Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

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*
MSCENV201A	**PG**	**Global Environmental Issues**	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:-

To make students aware about various global environmental issues.

Course Outcomes:-

After the completion of course students will be able to formulate the Problems faced by global environmental issues like global warming, climatic changes, ozone layer depletion, acid rain, etc.

Syllabus:

UNIT I

Environmental Issues and Movements Creation of UNEP and its role, UNFCCC, Convention on Climate Change, CoPs, CDM, Convention on Conservation of Antarctic Marine Living Resource, Global and national movements of Significance impact: Green Belt movement, Green Peace, Chipko movement, Narmada Bachao Andolan, Urja gram, Beej Bachao Andolan and related issues / case studies

UNIT II

Climate change Sea level Change- primary and secondary impacts- Adapting to Sea level changes. Global Warming and Greenhouse gases- Global and national scenario. National Action Plan on Climate Change (NAPCC), Intergovernmental Panel for Climate Change (IPCC), Climate Change and Biodiversity loss.

UNIT III

Nuclear issues, Nuclear power, Nuclear weapons, Nuclear and radiation accidents, nuclear safety, High-level radioactive waste management.

UNIT IV

Contemporary issues Green Buildings, Genetic pollution, Genetically modified food controversies, Intensive farming Monoculture, Health and Diseases- Epidemics and Famines.

UNIT V

Case studies of major environmental issues like Health problems and advanced technologies, Pollution problems and role of industrial chemicals, Impact of Urbanization over Natural environment. Environmental issues related to your city.

Text/Reference Books

1. Asthana, D.K. and Asthana, M. (2003). Environment: Problems and Solutions, S. Chand & Co., New Delhi.

2. Burroughs, W.J. (2007). Climate Change: A Multidisciplinary Approach. 2nd Edition. Cambridge University Press.

3. Cunningham, W. P. and Cunningham, M. A. (2004) Principles of Environment Science. Enquiry and Applications. 2nd Edition, Tata McGraw Hill, New Delhi.

4. Goel P. K and Sharma K. P. (1996). Environmental Guidelines and Standards in India, Techno Science Publications, Jaipur.

5. Harris, F. (2004). Global Environmental Issues. Wiley & Sons, Inc., USA.

6. Singh, J.S., Singh, S.P. and Gupta, S.R. (2006). Ecology, Environment and Resource Conservation. Anamaya Publishers, New Delhi, India.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

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*
MSCENV201B	**PG**	**Natural Disaster Management**	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 increase the knowledge and understanding of the disaster phenomenon.
2. To ensure skills and abilities to analyse potential effects of disasters.
3. To ensure skills and ability to design, implement and evaluate research on disasters.

Course Outcomes:-

1. Understanding foundations of hazards, disasters and associated natural/social phenomena

2. Familiarity with disaster management theory (cycle, phases)

Unit-I

Introduction to Hazards

Hazard Classification – Natural hazards and Technological hazards, Effects of hazards, Vulnerability and susceptibility of hazards, Assessing hazards and risks, Hazard prediction and warning, A brief introduction to biological hazards- Biological warfare, Anthrax.

Unit–II

Earthquakes and Landslides and Volcanoes Earthquakes

Types and Distribution of earthquakes, Prediction and control of earthquakes, Tsunami, mass movements; types, affecting factors, prediction, prevention & control and effect of mass movements. Volcanoes-Distribution, types, eruption processes, Factors, Products.

Unit-III

Water related hazards

Different kinds of floods, Factors leading to floods, Factors affecting floods, Floods and their associated hazards, Flood control measures, Prediction of floods. Factors leading to drought, drought consequences, strategies for drought mitigation, Desertification – Factors causing

desertification, famine, El Nino and their effects.

Unit- IV

Weather related Hazards

Effects of cyclones, genesis of a cyclone, Behavior of a cyclone and their forecast, Factors affecting cyclone hazards, Structure of a tropical cyclone, Size of tropical cyclones, Cyclone risk and mitigation strategies, Storm surge, Hurricane, cyclones and tornadoes, thunderstorms, lightening.

Unit - V

Disaster Management in India

Disaster Profile of India – Mega Disasters of India and Lessons Learnt, National Guidelines and Plans on Disaster Management, Case studies.

REFERENCES

1. Abbott, Patrick L. 2004. Natural disasters. 4th ed. Boston, McGraw-Hill Higher Education. Alexander, David. 2000. Confronting catastrophe: new perspectives on natural disasters. New York, Oxford University Press.

2. Allison, I. S. and Palmer, D. F. 1980. Geology, the science of a changing Earth. VII Edition. McGraw-Hill Inc.

3. Cesare Emiliani 1992. Planet Earth - Cosmology, geology and the evolution of life and the environment. Cambridge University press U.K.

4. Robinson, A.G. 2002. Earthshock: hurricanes, volcanoes, earthquakes, tornadoes, and other forces of nature. Rev. Ed. New York,

5. Thames & Hudson, 2002. Smith, Keith. 2002. Environmental hazards: assessing risk and reducing disaster. 3rd ed. London, New York, Routledge.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

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*
MSCENV202	**PG**	**Environmental Monitoring and Assessment**	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 verify the environmental impact predicted in the EIA studies;
2. To provide data to enable an environmental audit;
3. To provide information about remote sensing and GIS and its applications in environmental monitoring.

Course Outcomes:

By the end of the course, the student will have demonstrated ability to:
1. Monitor the performance of the project and the effectiveness of mitigation measures;
2. Determine compliance with regulatory requirements, standards and government policies.

Syllabus:

UNIT I
Environmental Monitoring:
What is environmental quality? Quality of environment for life on earth and man; Advantages of Environmental Monitoring, Deterioration of environmental quality with reference to anthropogenic impact; Methods of assessment of environmental quality; Short term studies/surveys; Rapid assessment; Continuous short and long term monitoring.

UNIT II
Environmental Impact Assessment (EIA):
Need of EIA; Scope and objectives; Types of environmental impacts; Steps involved in conducting the EIA Studies; Environmental Impact Assessment techniques-Ad-hoc method, checklist method, overlay mapping method, network method, simulation and modeling technique, matrix method, and system diagram technique; Merits and Demerits of EIA studies.

UNIT III
Remote sensing and its applications in Environmental Monitoring:
Principles and Basic concepts of Remote sensing; EMR & its interaction with matter; Aerial Photography and image recognition; Sensors & platforms; IRS satellites & their

sensors; Application of remote sensing in environmental studies: land use mapping, forest survey, habitat analysis, water management, drought monitoring and flood studies, wetland survey ; rainfall estimation, pollution studies, soil conservation, watershed management and vegetation mapping.

UNIT IV

Geographical Information System (GIS):

Basic principles, Techniques Application in Environmental Sciences. Types of Geographical Data; Data Structure; Vector and Raster data: their Advantages and Disadvantages; Input, verification, storage and output of geographical data; Importance of Geographical Information System in environmental studies. Global Positioning System (GPS): basic principles, Applications to environmental studies - Point source pollution, hazard monitoring and assessment.

UNIT V

Risk Management:

Risk communication and risk perception, Comparative Risks, Risk based decision making, Risk based environmental standard setting, Risk cost benefit optimization and tradeoffs, Emergency preparedness plans, Emergency planning for chemical agent release, Design for risk management programs, Risk based remediations, risk communication, adaptive management, precaution and stake holder involvement.

Text/Refernce Books

1. D. P. Lawrence (2003) Environmental Impact Assessment: Practical Solutions to Recurrent Problems, John Wiley and Sons, New Delhi.

2. Environmental Impact Analysis Handbook: J. G. Rau and D. C. Wooten; McGraw-Hill Book Co.

3. Environmental Impact Assessment, L. W. Canter, Mc Graw Hill Publication.

4. P. Morris and R. Therivel (2001), Methods of Environmental Impact Assessment, Spoon Press.

5. J. Weston (1997) Planning and EIA in Practice, Longman.

6. Jos Arts and Angus Morrison-Saunders (2004) Assessing Impact - Handbook of EIA and SEA follow-up, Earthscan, London.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

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*
MSCENV203	**PG**	**Pollution Control Technology**	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 understand the sewage and waste water treatment methods.
2. To understand the air pollution control technologies and devices.
3. To understand the solid waste disposal methods.
4. To understand the thermal and E-Waste management.
5. To understand the biotechnological methods to control pollution.

Course Outcomes:

By the end of the course, the student will have demonstrated ability to:

1. Select methods for control, and prevention of air pollution to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
2. Analyze various unit operations and unit processes used in air treatment.
3. Evaluate process design criteria for different air treatment technologies and perform basic calculations.

Syllabus:

UNIT I

Water Pollution control technologies:

Sewage and waste water treatments systems; Primary, secondary and tertiary treatments; Measurement of treatment efficiencies; Biological treatments - aerobic versus anaerobic treatments; Environmental pollution control- Bioremediation, Bioaugmentation and Biostimulation; Biofilms in treatment of waste water; Bioreactors for waste water treatments; Reactors types and design; Reactors in series; Development and optimization of membrane bioreactor process for use in sanitary and industrial sewage treatment.

UNIT II

Air pollution control technologies and devices:

Methods to control air pollution in the environment,Limestone injection and fluidized bed combustion, Desulfurization; Catalytic converter and control of vehicular emission, Gravity settling chamber, Centrifugal collectors-cyclone collector and dynamic precipitators; Electrostatic precipitators; Fabric filters.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

UNIT III

Solid waste management:

Solid waste disposal methods - open dumps, ocean dumping, Land fills, Incineration; Recycling and reuse. Organic pollutants and Hazardous waste disposal and management.

UNIT IV

Toxic, and Hazardous waste management:

Management of Radiation, noise, thermal, oil and e-wastes: recycling of waste. Biosorption - Biotechnology and heavy metal pollution; Oil field microbiology; Improved oil recovery;Biotechnology and oil spills; Hydrocarbon degradation.

UNIT V

Biotechnological methods to control pollution:

Bioremediation, Biotransformation Biodegradation and Phytoremediation: In situ and Ex situ bioremediation; Evaluating Bioremediation; Bioremediation of VOCs. Factors affecting process of biodegradation; Methods in determining biodegradability; Contaminant availability for biodegradation.; Use of microbes(bacteria and fungi) and plants in biodegradation and Biotransformation; Phytoremediation: Waste water treatment using aquatic plants; Root zone treatment.

Text Books/ Reference Books:

1. M.H.Fulekar (2005) Environemtal Biotechnology Oxford IBH Publishing cooperation.

2. M.H.Fulekar (2010) Bioremediation technology recent advances, springer

3.N.P Cheremisinoff (1996) Biotechnology for Waste and Wastewater Treatment, William An- drew Publishing, New York.

4.Bruce Rittman, Perry L. McCarty, Environmental Biotechnology: Principles and Applications,2nd edition, McGraw-Hill, 2000.

Shri Vaishnav Vidyapeeth Vishwavidyalaya

Master of Science (Environmental Science)

SEMESTER II

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*
MSCENV204	**PG**	**Green Technology**	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.

Objectives

1. To understand the principle, concepts and Tools of Green technology.
2. To learn the green synthetic methods of different chemicals.
3. To understand the green nanotechnology.
4. To understand various applications og green technology.

Outcomes

By the end of the course, the student will have demonstrated ability to:

1. Understand the principles of green chemistry and engineering.
2. Design processes that are benign and environmentally viable.
3. Design processes and products that are safe and hazard free.
4. Learn to modify processes and products to make them green safe and economically acceptable.

Syllabus:

UNIT I

Overview, Principle, concepts and Tools of Green technology: Overview of green chemistry, Chemistry of the atmosphere, principles of sustainable and green chemistry. Basic principles of green technology, concepts of atom economy and carbon trading, tools of green technology. waste minimization and climate change, Zero waste technology, concept of environmentally balanced industrial complexing and industrial ecology, green house effect, climate change, photochemical smog.

UNIT II

Green synthetic methods and designs:

Catalytic methods in green synthesis, safer chemicals - different basic approaches; selection of auxiliary substances (solvents, separation agents), green solvents,solventless processes, immobilized solvents and ionic liquids; energy requirements-use of microwaves, ultrasonic energy; selection of starting materials; use of blocking/protecting groups, catalytic reagents; designing of biodegradable products.

UNIT III

Green Nanotechnology:

Introduction to Nanomaterials and green nanotechnology, Fullerene, carbon nanotubes,

Nanoparticles; Green nanoparticle production and characterization; Biocompatibility;Nanomedical applications of green nanotechnologies; use of nanotechnologies and materials impact on biodiversity, resource conservation, ecosystems and human.

UNIT IV

Green technology applications I:

Biocatalysis, green chemistry in industries, fuel cell and electric vehicles, solar energy and hydrogen production, energy from alternate sources; Solar photovoltaic technology.

UNIT V

Green technology applications II:

Biofuel production (bio-ethanol and biodiesel), Biomass, prevention/minimization of hazardous/toxic products. Agricultural related practices and food processing, Production of biodegradable materials, concept of green building, Pollution free engineering processes.

Text Books/References

1. M. H. Fulekar (2010) Nanotechnology Importance and applications, I K international publishing house Pvt.Ltd.

2. Lynn Goldman, Christine Coussens, Implications of nanotechnology for environmental health research, National Academic Press, Washington, 2007

3. Matlack, A. S. Introduction to Green Chemistry. Marcel Dekker: New York, 2001

4. Anastas, P. T.; Warner, J. C. Green Chemistry: Theory and Practice. Oxford Univ. Press:Oxford, 1998.

5 Lynn E. Foster: Nanotechnology: Science, Innovation, and Opportunity, December 21, 2005, Prentice Hall.

6. Fei Wang & Akhlesh Lakhtakia (eds) (2006). Selected Papers on Nanotechnology—Theory & Modeling (Milestone Volume 182). SPIE Press.