DAV UNIVERSITY JALANDHAR

SYLLABI FOR

Skill Enhancement Courses

Session: 2018-19

DAV UNIVERSITY, JALANDHAR

Course Title: Instrumentation methods of Environmental Analysis

Paper Code: EVS502

L	T	P	Credits	Marks
3	0	1	4	100

Course Objective: To upgrade the students with information on instrumental techniques of chemical analysis, practical work with the realistic samples from the environment so that they could know the basis of instrumentation and their role in environment protection.

Possible outcome: The techniques further used in research perspective to control environmental problems.

Unit 1: Introduction to techniques

Introduction to Analytical Methods: Titrometry, Gravimetry, Colorimetry, Spectrophotometry, chromatography, Atomic Absorption Spectrophotometry and Flame Photometry; Sample preservations; Handling of samples and chemical in lab; Sample handling of Volatile and non-volatile organic compounds; pH metry**.** **12 hours**

Unit 2: Biophysical Methods

Instrumentation and analytical methods involved in the following techniques: UV/visible, fluorescence, UV, circular dichroism, NMR and ESR spectroscopy, molecular structure determination using X- ray, fluorescence and X-ray diffraction and NMR; Molecular analysis using light scattering, different types of mass spectrometry and surface plasma resonance methods. **11 hours**

Unit 3: Chromatographic techniques

Introduction to chromatography; Chromatographic Techniques: Gas Chromatography, HPLC, Supercritical Fluid chromatography, Reverse phase liquid chromatography, Electrophoresis: Capillary, X-ray diffraction, X-ray fluorescence, Bomb colorimetrry, Mass Spectroscopy, Microscopy; Fluorescence**.** **11 hours**

Unit 4: Microbial Techniques

Basics of Microbiological analysis: Laminar flow, autoclaving, preparations of media for culture growth; Handling of radioactive and hazardous samples; Determination of radionuclide in the environmental samples : Gamma spectrometry, alpha particle spectrometry, beta particle spectrometry, liquid scintillation measurement; Utilization of different techniques for analysis of Polycyclic Aromatic Hydrocarbons(PAHs), Pesticide residues, Polychlorinated Biphenyls in the Environment. **14 hours**

Practical:

1. Preparation of a standard solution.
2. Preparation of a standard curve.
3. To analyze the moisture content of a sample using gravimetry
4. Analysis of sample using titrimetry.
5. To analyze the pH of a sample.
6. To analyze the sample Using Spectrophotometry.
7. A visit to different labs to demonstrate the functioning of instrumentation as listed in the syllabi.

References:

1. Brown, T.A. (2001). Gene cloning and DNA analysis, An Introduction. 4th Edition, Blackwell Scientific Publication, Oxford, UK.
2. Chatwal, G. R. and Anand, S. K. (2007). Instrumental methods of chemical analysis. Himalaya Publishing House, Delhi.
3. De, A.K. (2000). Environmental Chemistry, New Age International, New Delhi.
4. Friefelder, D. (1982). Physical Biochemistry, Applications to Biochemistry and Molecular Biology, WH Freeman and Company.
5. Goldsby, R.A., Kindt, T. J. and Osborne, B.A. (2000). Immunology, 4th Edition, WH Freeman and Company, New York.
6. Murphy, W.J. (1977). Analytical chemistry. American Chemical Society, USA.
7. Plummer, D.T. (1988). An Introduction to Practical Biochemistry. Tata McGraw- Hill Publishing Company Limited, New Delhi.

8. Riley, T. and Tomilson, C. (1987). Principles of Electro analytical Methods. John Wiley and Sons Ltd., Chichester, England.
9. Sheehan, D. (2000). Physical Biochemistry: Principles and Applications, John Wiley and Sons Ltd., Chicester, England.
10. Wilson, K. and Walker, J. (Eds.) (1995). Practical Biochemistry: Principles and Techniques, Cambridge University Press, U.K.

DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Engineering and Applications

Paper Code: EVS503

L	T	P	Credits	Marks
3	0	1	4	100

Course Objective: To acquaint the students with latest Engineering technology on how to combat with environmental problems.

Possible outcome: This will assist the students for analyzing water parameters in industries.

Unit 1: Water Chemistry

Chemistry of water and chemical reactions in aquatic environment; Chemistry of water, dissolution/precipitation reactions; complexation reactions; Concept of DO, BOD, COD; Concept of salinity; Composition of seawater and physic-chemical speciation in oceans; Suspended particles; Concept of sedimentation, coagulation and filtration; BOD test procedure: Determination of BOD5 and modelling of BOD5; Interrelationship between BOD, COD and TOC; Box model; Oxygen sag curve. **12 hours**

Unit 2: Water Pollution Control Technologies

Water as a resource; Sewage and waste water treatments systems: Primary, secondary and tertiary treatments; Biological treatments: aerobic and anaerobic treatments; Design of screening, sedimentation, filtration, softening, break point, chlorination; Treatment plant operation and maintenance for screens, grit chamber, sedimentation tank, aeration tank, trickling filters, sludge digestion tanks, sludge drying beds and stabilization ponds.

12 hours

Unit 3: Sampling Methods

Physico-chemical and bacteriological sampling: MPN test and Membrane filter Technique; Standards for water quality and wastewater discharge; Methods of sampling**:** Grab, composite and integrated; Sample volumes; Selection of sampling points; Tests performed in the laboratory for raw sewage, primary sedimentation tank, aeration tank, secondary settling tank, sludge digester and stabilization ponds**.** **12 hours**

Unit 4: Treatment for potable Water

Procedures; Flocculation; Settling; Filtration; Reverse sand filter; Chlorination; Methods of Cleaning Potable Water: Filtration, Electro-dialysis, principle & theory of chemical oxidation; Disinfection mechanism: Ozone, permanganate, chlorination. Reverse osmosis, Ultra filtration; Water quality standards. **12 hours**

Practical:

1. To study the different methods of water sampling.
2. Determination of optimum coagulant dose by Jar test apparatus.
3. Determination of water transparency by Secchi disc method.
4. Determination of total solids of water samples.
5. Determination of DO of water sample.
6. Determination of BOD of water sample.
7. Determination of COD of water sample.
8. Determination of Chlorides in water sample.
9. A visit to nearby Sewage Treatment Plant.
10. A visit to nearby Effluent Treatment Plant.

References:

1. Benefield, L. D., Jedkins, J. F. Jr. and Weand, B. L. (1985). Process chemistry for Water and Wastewater Treatment. Prentice Hall Inc., New York.
2. Cornwell, D. A. and Davis, M. (1999). Introduction to Environmental Engineering. McGraw-Hill, New York.
3. Eckenfelder, W. W. Jr. (1989). Industrial Water Pollution Control. McGraw-Hill Book Company, New York.
4. Elangovan, R. and Saseetharan, M. K. (1995). Unit Operations in Environmental Engineering. New Age International, New Delhi.

5. Fair, G. M., Geyer, J. C. and Okun, K. (1979). Water and Wastewater Engineering. Vol. 2, John Wiley, New York.
6. Garg, S. K. (2003). Sewage Disposal and Air Pollution Engineering. Khanna Publishers, Delhi.
7. Khandpur, R.S. (1989). Handbook of Analytical Instruments, Tata McGraw-Hill, New Delhi.
8. Modi, P. N. (2003). Water Supply Engineering and Wastewater Engineering, Volume I & II, Standard Book House, Delhi.
9. Pelczar, M. J., Chan, E. C. S. and Kreig, N. R. (1993). Microbiology. Tata McGraw Hill, New Delhi.

DAV UNIVERSITY, JALANDHAR

Course Title: Solid Waste Management Techniques

Paper Code: EVS351

L	T	P	Credits	Marks
3	0	1	4	100

Course Objective: To understands the students with the common municipal solid wastes techniques to manage solid wastes.

Possible outcome: This will assist the students for designing of solid waste treatment technologies to manage the waste.

Unit 1: Introduction to solid waste

Sources, generation, classification & composition of solid wastes; Need for management and planning; Solid waste types; Types of solid waste; Special wastes: Types, household hazardous wastes, demolition waste, domestic waste; Sewage sludge and municipal waste; Slaughterhouse waste; Agricultural waste; Mining waste; Integrated Solid waste Management; Solid waste characterization: ultimate and proximate analysis; Waste reduction at source, volume reduction and collection techniques**.** **14 hours**

Unit 2: Recycling and Landfilling

Need of materials recovery/recycling; Recycling of Aluminum, glass, plastic and paper; Treatment and disposal techniques: Burning, Open dumping; Landfill: Landfilling methods and operation, Landfill liners: clay, Geo-membrane, HDPE, Geonet, Geotextile; Landfill emissions: Leachate and Landfill gas, Leachate collection & analysis**.** **11 hours**

Unit 3: Waste Treatment Methods

Composting; Vermicomposting; Incineration; Pyrolysis; Gasification; Refuse derived fuels; Biogas: Method and applications; Merits and demerits of waste disposal methods; Biomass gasification: Classification of biomass gasifiers, chemistry of gasification process, applications of the gasifier, problems in development of gasifier, advantages and disadvantages.

12 hours

Unit 4: Solid Waste Management Rules

Municipal Waste (Management and Handling) Rules 2000; Recycled Plastics (Manufacture and usage) Rules; Role of GIS in Waste Management; Hospital Waste Management; Hazardous Waste Management & Handling rules, 1989 & 2000 (amendments); Pollution abatements and public participation- cleaning river like Ganga and Yamuna.

10 hours

Practical:

1. A visit to Composting/Vermicomposting Unit.
2. Ultimate analysis of Solid waste.
3. Practical knowledge and working of incinerators.
4. Practical knowledge and working of Pyrolysis.
5. To prepare a list of materials from municipal waste stream that can be reused or recycled.
6. A visit to the RDF plant.
7. Practice exercises on computer related to handling of data.
8. Visit to local landfill site.
9. Survey of different machine's used in solid waste management.

References:

1. Evans, G. (2005). Biowaste and Biological Waste Treatment. James and James (Science Publishers) Ltd, U.K.
2. Hammer, M. J. and Hammer Jr, M. J. (2000). Water and Wastewater Technology. 3rd ed. Prentice Hall of India.
3. Jaswal, P.S. and Jaswal, N. (2003). Environmental Law. Pioneer Publications, Delhi.
4. Kreith, F. (1999). Handbook of Solid Waste Management. McGraw Hill Publishers, USA.
5. Kumar, R. and Singh, R.N. (2006). Municipal Water and Wastewater Treatment. Capitol Pub Co., New Delhi.

6. Noble, G. (1976). Sanitary Landfill Design Handbook. Technomic Westport Connecticut, USA.
7. Peavey, H. S., Rowe, D. R. and Tchobanoglous, G. (1985). Environmental Engineering. International Ed. McGraw-Hill, New York, USA.
8. Shah, K. L. (1999). Basics of Solid and Hazardous Waste ManagementTechnology. McGraw Hill, USA.
9. Tchobanogloas, G. (1993). Integrated Solid Waste Management*:* Engineering, Principle and Management. McGraw Hill, USA.
10. Vesilind, P. A., Worrell, W. and Reinhart, D. (2002). Solid Waste Engineering**.** Brooks/Cole Thomson Learning Inc., USA.
11. White, P., Frank, M. and Hindle, P. (1999). Integrated Solid Waste Management- A Life Cycle Inventory.Chapman & Hall, USA.

DAV UNIVERSITY, JALANDHAR

Course Title: Environmental Impact Assessment and Auditing

Paper Code: EVS352

L	T	P	Credits	Marks
3	0	1	4	100

Course Objective: This paper is an introduction to EIA, a systematic process that examines the environmental consequences of development actions, in advance. This process is firmly on the agenda of all environmental agencies as a result of introduction of legislations in various countries.

Learning outcome: Students will be thoroughly conversant with the environmental hazards of some industries. They will be equipped with the tools of environmental auditing also.

Unit 1: Introduction to Environmental Impact Assessment

Introduction to Environmental Impact Analysis, Environmental impact statement & environmental management plan , EIA guidelines 1994, notification of the Government of India, 2006; various appendices and forms for application, Procedure of Environmental clearance-Screening, Scoping, Public Consultation, Appraisal, Types of Project activities requiring Environmental Clearance.

10 hours

Unit 2: Checklist for EIA

Generic structure of EIA Document, Procedure of Public hearing, Composition of EAC, SEAC , Coastal Regulation Zone Notification, 1991, Impact assessment Methodologies Generalized approach to impact analysis and statement, Baseline information and predictions.

12 hours

Unit 3: Environmental Auditing

Guidelines for environmental audit & Introduction to environmental planning, Environmental Auditing Procedure, Matrix method and Batelle Method of auditing, Restoration and rehabilitation and reclamation ecology concept.

11 hours

Unit 4: Sustainable Development

Urban and Rural planning and land-use pattern and policy for India, Sustainable Development: The Concept and strategies of sustainable development, Economic principles, Development models, ecological economics and different methods of economic evaluation

10 hours

Practical/ Assignments:

1. Perform EIA on: dam / air post / Industry / Bridge / railway tract/ urban city.
2. Prepare an environmental audit of hostel / institute / industrial area /city / suburbs.
3. Prepare a strategy for restoration of a degraded forest ecosystem
4. Illustrate a poorly-managed and well-managed ecosystem in your area/ locality.
5. Illustrate a land use pattern for a wasteland / roadsides / roundabouts. Prepare a model showing sustainable development in a man-made ecosystem.
6. Collect a baseline data on vegetation in an over-grazed grassland disturbed ecosystem.
7. Assignment by teacher.

References:

1. Bassam, N. E. (2005). Energy Plant Species: Their Use and Impact on Environment and Development. James and James (Science Publishers) Ltd, U.K.
2. Coley, D. (2008). Energy and Environment Change. John Wiley and Sons.
3. Cutter, S.L. (1999). Environmental Risks and Hazards. Prentice Hall of India, New Delhi.
4. Glasson, J., Therivel, R. and Chadwick, A. (2006). Introduction to Environmental Impact Assessment. Routledge, London.
5. Kulkarni, V. and Ramachandra, T.V. (2006). Environmental Management. Capitol Pub. Co., New Delhi.
6. Petts, J. (2005). Handbook of Environmental Impact Assessment- Volume 1 and 2. Blackwell Publishers, UK
7. Quaschning, V. (2006). Understanding Renewable Energy Systems. Earth scan Pub Ltd., U.K.
8. Rai, G.D. (1998). Non ConventionalEnergy Sources. Khanna Publishers, New Delhi.
9. Ravindranath, N.H., Rao, U.K., Natarajan, B. and Monga, P. (2002). Renewable Energy and Environment – A Policy Analysis of India. Tata McGraw Hill, New Delhi.

DAV UNIVERSITY, JALANDHAR

Course Title: Disaster Management

Paper Code: EVS353

L	T	P	Credits	Marks
3	0	1	4	100

Course Objective: This paper introduces the students to various environmental hazards, their causes, nature, preparedness and assessment of loss. It teaches them to model hazards and familiarizes them with methods of disaster management.

Learning outcomes: At the end of the course, the students will be able to help themselves, their work places and other organizations to counter disasters of all kinds with minimum damage to life and property.

Unit 1: Introduction to Disasters

Introduction, Types of natural calamities, major and minor calamities, impact of calamities. Concept of hazard, disaster, risk, vulnerability, exposure and response. Distinction between natural hazards and anthropogenic environmental disturbances, Environmental Hazards: Classification, Causes and Distribution. **12 hours**

Unit 2: Types of Disasters

Geological Hazards: Earthquakes, Volcanoes, Mass-movement; Tsunami. Hydrological Hazards: Floods, Droughts, Water Quality, Contamination, Arsenic problem, Cyclones, Hurricanes Atmospheric/Climatic Hazards: Extreme weather events, Global Climatic change.

Man-made Hazards*:* Wars, Biological war (introduction of pathogens), major accidents from industries; Biophysical Hazards: Frost Hazards in agriculture, epidemics, wildfires Technological Hazards: Nature and significance. Lessons from Bhopal and Chernobyl disasters.

12 hours

Unit3: Management of disasters

Disaster Impacts and response – Identification of dead – Search rescue –first and relief phase Vaccination, basic sanitation and personal hygiene. Disasters and Hazard Management: Human and ecological impacts; Risk assessment and vulnerability analysis; National preparedness and adaptation strategies; Hazards policies and agencies; Land use classification. Role of GIS and remote sensing in surveillance, monitoring, risk assessment, estimation of losses and planning.

13 hours

Unit 4: Environmental Disaster Assessment

Planning, mitigation program, preparedness, resettlement rehabilitation, role of NGOS,), Psychotherapy – simplified yoga and meditation, stress management.

10 hours

Practical/ Assignments:

1. Risk Assessment for Hazards.
2. Vulnerability Assessment for Hazards.
3. Preparedness for Hazard Occurrence Evaluation of Early Warning Systems.
4. Gap Analysis based on field visits.
5. Development of indicators, questionnaires and potential impact assessment.
6. First Aid Practices for Hazards.

References:

1. Bell, F.G. and Spon, F.N. (1999). Geological Hazards: Their Assessment, Avoidance and Mitigation, e Books der ULB Darmstadt.
2. Henrry, J.G. and Heinke, G.W. (2004). Environmental Science and engineering, Pearson education, Delhi, India.
3. Keith, S. (2001). Environmental Hazards: Assessing Risk and Reducing Disaster, Routledge.
4. Keller, E.A. (1996). Introduction to Environmental Geology, Prentice Hall, Upper Saddle River, New Jersey.
5. Natural disasters (1980) – A guide for relief workers – JAC AdhyatmaSadhema, Kendra Mehrani, New Delhi.
6. Singh, S., Kundan, S.C. and Singh, S. (1998). Disaster Management. Mittal Publications. New Delhi.