Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCENV401	**PG**	**NON-CONVENTIONAL ENERGY RESOURCES**	3	1	0	4	60	20	20	00	00

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:-

1. To give basic knowledge of energy resources.
2. To study various types of conventional and non-conventional energy resources including solid, liquid and gaseous fuels.
3. To understand processing and limitations of fossil fuels (coal, petroleum and natural gas) and necessasity of harnessing alternate energy resources such as solar, wind, nuclear, geothermal, tidal and biomass.

Course Outcomes:-

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Theoretical understanding of alternate energy sources.

CO2. Explain energy crisis and different aspects of sustainability.

CO3. Critically discuss local and global environmental issues based on scientific principles and data.

CO4 To know the energy demand of world, nation and available resources to fulfill the demand

Syllabus:

UNIT I

Introduction various non-conventional energy resources- Introduction, availability, classification, relative merits and demerits. Solar Cells: Theory of solar cells. Solar cell materials, solar cell array, solar cell power plant, limitations.

UNIT II:

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

UNIT III:

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo-thermal energy conversion-electrical conversion, non-electrical conversion, environmental considerations. Magneto-hydrodynamics (MHD): Principle of working of MHD Power plant, performance and limitations. Fuel Cells: Principle of working of various types of fuel cells and their working, performance and limitations.

UNIT IV:

Thermo-electrical and thermionic Conversions: Principle of working, performance and limitations. Wind Energy: Wind power and its sources, site selection, criterion, momentum theory, classification of rotors, concentrations and augments, wind characteristics. Performance and limitations of energy conversion systems.

UNIT V:

Bio-mass: Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations. Wave and Tidal Wave: Principle of working, performance and limitations. Waste Recycling Plants.

Text / Reference Books :

1. Raja etal, “Introduction to Non-Conventional Energy Resources” Scitech Publications.
2. John Twideu and Tony Weir, “Renewal Energy Resources” BSP Publications, 2006.
3. M.V.R. Koteswara Rao, “ Energy Resources: Conventional & Non-Conventional “ BSP Publications,2006.
4. D.S. Chauhan,”Non-conventional Energy Resources” New Age International.
5. C.S. Solanki, “Renewal Energy Technologies: A Practical Guide for Beginners” PHI Learning. (14)
6. Peter Auer, "Advances in Energy System and Technology". Vol. 1 & II Edited by Academic Press.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCENV402A	**PG**	**Environmental Policies And Regulations**	4	1	2	6	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To explain the role of law, policy and institutions in the conservation and management of natural resources as well as pollution control
2. To introduce the laws and policies both at the national and international level relating to environment
3. To equip the students with the skills needed for interpreting laws, policies and judicial decisions.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. be familiar with the laws, policies and institutions in the field of environment

CO2. Acquire the skills needed for interpreting laws, policies and judicial decisions in a holistic perspective

CO3. Acquire the ability to evaluate the role of law and policy in conservation and management of natural resources and prevention of pollution.

Syllabus:

UNIT I

Environment Definitions and Acts:

Environment definition in Indian law- Different environmental protection legislations- History of Environmental protection in India - Provisions in Indian Penal Code for Environmental protection-The constitutions of India – Union list- State list – Concurrent list - Panchayats and Municipalities role

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

UNIT II

Water (prevention & control of Pollution) Act & Air (prevention & control of Pollution) Act:

Water pollution – definition – Water (Conservation and protection) Act 1974 – Objectives of Water Act – Legislation to control water pollution – Functions of CPCB and SPCB - Local bodies role – Water (prevention & control of pollution) Act 1974 as amended by Amendment Act 1988. Water (prevention and control of pollution) Rules 1975 - Water (prevention & control of Pollution) Cess Act 1977 as amended by Amendment Act 1987 and relevant notifications - Tolerance limits for effluents discharge and drinking water - Constitution and Resources management and pollution control – Air (prevention & control of Pollution) Act 1981-Sections of Air (prevention & control of Pollution) Act 19, 20, 21, 22-Penalties - Ambient air quality standards-Noise and the Laws.

UNIT III

Environmental (Protection) Act 1986:

Environment and pollution - definition as per Environmental law-General powers of Central and state Government under EPA-Important Notification in EPA 1986- The Indian Forest Act 1927- Forest Conservation Act 1980 - Wild Life (Protection) Act - Constitution of Pollution Control Boards - Powers, functions, Accounts, Audit etc. – Equitable remedies for pollution control 11

UNIT IV

Municipal Solid Waste Management Rules:

Solid waste management – Hazardous Wastes (Handling and Management) Rules 1998-Bio-medical Wastes (Handling and Management) Rules 1998-Recycled plastics (Manufacture and Usage) Rules, 1999-Municipal Solid Waste Management Act 2003- Rules - E.I.A and Public Hearing- Ecolabeling-Eco Mark. Recent guidelines for waste management.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

UNIT V

Coastal Regulation Zone Notification and Green Benches:

Coastal Regulation Zone - definition-Importance of coral reef-Regulation activities in CRZ - The Biological Diversity Act 2002-Bio diversity Rules 2004- The Intellectual Property Rights (IPR)-National Environment Appellate Authority –Environmental Tribunal and Green Benches - Some Important cases on Environment - International Conventions - Protocols for protection of the Environment

Text / Reference Books:

1. Constitutional Law of India – J.N. Pandey 1997 (31st Edn.) Central Law Agency Allahabad.

2. Administrative Law U.P.D. Kesari 1998. Universal Book Trade Delhi.

3. Environmental Law H.N. Tiwari, Allahabad Law. Agency 1997.

4. Environmental, A., Divan and Noble M. Environmental Law and Policy in India (cases, Materials and Statutes) 1991 Tripathi Bombay.

5. Environmental Policy. Forest Policy. Bare Acts – Government Gazette Notifiaciton.

6. Environmental Laws of India-C.P.R. Environmental Education Centre.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCENV402B	**PG**	**Environmental Impact Assessment (EIA)**	4	1	2	6	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
***Teacher Assessment** shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. To give basic knowledge of Understanding strengths & limitations of environmental management.
2. To appreciate the purpose and role of EIA in the decision-making process.
3. To equip to understand the planning and management tasks associated with the principal stages of environmental assessment.

Course Outcomes:

After completion of this course the students are expected to be able to demonstrate following knowledge, skills and attitudes. The student will demonstrate capability of

CO1. Take account of public comment and to take advantage of public EIA review.

CO2. Assess the adequacy and quality of all documents culminating in review of the EIA report.

Syllabus:

UNIT I

INTRODUCTION

Impact of development projects – Sustainable development- Need for Environmental Impact Assessment (EIA) – Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA-Stages of EIA, Types of EIA.

UNIT II

METHODOLOGIES

Methods of EIA – Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives.

UNIT III

PREDICTION AND ASSESSMENT

Assessment of Impact on land, water, air, social & cultural activities and on flora & fauna- Mathematical models- Public participation.

UNIT IV

ENVIRONMENTAL MANAGEMENT PLAN

Plan for mitigation of adverse impact on environment – Options for mitigation of impact on water, air, land and on flora & fauna – Addressing the issues related to the Project Affected People. Post project monitoring.

UNIT V

CASE STUDIES

EIA for infrastructure projects – Dams – Highways – Multi-storey Buildings – Water Supply and Drainage Projects – Waste water treatment plants, STP.

Text / Reference Books:

1. Canter, Larry W. Environment Impact Assessment. McGraw-Hill.
2. Rau, G.J. and C.D. Weeten. 1980. Environmental Impact Analysis Handbook. McGraw Hill.
3. Glasson, John, Rikki Therievel and Andrew Chadwic. 1996. Introduction to Environmental Impact Assessment, 2nd edition UCL Press.
4. Kulkarni, Vijay and T.V. Ramchandra. Date Environmental Management. Capital Publishing.
5. Mhaskar, A.K. Environmental Audits.Enviro Media Publications.
6. Eccleston, Charles H. 2011. Environmental Impact Assessment: A Guide to Best Professional Practices. CRC Press.

7. Morris, Peter and RikiTherivel. 2009. Methods of Environmental Impact Assessment (Natural and Built Environment Series). Routledge.

8. 6.Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
9. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.
10. John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.
11. "Environmental Assessment Source book", Vol. I, II & III. The World Bank, Washington, D.C., 1991. 3. Judith Petts, "Handbook of Environmental Impact Assessment Vol. I & II", Blackwell Science, 1999.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER IV

COURSE CODE	CATEGORY	COURSE NAME	L	T	P	CREDITS	TEACHING & EVALUATION SCHEME				
							THEORY		PRACTICAL		
							END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*
MSCENV403	**PG**	**Environmental Health and Toxicology**	4	1	2	6	60	20	20	30	20

Legends: **L** - Lecture; **T** - Tutorial/Teacher Guided Student Activity; **P** – Practical; **C** - Credit;
*__Teacher Assessment__ shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

1. Students will be able to understand the chemistry of toxic substances present in environment.
2. Students will be aware about the effects of toxic chemicals on human health.

Course Outcomes:

Students acquire knowledge of the field of toxicology including the basic principles, target organ toxicity, toxicity of a select group of compounds and their effects on human health.

Syllabus:

UNIT I:

Toxic chemicals in the environment

Organic compounds: Hydrocarbons, Chemistry of hydrocarbons, phenols, chlorofluorocarbons, pesticides, chemical fertilizers, environmental effects, effects on macro and microorganisms. Gasoline lubricants and greases, Pesticides: Classification, degradation, analysis, pollution due to pesticides and heavy metals.

Unit-II:

Principles of toxicology

Environmental toxicology and its importance; Occurrence of Toxicants and their chronic and acute effects; Exposure, uptake, transportation, storage, metabolism and excretion of pollutants

Unit-III:

Pollution and human health

Trace element deficiency and disorders; Occupational health hazards; Biogeochemical factors in environmental health; Epidemiological issues- Goiter, Fluorosis, Arsenic poisoning.

Unit-IV:

Linkages between Environment and Health

Understanding linkages between Environment and Public Health: Effect of quality of air, water and soil on health, Manifestations of Climate change on Public HealthBurning of Fossil fuels, automobile emissions and Acid rain. Perspective on Individual health: Nutritional, socio-cultural and developmental aspects.

Unit-V:

Genetic Toxicology

Carcinogenesis; Carcinogens, chemical carcinogenicity, mechanism of carcinogenicity, Oncogenes and tumour suppressor genes. Environmental carcinogenicity testing. Mutagenicity: Mutagens, Environmental mutagen testing- Bacterial mutagenesis assays, gene mutation chromosome damage assays, DNA damage and repair assays.

References

1. Ayres, J., (2009). Occupational industrial and environmental toxicology, 2nd edition.
2. Chatterjee, P., Progress in predictive toxicology- Clayson, Munro, Shubik & Swenderg (eds.)
3. Landis, W., Sofield, R., Yu, M.H., Wayne G. Landis, Yu, S.M.H. Introduction to Environmental Toxicology: Molecular Substructures to Ecological Landscapes, Fourth Edition
4. Niesink, R., Hollinger, M.A., Vries, J.D. (1999). Toxicology: Principles and Applications.
5. Perk, Preventive and Social Medicine
6. Phillip. R.B. (2001).Ecosystems and human health: toxicology and environmental hazards. 2nd edition. Boca Raton: Lewis Publishers.