radiation and Effects on Man, Radiation Protection.

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ENV 403 CURRENT ENVIRONMENTAL ISSUES

REFERENCES

1) S.C. Santra, "***Environmental Science"***, 2nd Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
2) Joner J.AA., "***Global Hydrology : Processes, Resources and Environment"***, Longman, Essenx, England, 1997.
3) Wilson E.O., "***Biodiversity"***, National Academy Press, Washinton, DC, 1988.
4) Tudge, Colin, "***Global Ecology"***, Oup, New York, 1991.
5) Bridgeman, Howard, "***Global Air Pollution : Problems for the 1990S"***, Belhaven Press, New York, 1991.
6) Mauahan S.E., "***Environmental Chemistry"***, Willaw Grant Press, Beston, USA, 1983.
7) Moeller, Dave W., "***Environmental Health"***, Mass : Harvard University Press, Cambridge, 1992.

M.Sc. SEMESTER – I

ENV 404 ENERGY PRODUCTION AND MANAGEMENT

UNIT-1 Energy Flow and Equilibrium, The Nature and Organization of Matter

Introduction, The laws of energy flow, Dynamic equilibrium and spontaneous change, Chemical kinetics, Atoms and elements, Molecules and covalent compounds, Valency and periodic table of the elements, Oxidation states, Compound mixtures, Chemical species and chemical reactions, The atomic nucleus and nuclear reactions.

UNIT-2 Energy Production and Management

Introduction, Energy Production and Consumption, Sources of Energy, Renewable Energy, Energy Conservation, Solar Energy Input, Conventional Fuels, Natural Gas, Uranium, Nuclear Energy and Nuclear Reactions, The Risk of Nuclear Accidents.

UNIT-3 Non-Conventional and Biological Energy

Introduction, Photovoltaics, Solar Heating, Wind Energy, Tidal Power, Biomass and Biofuels, Natural Vegetation, Energy Tree Plantations, Specific Energy Crops, Power From Biomass, Biomass Programs, Biomass and the Environment.

UNIT-4 Use of Wastes and Energy Use Pattern in India

Introduction, Water-Based Biomass, Energy from Wastes, Solid Wastes, Research and Development, Biogas-an Energy from Wastes, Biogas Technology, Biogas Programs in Developing Countries, Experience with Biogas in India, Biogas Plants, Use of Biogas, Utilization of Effluent, Cost of Installation, Annual Costs and Savings, Financial Assistance from Government, Organization of the Biogas Sector, Potential for Biogas Generation and Digester Construction, Future Energy Scenario of the World.

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ENV 404 ENERGY PRODUCTION AND MANAGEMENT

REFERENCES

1) Andrew R.W., Jackson & Julie M. Jackson, "***Environmental Science – The Natural Environment and Human Impact"***, Addison Wesley Longman Limited, 1996.
2) S.C. Santra, "***Environmental Science"***, 2nd Edition, New Central Book Agency (P) Ltd, Kolkata, India, 2005.
3) Flowler, John M., "***Energy and the Environment"***, 2nd Edition, McGraw Hill, New York, 1984.
4) Atkins P.W. and J.A. Beran, "***General Chemistry"***, 2nd Edition, W.H. Ereeman, New York, 1992.
5) Weast R.C., "***Handbook of Chemistry and Physics"***, CRC Press, 1994.
6) Ebbing, D.D., ***"General Chemistry",*** (International 4th Edition) MA : Houghton Mifflin, Boston, 1993.
7) Carless, Jennifer, ***"Renewable Energy : A Concise Guide to Green Alternative"***, Walker, New York, 1993.
8) Gray, N.E., ***"Biology of Wastewater Treatment"***, Oxford University Press, New York, 1992.

M.Sc. SEMESTER – I

ENV 405 PR PRACTICALS

1) Good Laboratory Practices
   Preparation and standardization of Experimental Solutions, Calibration of Glasswares
2) Physical Characteristics of Water
   Hardness, Color, Turbidity, TDS, Alkalinity, Acidity
3) Estimations
   Dissolve Oxygen, Chemical Oxygen Demand, Biological Oxygen Demand
4) Determination
   Chloride, Sulphate, Phosphate and Copper from Waste Water Samples
5) Determination from Soil Samples
   Nitrogen, Phosphorous, Potassium and Heavy Metals
6) Determination of Oil and Grease from Water Sample.

M.Sc. SEMESTER – I

ENV 406 S SEMINARS

1) Select an Environmental Topic Related to the syllabus
2) Explore the Resources Available and Learn How to Access Them
3) Collect References Secondary Information on the Topic Selected and Prepare Bibliography
4) References must be taken from a Book, Magazine, Newspaper and Internet
5) An Appropriate Report to be submitted after the Field Visit, Highlighting the Objective and Findings.

References:

1. Richard T. Wright, " Environmental Science", Published by Dorling Kindersley(India) Pvt. Ltd., licenses of Pearson Education.
2. S.C. Santra, " Environmental Science", Published by New Central Book Agency.
3. Andrew R.W. Jackson and Julie M. Jackson, "Environmental Science – The natural environment and human impact", Published by Addison Wesley Longman Limited.
4. Y. Anjaneyulu, " Introduction to Environmental Science", B.S. Publication.
5. Anil Kumar De, "Environmental Chemistry", New Age International Limited, Publishers.
6. Mahesh Rangarajan, "Environmental Issues in India", Published by Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education.
7. Stanley E. Manahan, " Environmental Chemistry", Lewis Publishers.
8. Anindita Basak," Environmental Studies", Published by Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education.
9. D.L. Manjunath, " Environmental Studies", Published by Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education.