E.G.S. PILLAY ENGINEERING COLLEGE

(Autonomous)

Approved by AICTE, New Delhi | Affiliated to Anna University, Chennai

Accredited by NAAC with 'A' Grade | Accredited by NBA (CSE, EEE, MECH)

NAGAPATTINAM – 611 002

M.E. ENVIRONMENTAL ENGINEERING

Full Time Curriculum and Syllabus

Second Year – Third Semester

Course Code	Course Name	L	T	P	C	Maximum Marks		
						CA	ES	Total
Theory Course								
1703EV008	**Elective III**- Membrane Technologies For Water And Waste Water Treatment	2	2	0	3	40	60	100
1703EV009	**Elective IV**- Remote Sensing and GIS Applications In Environmental Management	3	0	0	3	40	60	100
1703MF021	**Elective V**- Project Management	3	0	0	3	40	60	100
Laboratory Course								
1704EV301	Project Work Phase-I	0	0	12	6	50	50	100
Open Electives								
1703EV016	Air Pollution Monitoring and Control	3	0	0	3	40	60	100
1703EV017	Industrial Waste Management	3	0	0	3	40	60	100
1703EV018	Environmental Instrumentation	3	0	0	3	40	60	100
1703EV019	Cleaner Production and Environmental Management	3	0	0	3	40	60	100
1703EV020	Environmental Engineering And Pollution Control	3	0	0	3	40	60	100

L – Lecture | T – Tutorial | P – Practical | C – Credit | CA – Continuous Assessment | ES – End Semester

1703EV008	MEMBRANE TECHNOLOGIES FOR WATER AND WASTE WATER TREATMENT	L	T	P	C
		3	0	0	3

PREREQUISITE :

Principles and design of physic-chemical treatment systems.

COURSE OBJECTIVES:

1. To impart knowledge on the membrane filtration process.
2. To educate the students about the advanced membrane systems and design of bioreactors.
3. To develop the pretreatment and membrane treatment units.

UNIT I MEMBRANE FILTRATION PROCESSES 10 Hours

Solid Liquid separation systems- Theory of Membrane separation – mass Transport Characteristics- Cross Flow filtration - Membrane Filtration- Flux and Pressure drop -Types and choice of membranes, porous, non-porous, symmetric and asymmetric – Plate and Frame, spiral wound and hollow fibre membranes – Liquid Membranes.

UNIT II MEMBRANE SYSTEMS 10 Hours

Microfiltration principles and applications – Ultra filtration principles and applications - Nano Filtration principles and applications – Reverse Osmosis: Theory and design of modules, assembly, plant process control and applications – Electro dialysis : Ion exchange membranes, process design- Pervaporation – Liquid membrane – Liquid Pertraction – Supported Liquid Membrane and Emulsion Liquid membrane - Membrane manufactures – Membrane Module/Element designs – Membrane System components – Design of Membrane systems - pump types and Pump selection– Plant operations – Economics of Membrane systems.

UNIT III MEMBRANE BIOREACTORS 9 Hours

Introduction and Historical Perspective of MBRs, Biotreatment Fundamentals, Biomass Separation MBR Principles, Fouling and Fouling Control, MBR Design Principles, Design Assignment, Alternative MBR Configurations, Commercial Technologies, Case Studies.

UNIT IV PRETREATMENT SYSTEMS 8 Hours

Membrane Fouling – Control of Fouling and Concentration Polarisation-Pretreatment methods and strategies – monitoring of Pretreatment – Langlier Index, Silt Density Index, Chemical cleaning , Biofoulant control.

UNIT V CASE STUDIES 8 Hours

Case studies on the design of membrane based water and wastewater treatment systems – zero Liquid effluent discharge Plants – Desalination of brackish water.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Analyzing and developing the existing membrane systems with the help of recent technologies

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Familiar with main membrane processes, principles, separation mechanisms, and applications.
CO2 Understand the selection criteria for different membrane processes.
CO3 Know the principle of the most common membrane applications.
CO4 Analyze and design the pretreatment systems.
CO5 Carry out design of project for a particular membrane technology application.

REFERENCES:

1. Anthony Wachinski, Membrane Processes for water reuse, McGraw-Hill, USA, 2013
2. Baker, R.W., "Membrane technology and applications", 2nd., John Wiley 2004
3. Jorgen Wagner, “Membrane Filtration handbook, Practical Tips and Hints, 2nd Edition, Revision2, Osmonics Inc., 2001.
4. Noble, R.D. and Stern, S.A., "Membrane Applications", Elservier,Netherlands,1995.
5. Symon Jud, MBR Book – "Principles and application of MBR in water and wastewater treatment", Elservier, 2006.

1703EV009	REMOTE SENSING AND GIS APPLICATIONS IN ENVIRONMENTAL MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE :

Basics on remote sensing and GIS applications

COURSE OBJECTIVES:

1. To educate the students on aspects of Remote Sensing.
2. Develop the different remote sensing technique.
3. To educate the students on aspects of GIS and data management.
4. Develop the GIS Applications for monitoring and management of environment.

UNIT I REMOTE SENSING ELEMENTS 8 Hours

Historical Perspective, Principles of remote sensing, components of Remote Sensing, Energy source and electromagnetic radiation, Electromagnetic spectrum, Energy interaction, Spectral response pattern of earth surface features, Energy recording technology.

UNIT II REMOTE SENSING TECHNOLOGY 9 Hours

Classification of Remote Sensing Systems, , Aerial photographs, Photographic systems – Across track and along track scanning, Multispectral remote sensing, Thermal remote sensing, Microwave remote sensing – Active and passive sensors, RADAR, LIDAR

UNIT III SOCIAL IMPACT ASSESSMENT AND EIA DOCUMENTATION 9 Hours

Social impact assessment - Relationship between social impacts and change in community and institutional arrangements. Individual and family level impacts. Communities in transition Documentation of EIA findings – planning – organization of information and visual display materials – Report preparation.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN 10 Hours

Environmental Management Plan - preparation, implementation and review – Mitigation and Rehabilitation Plans – Policy and guidelines for planning and monitoring programmes – Post project audit – Ethical and Quality aspects of Environmental Impact Assessment- Case Studies.

UNIT V ENVIRONMENTAL RISK ASSESSMENT AND MANAGEMENT 9 Hours

Environmental risk assessment framework-Hazard identification -Dose Response Evaluation – Exposure Assessment – Exposure Factors, Tools for Environmental Risk Assessment– HAZOP and FEMA methods – Event tree and fault tree analysis – Multimedia and multipathway exposure modeling of contaminant- Risk Characterization Risk communication - Emergency Preparedness Plans –Design of risk management programs.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

Case studies on environmental risk assessment using Remote sensing and GIS applications.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Understand the principles of basic elements of remote sensing
CO2 Know about the various the remote sensing techniques
CO3 Prepare EIA documentations with the help of GIS applications
CO4 Know about the legal requirements of Environmental and Risk Assessment for projects.
CO5 Understand the necessity to study the impacts and risks that will be caused by projects or industries and the methods to overcome these impacts.

REFERENCES:

1. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996
2. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey. 2003 World Bank –Source book on EIA
3. Cutter, S.L., Environmental Risk and Hazards, Prentice-Hall of India Pvt. Ltd., New Delhi, 1999.
4. Kolluru Rao, Bartell Steven, Pitblado R and Stricoff "Risk Assessment and Management Handbook", McGraw Hill Inc., New York,1996.
5. K. V. Raghavan and A A. Khan, Methodologies in Hazard Identification and Risk Assessment, Manual by CLRI, 1990.
6. Sam Mannan, Lees' Loss Prevention in the Process Industries, Hazard Identification, Assessment and Control, 4th Edition, Butterworth Heineman, 2012.

1703MF021	PROJECT MANAGEMENT	L	T	P	C
		3	0	0	3

PREREQUISITE :

1. Total Quality Management
2. Professional Ethics

COURSE OBJECTIVES:

1. To make the students to have on methods for project identification &appraisal.
2. To make the students to understand the Define and plan a project within the constraints of the environment
3. To make the students to have on Develop & analyze quantitative models for project selection &scheduling

UNIT I INTRODUCTION **9 Hours**

Introduction - Project Management: An Overview – Types, Characteristics of Projects – Project life cycle. Identification of investment opportunities - Screening and Selection, Project Appraisal.

UNIT II TECHNICAL ANALYSIS **9 Hours**

Market and demand analysis- market survey-demand forecasting methods-Technical analysis – manufacturing process, materials-product mix, plant location-project charts and layouts.

UNIT III FINANCIAL ANALYSIS **9 Hours**

Financial analysis – cash flows for project appraisal- Investment evaluation using capital budgeting techniques - net present value, profitability index internal rate of return, payback period, accounting rate of return.

UNIT IV NETWORK MANAGEMENT **9 Hours**

Mathematical Techniques for project evaluation – Linear programming, goal programming, Network technique for Project Management – CPM, PERT, Multiple projects and constraints, scheduling.

UNIT V PROJECT MANAGEMENT **9 Hours**

Organization systems for project implementation- Work Breakdown-coordination and control- Project Management Software's.

TOTAL: 45 HOURS

FURTHER READING / CONTENT BEYOND SYLLABUS / SEMINAR :

1. Software for project management.
2. Software for financial analysis.
3. Project management for automotive industry.

COURSE OUTCOMES:

On the successful completion of the course, students will be able to

CO1 Explain the methods for project identification &appraisal.
CO2 Define and plan a project within the constraints of the environment
CO3 Develop & analyze quantitative models for project selection &scheduling.
CO4 Analyse network techniques using CPM and PRT.
CO5 Organise the system for project implementation.

REFERENCES:

1. Prasanna Chandra, "Projects – Planning, Analysis, Financing, Implementation and Review", Tata McGraw Hill,4thEd,1997
2. S.Choudry "Project Management", Tata McGraw Hill,27th Edition,2006.
3. John M Nicholas, "Project Management for Business and Technology", 2nd Edition, Pearson Education Asia,2001