# SACRED HEART COLLEGE (AUTONOMOUS)

## Department of Environmental Studies

**Post Graduate Programme**

**(Environmental Science)**

**Course plan**

**Academic Year 2018-19**

**Semester 3**

| Course Code | Title Of The Course | No. Hrs./Week | Credits | Total Hrs./Sem |
|---|---|---|---|---|
| 16P3EVST09 | Environmental Pollution and Toxicology | 5 | 4 | 90 |
| 16P3EVST10 | Environmental Monitoring and Management | 4 | 4 | 90 |
| 16P3EVST11 | Biodiversity, Conservation and Social Issues | 4 | 4 | 90 |

## COURSE PLAN

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| PROGRAMME | **MSc ENVIRONMENTAL SCIENCE** | SEMESTER | 2 |
| COURSE CODE AND TITLE | **16P3EVST09: ENVIRONMNETAL POLLUTION AND TOXICOLOGY** | CREDIT | 4 |
| HOURS/WEEK | **4** | HOURS/SEM | 90 |
| FACULTY NAME | **DR. JAMES.T.J AND DR. Anju S G** | | |

| COURSE OBJECTIVES |
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| To identify the sources of pollution. |
| To understand the concepts involved in pollution control technologies. |
| To evaluate methods of regulating, controlling and attenuating pollution. |
| To develop knowledge of the environmental toxicants and their effects. |
| To illustrate methods of purification of sewage water and recycling / reuse of solid waste |

| SESSION | TOPIC | LEARNING RESOURCES | VALUE ADDITIONS | REMARKS |
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| | **Module I. Introduction 3hrs.** | | | |
| 1 | Brief history of human civilization, industrialization and urbanization. | PPT | video | |
| 2 | Definition of pollution. Different types of pollution- Air, Water and soil and their local, regional and global aspects | PPT/Lecture | video | |
| 3 | Definition of pollution. Different types of pollution- Air, Water and soil and their local, regional and global | PPT/Lecture | DISCUSSION | |

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| | aspects | | | |
| | **Module II. Air Pollution 12 hrs.** | | | |
| 4 | Sources and classification of air pollution; particulates and gaseous pollutants in the atmosphere. | PPT/Lecture | DISCUSSION | |
| 5 | Sources and classification of air pollution; particulates and gaseous pollutants in the atmosphere. | PPT/Lecture | | |
| 6 | Primary and secondary pollutants. | PPT/Lecture | | |
| 7 | Effects of air pollutants on human health, animals, vegetation, materials and structures. | PPT/Lecture | | |
| 8 | Effects of air pollutants on human health, animals, vegetation, materials and structures. | PPT/Lecture | Assignmnet | |
| 9 | Air pollution monitoring - methods, | PPT/Lecture | | |
| 10 | Air pollution monitoring - methods, air quality standards; ISI, EPA. | PPT/Lecture | | |
| 11 | Sampling and measurement of particulate matters (SPM) - gaseous pollutants, $CO_2$, CO, NOx, $SO_2$, $H_2S$, oxidants, ozone and hydrogen fluoride. | PPT/Lecture | DISCUSSION | |
| 12 | Sampling and measurement of particulate matters (SPM) - gaseous pollutants, $CO_2$, CO, NOx, $SO_2$, $H_2S$, oxidants, ozone and hydrogen fluoride. | PPT/Lecture | | |
| 13 | Control of gaseous emission: adsorption by liquids, adsorption by solids, combustion and condensation. | PPT/Lecture | Video | |
| 14 | Control of gaseous emission: adsorption by liquids, adsorption by solids, combustion and condensation. | PPT/Lecture | | |
| 15 | Control of $SO_2$, NOx, CO, $CO_2$ and hydrocarbons | PPT/Lecture | | |

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| | **Module III. Water Pollution 15 hrs.** | | | |
| 16 | Sources of water pollution- Domestic (municipal sewage), industrial and agricultural. | PPT/Lecture | DISCUSSION | |
| 17 | Health effects of water pollution. Water borne and water related diseases. | PPT/Lecture | | |
| 18 | Effects of water pollution on aquatic system. | PPT/Lecture | | |
| 19 | Water quality standard for potability - Pollution parameters, BOD, COD, Coliform bacteria. | Lecture | Quiz | |
| 20 | Treatment of water for potable purpose (mixing, sedimentation, coagulation, filtration and disinfection) Primary and secondary treatment. | PPT/Lecture | DISCUSSION/Video | |
| 21 | Treatment of water for potable purpose (mixing, sedimentation, coagulation, filtration and disinfection) Primary and secondary treatment. | PPT/Lecture | DISCUSSION/Video | |
| 22 | Sludge disposal. Biological treatment: Kinetics of Biological growth - activated sludge treatment - trickling filters - anaerobic digestion, combined aerobic and anaerobic treatment process, aerobic process. | PPT/Lecture | DISCUSSION/Video | |
| 23 | Sludge disposal. Biological treatment: Kinetics of Biological growth - activated sludge treatment - trickling filters - anaerobic digestion, combined aerobic and anaerobic treatment process, aerobic process. | PPT/Lecture | DISCUSSION/Video | |
| 24 | Sludge disposal. Biological treatment: Kinetics of Biological growth - activated sludge treatment - trickling filters - anaerobic digestion, combined aerobic and | PPT/Lecture | DISCUSSION/Video | |

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| | anaerobic treatment process, aerobic process. | | | |
| 25 | Advanced waste water treatment - removal of dissolved organics and inorganic - precipitation, iron exchange, reverse osmosis, electro dialysis, adsorption and oxidation. | PPT/Lecture | DISCUSSION/Video | |
| 26 | Advanced waste water treatment - removal of dissolved organics and inorganic - precipitation, iron exchange, reverse osmosis, electro dialysis, adsorption and oxidation. | PPT/Lecture | DISCUSSION/Video | |
| 27 | Removal of nutrients. Removal of heavy metals - overall waste water treatment for sewage water. | PPT/Lecture | | |
| 28 | Removal of nutrients. Removal of heavy metals - overall waste water treatment for sewage water. | PPT/Lecture | | |
| 29 | Water pollution treatment using constructed wetlands Bioremediation; traditional water purification techniques | PPT/Lecture | | |
| 30 | Water pollution treatment using constructed wetlands Bioremediation; traditional water purification techniques | PPT/Lecture | | |
| **Module IV. Soil Pollution 10 hrs.** | | | | |
| 31 | Sources of soil pollution; - agricultural, industrial and domestic. | PPT/Lecture | | |
| 32 | Sources of soil pollution; - agricultural, industrial and domestic. | PPT/Lecture | | |
| 33 | Hazardous waste compounds, formulations and classes of substances, chemical classification of hazardous waste. | PPT/Lecture | | |
| 34 | Hazardous waste compounds, formulations and classes of substances, chemical classification of hazardous | PPT/Lecture | | |

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| | waste. | | | |
| 35 | Soil factors affected by pollution – physico-chemical and biological impacts. | PPT/Lecture | | |
| 36 | Soil factors affected by pollution – physico-chemical and biological impacts. | PPT/Lecture | | |
| 37 | Case studies on soil pollution in wetland and Highland soils in Kerala. Control of soil pollution. | PPT/Lecture | DISSCUSION | |
| 38 | Case studies on soil pollution in wetland and Highland soils in Kerala. Control of soil pollution. | PPT/Lecture | DISSCUSION | |
| 39 | Soil quality parameters and test methods | PPT/Lecture | | |
| 40 | Soil quality parameters and test methods | PPT/Lecture | | |
| **Module V. Solid Waste Management 15 hrs** | | | | |
| 42 | Municipal solid wastes (MSW) - quantities and characteristics, waste collection and transport, waste processing and resources recovery and recycling. | PPT/Lecture | DISCUSSION/Video | |
| 43 | Municipal solid wastes (MSW) - quantities and characteristics, waste collection and transport, waste processing and resources recovery and recycling. | PPT/Lecture | DISCUSSION/Video | |
| 44 | Aerobic and anaerobic systems- composting, vermicomposting; Biodigesters (Biogas plants); | PPT/Lecture | DISCUSSION/Video | |
| 45 | Aerobic and anaerobic systems- composting, vermicomposting; Biodigesters (Biogas plants); | PPT/Lecture | | |
| 46 | incineration, pyrolysis, plasma pyrolysis; sanitary landfills and open dumping yards. Management of plastic and e-waste. | PPT/Lecture | DISCUSSION/Video | |
| 47 | incineration, pyrolysis, plasma pyrolysis; sanitary landfills | PPT/Lecture | DISCUSSION/Video | |

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| | and open dumping yards. Management of plastic and e-waste. | | | |
| 48 | Better management strategies (any two model case studies). | PPT/Lecture | DISCUSSION | |
| 49 | Better management strategies (any two model case studies). | PPT/Lecture | DISCUSSION | |
| 50 | Treatment process for unsegregated waste, fixation of hazardous solid waste prior to disposal, hazardous waste in land fill. | PPT/Lecture | | |
| 51 | Treatment process for unsegregated waste, fixation of hazardous solid waste prior to disposal, hazardous waste in land fill. | PPT/Lecture | | |
| 52 | Treatment process for unsegregated waste, fixation of hazardous solid waste prior to disposal, hazardous waste in land fill. | PPT/Lecture | | |
| 53 | Hazardous waste (Management and Handling) Rules 1989 - the Manufacture Storage and Import of Hazardous Chemicals Rules 1989 | PPT/Lecture | | |
| 54 | Hazardous waste (Management and Handling) Rules 1989 - the Manufacture Storage and Import of Hazardous Chemicals Rules 1989 | PPT/Lecture | | |
| 55 | Biomedical Waste (Management and Handling) Rules 1998 | PPT/Lecture | | |
| 56 | Plastic Act 1999. Extended producer responsibility | PPT/Lecture | | |
| | **Module VI. Noise, Thermal and Oil Pollution 7 hrs.** | | | |
| 57 | Properties of sound and noise. Effects of noise on People and ecosystem. | PPT/Lecture | | |
| 58 | Properties of sound and noise. Effects of noise on People and ecosystem. | PPT/Lecture | | |
| 59 | Basic principles of noise | PPT/Lecture | | |

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| | control. National and International Standards. Assessment and measurement of sound. | | | |
| 60 | Thermal Pollution-causes and consequences | PPT/Lecture | DISCUSSION/Video | |
| 61 | Oil pollution – causes and consequences | PPT/Lecture | DISCUSSION/Video | |
| 62 | Oil pollution – causes and consequences | PPT/Lecture | | |
| 63 | case studies | PPT/Lecture | | |
| | **Module VII. Radiation Pollution 8 hrs.** | | | |
| 64 | Radiation pollution-Definition, Radioactivity, Radionuclide, Radiation emissions, sources | PPT/Lecture | | |
| 65 | Radiation pollution-Definition, Radioactivity, Radionuclide, Radiation emissions, sources | PPT/Lecture | | |
| 66 | Radioactive decay and buildup. Biological effects of radiation. | PPT/Lecture | | |
| 67 | Radioactive decay and buildup. Biological effects of radiation. | PPT/Lecture | | |
| 68 | Radioactive pollution impacts on ecosystem. | PPT/Lecture | | |
| 69 | Nuclear reactor disasters (Any two case studies), | PPT/Lecture | DISCUSSION/Video | |
| 70 | Nuclear reactor disasters (Any two case studies) | PPT/Lecture | DISCUSSION/Video | |
| | **Module VIII. Toxicology 20 hrs.** | | | |
| 71 | Definition, scope and history of toxicology, Acute and chronic toxicity, selective toxicity, dose, synergism and antagonism. | PPT/Lecture | | |
| 72 | Definition, scope and history of toxicology, Acute and chronic toxicity, selective toxicity, dose, synergism and antagonism. | PPT/Lecture | | |
| 73 | Definition, scope and history of toxicology, Acute and | PPT/Lecture | | |

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| | chronic toxicity, selective toxicity, dose, synergism and antagonism. | | | |
| 74 | Dose – Response relationships – Graded response, quantal response, Time action curves, Threshold Limit value (TLV); LC50 | PPT/Lecture | DISCUSSION/Video | |
| 75 | Dose – Response relationships – Graded response, quantal response, Time action curves, Threshold Limit value (TLV); LC50 | PPT/Lecture | DISCUSSION/Video | |
| 76 | Dose – Response relationships – Graded response, quantal response, Time action curves, Threshold Limit value (TLV); LC50 | PPT/Lecture | DISCUSSION/Video | |
| 77 | Dose – Response relationships – Graded response, quantal response, Time action curves, Threshold Limit value (TLV); LC50 | PPT/Lecture | DISCUSSION/Video | |
| 78 | Margin of safety; Toxicity curves; Cumulative toxicity and LD50 and CTF. | PPT/Lecture | DISCUSSION/Video | |
| 79 | Margin of safety; Toxicity curves; Cumulative toxicity and LD50 and CTF. | PPT/Lecture | DISCUSSION/Video | |
| 80 | Toxic chemicals in the Environment – Biochemical aspects of As, Cd, Pb, Hg, Cu, O3, PAN, pesticides, MIC and other carcinogens. Bio accumulation and biomagnification. | PPT/Lecture | DISCUSSION/Video | |
| 81 | Toxic chemicals in the Environment – Biochemical aspects of As, Cd, Pb, Hg, Cu, O3, PAN, pesticides, MIC and other carcinogens. Bio accumulation and biomagnification. | PPT/Lecture | DISCUSSION/Video | |
| 82 | Toxic chemicals in the Environment – Biochemical aspects of As, Cd, Pb, Hg, Cu, O3, PAN, pesticides, MIC and other carcinogens. Bio accumulation and | PPT/Lecture | DISCUSSION/Video | |

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| | biomagnification. | | | |
| 83 | Toxic chemicals in the Environment – Biochemical aspects of As, Cd, Pb, Hg, Cu, O3, PAN, pesticides, MIC and other carcinogens. Bio accumulation and biomagnification. | PPT/Lecture | DISCUSSION/Video | |
| 84 | Occupational toxicology-hazardous chemicals, disorders from chemical exposure at work, assessment of occupational hazards | PPT/Lecture | | |
| 85 | Toxicity testing; Bioassay – Definition, purpose, criteria for selection of test organism, methodology, estimation of LC50 | PPT/Lecture | | |
| 86 | Limitation and importance of bioassay, acute toxicity (single); sub-acute toxicity; chronic toxicity; teratogenicity, carcinogenicity and mutagenicity | PPT/Lecture | | |
| 87 | Limitation and importance of bioassay, acute toxicity (single); sub-acute toxicity; chronic toxicity; teratogenicity, carcinogenicity and mutagenicity | PPT/Lecture | | |
| 88 | Bio-monitoring of toxic chemicals - objectives, programs and parameters, concepts of bio indicators. | PPT/Lecture | | |
| 89 | Bio-monitoring of toxic chemicals - objectives, programs and parameters, concepts of bio indicators. | PPT/Lecture | | |
| 90 | Bio-transformation of Xenobiotics (Selective Toxicity) | PPT/Lecture | | |

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 4/07/2018 | All student were given different Case studies on pollution |

**GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines**

| | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| **1** | 17/08/2018 | Bio-monitoring of toxic chemicals - objectives, programs and parameters, concepts of bio indicators. |

**REFERENCES**


1. APHA-AWWA-WPCF, 1989. *Standard Methods for the Examination of water and Waste water.*
2. (17th edn.). Publishers.
3. Butter, G.C.1988. *Principles of Ecotoxicology.* John Wiley and Sons.
4. Cockerham, G.L. and Shane, B.S. 1994. (Eds.). *Basic Environmental Toxicology*. CRC Press.
5. Eisenbude, M. 1998. *Environmental Radioactivity*. Academic Press , NY. Fellenberg, G.1999.*Chemistry of Pollution*. John Wiley and Sons, New Delhi Hayes,W.A.2001. *Principles and Methods of Toxicology*.CRCPress,NY.
6. James, P. Lodge, J.R, Year. *Methods of Air sampling and Analysis* (3rd Edn.). ISc Lewis Pub., INC.
7. Klaassen,C.D and J.B.Walkins. 2003. *Essentials of Toxicology*. Mc Graw –Hill Professional New Delhi
8. Lutgens, F.K. and Tarbuek, J.E.1992.*The Atmosphere*. Prentice Hall, New Jersey.
9. Niesink, R.J.M., De Vries, J. and Hollinger, M.A. 1996. (Eds.).*Toxicology- Priniples and Applications.*CRC Press.
10. Odum E P(1971), Fundamentals of Ecology, W B Saunders Company, Philadelphia
11. Odum E P(1983), Basic Ecology, Saunders College Publishing, Philadelphia
12. Oehme, W.F. 1989. *Toxicity of Heavy Metals in Environment.* Marcel Dakkar Inc., New York.
13. Purnima,B.b., A.K.Janin and Arun.K.Jain.2011.*Waste Water Engineering Including Air Pollution*.
14. Laxmi
15. Publications (P) Ltd. New Delhi
16. Samuel, G.1990. *Nuclear Engineering.* Academic Press, N.Y.
17. Wilber, C.G.1989. *Biological aspects of Water Pollution.* Charles C. Thomas Publishers, Ilinois, USA.

**COURSE PLAN**

| PROGRAMME | **MSc ENVIRONMENTAL SCIENCE** | SEMESTER | 2 |
|---|---|---|---|
| COURSE CODE AND TITLE | 16P3EVST10:Environmental Monitoring and Management | CREDIT | 4 |
| HOURS/WEEK | **4** | HOURS/SEM | 90 |
| FACULTY NAME | **Dr. Anjana N S** | | |

| **COURSE OBJECTIVES** |
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| To find professional level employment and pursue research for contributing to the betterment of humanity and in shaping a sustainable society |
| To explain the environmental, social and economic framework in which environmental management decisions are made. |
| To develop environmental strategies, policies, programmes and systems that promote sustainable development. |
| To analyze environment management systems and formulate solutions that are technically sound, economically feasible, and socially acceptable. |
| Todecide measures for resource conservation. |
| To formulate environmental monitoring and assessment reports and monitor progress of environmental improvement programs. |

| **SI. No** | **Topic** | **Learning Recourses** | **Value additions** | **Remarks** |
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| **Module I. Environmental Management** | | | | |
| 1 | **Basic principles: Management of physical, environment.** | Class room lecture, PPT discussion. | Presentation of students' knowledge or how they organize and represent knowledge | CO2 |
| 2 | **Basic principles: Management of social environment.** | Class room lecture, PPT discussion. | | |
| 3 | **Basic principles: Management economic environment.** | Class room lecture, PPT discussion. | | |
| 4 | **Concepts and scope of environmental** | | | |

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| | **planning** | | | |
| 5 | **Regional planning and management.** | Class room lecture, group discussion | Class room assignments and resulting students work | |
| 6 | **Cost-benefit analysis and** | PowerPoint presentation, Group discussion, Class room lecture | Class room assignments and resulting students work | |
| 7 | **Resource economics.** | | | |
| 8 | **Environmental modeling-simulation modeling** | Demonstration of different modelling, Class room lecture | Computer based Experimental leaning activities | |
| 9 | **Input-output modeling** | | | |
| 10 | **Linear programming,** | | | |
| 11 | **Software and resource management.** | | | |
| 12 | **Tool box for environmental management – An over view of Ecological foot prints** | | Develop interest in using the technique in future field study and research. | |
| 13 | **SEA** | Group discussion, PPT presentation | Its use is corroborated with their own field study. | |
| 14 | **Ecological Economics** | | Video, photo , charts and diagrams | |
| | **conflict resolution strategies** | | | |
| 15 | **Eco funds** | | | |
| 16 | **Environmental auditing standards** | Demonstration of eco labeling on products, PPT presentation | Using concept test (short, informal, targeted tests) | |
| 17 | **Eco labeling and certification,** | | | |
| 18 | **accreditation – need, objectives and benefits** | | | |
| 19 | **Corporate social responsibility** | | | |

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| 20 | **Corporate environmental responsibility** | Class room lecture, PPT presentation | Group seminar presentation | |
| 21 | **ISO standards for environmental management systems (** | Demonstration of ISO marks on different products, Class room lecture | Class room assignments and resulting students work | |
| 22 | **EMS) ISO 14000, 14001** | | | |
| 23 | **EMS) ISO 26001;** | | | |
| 24 | **OHSAS 18001.** | | | |
| **Module II Ecosystem Management** | | | | |
| 25 | **An overview of Population** | Group discussion, class room lecture | Assignment 1 | |
| 26 | **Resources and ecosystem management,** | | | |
| | **Exponential growth in human numbers and the implications.** | | | |
| 27 | **Major management concepts and methodologies: The five basic laws of Ecology and their relevance for ecosystems management** | | | |
| 28 | **Ist Law** | Class room lecture, PPT presentation | Class room assignments and resulting students work | |
| 29 | **2nd Law** | | | |
| 30 | **3rd Law** | | | |
| 31 | **4th Law** | | | |
| 32 | **5th Law** | | | |
| 33 | **Paradigm shifts in the management of Ecosystems-.** | Class room lecture, Students presentation and group discussion | Conducting quiz | |
| 34 | **Influence of economics in ecology** | | | |
| 35 | **Management practices for** | Class room lecture, Students | Assessing outdoor group work | |

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| | **various ecosystems** | presentation and group discussion | | |
| 36 | **Grasslands,** | | | |
| 37 | **Forests,** | | | |
| 38 | **Mountains,** | | | |
| 39 | **Wetlands** | | | |
| 40 | **Coastal areas.** | | | |
| 41 | **Environmental planning and management of – waste lands** | Class room discussion, Site visit to understand the current status of specified area | Outdoor group activities. | |
| 42 | **Reclaimed lands** | | | |
| 43 | **Mining areas** | | | |
| 44 | **Human settlements** | | | |
| 45 | **Industrial lands and agricultural lands.** | | | |
| 46 | **Ecorestoration/re mediation** | Class room discussion, Lecturing | Outdoor group activities. | |
| 47 | **Environmentally sound management of Biotechnologies** | | | |
| 48 | **Local knowledge and management systems** | | | |
| 49 | **The common property resources and their management.** | | | |
| **Module III. Environmental Impact Assessment (EIA)** | | | | |
| 50 | **Definition, history of EIA** | Class room discussion | Class room assignments and resulting students work | |
| 51 | **Aim, principles, concept and scope of EIA** | Class room lecturing | Develop interest in using the technique in future field study and research. | |
| 52 | **Baseline data collection,** | PPT presentation, Class room lecture | Its use is corroborated with their own field study | |
| 53 | **Methods and steps - Adhoc method,** | | | |
| 54 | **Checklist method,** | | | |

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| 55 | **Matrices,** | | | |
| 56 | **Map overlays method,** | | | |
| 57 | **Network method,** | | | |
| 58 | **Index method.** | | | |
| 59 | **Impact assessment and impact evaluation-E1A Processes,** | Lecturing and PPT presentation | Assignment -4 | |
| | **Stages, E1A Statement** | | | |
| 60 | **Environment management plan** | Lecturing and PPT presentation | Assignment-5 | |
| 61 | **Risk assessment and disaster management programme.** | | | |
| 62 | **National Policy on EIA and Regulatory Framework** | Lecturing and PPT presentation | Assignment 6 | |
| 63 | **Environmental Impact Assessment Notification 2006** | | | |
| 64 | **Coastal Zone Notification 1991** | | | |
| 65 | **Environmental Clearance Process in India** | Lecturing and PPT presentation | Assignment-5 | |
| 66 | **Legislative requirements (discharge requirements and area restrictions)** | | | |
| 67 | **Environmental Appraisal procedure for mining, industrial , and** | Lecturing and PPT presentation | Assignment 5 | |
| 68 | **thermal power, nuclear power** | | | |
| 69 | **multipurpose river valley projects .** | | | |
| 70 | **Central and state pollution control boards for environmental protection.** | Lecturing and PPT presentation | Seminar presentation | |
| 71 | **EIA case studies** | Students | Assignment 4 | |

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| | | presentation | | |
| 72 | **EIA case studies** | | | |
| 73 | **Life Cycle Assessment (LCA)** | Lecturing and PPT presentation | Outdoor group activities. | |
| 74 | **LCA- significance.** | | | |
| **Module IV. Environment Vs Development** | | | | |
| 75 | **Dominance of Man on earth.** | Group discussion and student's presentation | Assiginment-1 | |
| 76 | **Limits of growth** | | | |
| 77 | **Industrial revolution and resource utilization,** | Student's presentation and discussion | Group seminar presentation | |
| 78 | **environmental consequences** | | | |
| 79 | **Modern agriculture and green Revolution- environmental impacts** | Student's presentation and discussion | Group seminar presentation | |
| 80 | **Conflicts of interest - environment and development.** | Student's presentation and discussion | Group seminar presentation | |
| 81 | **Tragedy of the commons.** | | | |
| **Module V. Sustainable Development** | | | | |
| 82 | **Our common future and the idea of Sustainable Development - concepts and dimensions,** | Lecturing, Group discussion, PPT presentation | Assignment-7 | |
| 83 | **Imperatives relating to sustainable development** | | | |
| 84 | **Johannesberg Conference 2002 and follow up Conference on sustainable development** | PPT presentation and Class room lecturing | Seminar presentation | |
| 85 | **Securing Sustainable futures** | | | |

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| | **Millennium Development Goals and Strategies (MDG & S)** | | | |
| 86 | **The earth charter; need and scope for evolving participatory, community based environmental management strategies** | PPT presentation and Class room lecturing | Assignment-5 | |
| 87 | **Education for sustainability.** | | | |
| 88 | **Building sustainable societies and lifestyles.** | Student's presentation and discussion | Assignment-3 | |
| 89 | **Ecological Foot Print analysis and its significance.** | PPT presentation and Class room lecturing | Assignment-7 | |
| 90 | **Environmental concerns in traditional societies, Gandhian environmentalism** | PPT presentation and Class room lecturing | Group seminar | |

## INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines

| No | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 20/06/2018 | Environmental Degradation and Population Flows |
| 2 | 10/07/2018 | Environmental management plan for port and harbour projects |
| 3 | 30/07/2018 | Ecosystem services as a boundary object for sustainability |
| 4 | 03/08/2018 | Identify five project/development examples that would require an EIA, five that would only require an Environmental Management Plan (EMP), and five that wouldn't require EIA nor EMP and discuss the reasons. |
| 5 | 28/08/2018 | Review impact assessment methods and discuss their potential advantages and challenges. |

**GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines**

| No | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 5/07/2018 | Review local and international media publications to identify what aspects of EIA and projects/developments are most commonly discussed. |
| 2 | 27/08/2018 | How is sustainable development linked to ecological footprint? |

**REFERENCES**


1. Asit K. Biswas *et.al.*, 1987. *EIA for Developing Countries*. United Nations University, Tokyo.

2. Carter,L.1996. Environmental Impact Assessment. McGraw Hill,New Delhi

3. Coronel, C., Morris, S. and Rob, P. 2009. Database Systems: Design, Implementation and Management.9th edn., Course Technology.

4. Eagles, P.F.J.1987. *The planning and Management of Environmentally Sensitive areas*.

5. Longman Group Ltd., USA.

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| **COURSE PLAN** PROGRAMME | **MSc ENVIRONMENTAL SCIENCE** | SEMESTER | 3 |
| COURSE CODE AND TITLE | **16P3EVST11 : BIODIVERSITY CONSERVATION AND SOCIAL ISSUES** | CREDIT | 4 |
| HOURS/WEEK | **4** | HOURS/SEM | 90 |
| FACULTY NAME | **DR. REMYA.R** | | |

| **COURSE OBJECTIVES** |
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| To develop a sense of conservation attitude |
| To formulate plans for biodiversity conservation in various committees pertaining to the same |
| To examine man-wildlife conflicts |
| To estimate the biodiversity of an ecosystem |
| To apply various methods of water conservation techniques around their locality |

| SESSION | TOPIC | LEARNING RESOURCES | ACTIVITY | REMARKS |
|---|---|---|---|---|
| | **MODULE I**<br><br>**Biodiversity** | | | |
| 1 | Definition: genetic, species and ecosystem diversity | PPT | video | |
| 2 | Biogeographical classification of India | PPT | Discussion with maps | |
| 3 | Value of biodiversity: consumptive use, productive use, social, ethical aesthetic and option values | PPT | Visit to nearby parks | |
| 4 | Biodiversity at global, national and local levels | PPT | Assignments and seminars | |
| 5 | India as a mega diversity nation | PPT | Assignments and seminars | |
| 6 | Hot-spots of biodiversity | Popular articles<br>PPT | | |
| 7 | Threats to biodiversity | PPT | e-resource | |
| 8 | Habitat loss, poaching of wildlife, man wildlife conflicts | PPT | Discussion | |
| 9 | Endangered and endemic species of India | PPT | | |
| | **MODULE II**<br>**Concepts and Patterns of Biodiversity** | | | |
| 10 | Types of biodiversity-wild biodiversity, agro-biodiversity, domesticated biodiversity | PPT/Lecture | Group discussion | |
| 11 | Values of biodiversity, ecosystem functions and | Lecture | Assignments | |

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| | biodiversity, mobile links and valuating ecosystem services | | | |
| 12 | Drivers of biodiversity loss. | Lecture | Quiz | |
| 13 | Tools and techniques for biodiversity estimation-biodiversity indices | Lecture | Assignments | |
| | **MODULE III**<br>**Conservation Biology** | | | |
| 14 | Introduction, Origin, concepts and definition of conservation biology | PPT/Lecture | | |
| 15 | Introduction, Origin, concepts and definition of conservation biology | PPT/Lecture | | |
| 16 | Fitness and Viability of Population, | PPT/Lecture | | |
| 17 | Minimum Viable Population, | PPT/Lecture | | |
| 18 | Heterozygocity and Fitness | PPT/Lecture | | |
| 19 | Habitat Fragmentation and its effects | PPT/Lecture | | |
| 20 | Types of soil | Lecture | Quiz | |
| 21 | Community processes | PPT/Lecture | | |
| 22 | Community Stability and Structure, | PPT/Lecture | | |
| 23 | Community Stability and Structure, | PPT/Lecture | | |
| 24 | Co-adaptation | PPT/Lecture | | |
| 25 | Co-evolution (plant and animal interactions-basic, concepts only | PPT/Lecture | | |
| 26 | Keystone Species | PPT/Lecture | | |
| 27 | Dominant species | PPT/Lecture | | |
| 28 | Infectious diseases and conservation biology | PPT/Lecture | | |
| 29 | Infectious diseases and conservation biology | PPT/Lecture | | |
| 30 | Infectious diseases and conservation biology | PPT/Lecture | | |
| 31 | Conservation of Habitats | PPT/Lecture | | |
| 32 | Threats and management of habitats | PPT/Lecture | | |
| 33 | Theory and practice of conservation (basics only), | PPT/Lecture | | |
| 34 | Restoration, reclamation and regeneration of habitats (measures and steps introduction only). | PPT/Lecture | | |
| 35 | Restoration, reclamation and regeneration of habitats (measures and steps introduction only). | PPT/Lecture | | |
| 36 | Restoration, reclamation and regeneration of habitats (measures and steps introduction only). | PPT/Lecture | | |
| | **MODULE IV**<br>**Conservation strategies** | | | |
| 37 | In-situ conservation: sanctuaries, biospheres reserves, national parks, nature reserves, preservation plots | PPT/Lecture | | |
| 38 | In-situ conservation: sanctuaries, biospheres reserves, national parks, nature reserves, preservation plots | PPT/Lecture | | |
| 39 | In-situ conservation: sanctuaries, biospheres reserves, national parks, nature reserves, preservation plots | PPT/Lecture | | |

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| 40 | Ex-situ conservation: botanical gardens, zoos, aquaria, homestead garden; herbarium | Lecture | | |
| 41 | Ex-situ conservation: botanical gardens, zoos, aquaria, homestead garden; herbarium | PPT/Lecture | | |
| 42 | Ex-situ conservation: botanical gardens, zoos, aquaria, homestead garden; herbarium | PPT/Lecture | | |
| 43 | In-vitro Conservation: germplasm and gene bank; tissue culture: pollen and spore bank, DNA bank | PPT/Lecture | Interactive session | |
| 44 | In-vitro Conservation: germplasm and gene bank; tissue culture: pollen and spore bank, DNA bank | PPT/Lecture | | |
| 45 | In-vitro Conservation: germplasm and gene bank; tissue culture: pollen and spore bank, DNA bank | PPT/Lecture | | |
| 46 | GEF-World Bank initiatives | PPT/Lecture | | |
| 47 | GEF-World Bank initiatives | PPT/Lecture | | |
| 48 | Biodiversity hotspots and their characteristics, global distribution | PPT/Lecture | | |
| 49 | Biodiversity hotspots and their characteristics, global distribution | PPT/Lecture | | |
| 50 | CBD, IPRs, National and international programmes for biodiversity conservation. | PPT/Lecture | Video | |
| 51 | CBD, IPRs, National and international programmes for biodiversity conservation. | PPT/Lecture | | |
| 52 | CITES and TRAFFIC | PPT/Lecture | | |
| 53 | National Board of Biodiversity, State Board of Biodiversity. | PPT/Lecture | | |
| 54 | Ecosystem people and traditional conservation strategies | PPT/Lecture | | |
| 55 | Ecosystem people and traditional conservation strategies | PPT/Lecture | | |
| 56 | People's participation in conservation-PFM | PPT/Lecture | | |
| 57 | People's participation in conservation-PFM | PPT/Lecture | | |
| 58 | Community reserve and People's Biodiversity Register (PBR) | PPT/Lecture | | |
| 59 | Biodiversity Management Committee (BMC). | PPT/Lecture | | |
| 60 | Wildlife values and eco-tourism | PPT/Lecture | | |
| 61 | Wildlife distribution in India | PPT/Lecture | | |
| 62 | Problems in wildlife protection-Policies and programmes | PPT/Lecture | | |
| 63 | Threatened animals of India. | PPT/Lecture | | |
| | **MODULE V**<br>**Social Issues and the Environment** | | | |
| 58 | From unsustainable to sustainable development | Lecture | | |
| 59 | Urban problems and related to energy | PPT/Lecture | | |
| 60 | Urban problems and related to energy | PPT/Lecture | | |
| 61 | Water conservation, rain water harvesting, watershed management | PPT/Lecture | | |
| 62 | Water conservation, rain water harvesting, | PPT/Lecture | Debate | |

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| | watershed management | | | |
| 63 | Resettlement and rehabilitation of people; its problems and concerns | PPT/Lecture | | |
| 64 | Resettlement and rehabilitation of people; its problems and concerns | PPT/Lecture | | |
| 65 | Case studies | PPT/Lecture | | |
| 66 | Environmental ethics: Issues and possible solutions | PPT/Lecture | | |
| 67 | Environmental ethics: Issues and possible solutions | PPT/Lecture | | |
| 68 | Climate change, global warming, acid rain | PPT/Lecture | | |
| 69 | Ozone layer depletion, nuclear accidents and holocaust. | PPT/Lecture | Debate | |
| 70 | Ozone layer depletion, nuclear accidents and holocaust. | PPT/Lecture | | |
| 71 | Case studies. | PPT/Lecture | | |
| 71 | Waste land reclamation | PPT/Lecture | | |
| 72 | Waste land reclamation | PPT/Lecture | | |
| 73 | Consumerism and waste products | PPT/Lecture | | |
| 74 | Consumerism and waste products | PPT/Lecture | | |
| 75 | Environmental Protection Act· | PPT/Lecture | Debate | |
| 76 | Environmental Protection Act· | PPT/Lecture | | |
| 77 | Air (Prevention and Control of Pollution) Act | PPT/Lecture | | |
| 78 | Water (Prevention and control of Pollution) Act | PPT/Lecture | | |
| 79 | Indian Biodiversity Act 2002 and laws | PPT/Lecture | | |
| 80 | Indian Biodiversity Act 2002 and laws | PPT/Lecture | | |
| 81 | Wildlife Protection Act | PPT/Lecture | | |
| 82 | Wildlife Protection Act | PPT/Lecture | | |
| 83 | Forest Conservation Act | PPT/Lecture | | |
| 84 | Forest Conservation Act | PPT/Lecture | | |
| 85 | Issues involved in enforcement of environmental legislation | PPT/Lecture | | |
| 86 | Issues involved in enforcement of environmental legislation | PPT/Lecture | | |
| 87 | Public awareness | PPT/Lecture | | |
| 88 | Public awareness | PPT/Lecture | | |
| 89 | Revision | PPT | | |
| 90 | Revision | PPT | | |

**INDIVIDUAL ASSIGNMENTS/SEMINAR – Details & Guidelines**

| No | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| 1 | 14/7/2018 | Environmental ethics: Issues and possible solutions |
| 2 | 2/8/2018 | Climate change, global warming, acid rain |
| 3 | 16/8/2018 | Ozone layer depletion, nuclear accidents and holocaust. |
| 4 | 30/8/2018 | Case studies. |
| 5 | 4/9/2018 | Waste land reclamation |
| 6 | 14/9/2018 | Consumerism and waste products |

**GROUP ASSIGNMENTS/ACTIVITES – Details & Guidelines**

| No | Date of completion | Topic of Assignment & Nature of assignment (Individual/Group – Written/Presentation – Graded or Non-graded etc) |
|---|---|---|
| **1** | 21/8/2018 | Wildlife values and eco-tourism |

**References**


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