



The Kavery Engineering College

(Approved by AICTE, New Delhi & Affiliated to Anna University)
Mecheri, Mettur Tk. Salem Dt - 636 453.

DEPARTMENT OF CIVIL ENGINEERING

PROGRAMME: M.E. ENVIRONMENTAL ENGINEERING

VISION

- ❖ To attain global recognition as a Commendable centre for quality Engineering Education and Research

MISSION

- ❖ To equip the graduates to meet the sustainable development of Construction Industry for the betterment of the society.
- ❖ To provide quality education for the graduates to execute traditional and Ethical Civil Engineering Practices.
- ❖ To enable successful Professional Engineers to meet the Industrial challenges.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

- ❖ Gain knowledge and skills in environmental engineering which will enable them to have a career and professional accomplishment in the public or private sector organizations
- ❖ Become consultants on complex real life Environmental Engineering problems related to water supply, sewerage, sewage treatment, solid waste management, air pollution control, environmental impact assessment, industrial pollution control.
- ❖ Become entrepreneurs and develop processes and technologies to meet desired environmental protection needs of society and formulate solutions that are technically sound, economically feasible, and socially acceptable.
- ❖ Perform investigation for solving environmental problems by conducting research using modern equipment and software tools.
- ❖ Function in multi-disciplinary teams and advocate policies, systems, processes and equipment for control and remediation of pollution.

PROGRAM OUTCOMES (POs)

- ❖ Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.



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- ❖ Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- ❖ Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- ❖ Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- ❖ Modern Tool Usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- ❖ The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- ❖ Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- ❖ Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- ❖ Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- ❖ Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- ❖ Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- ❖ Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)



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- ❖ Use research based knowledge, methods, appropriate techniques, resources and tools to solve complex engineering issues with an understanding of the limitations.
- ❖ Ensure development of socially relevant and eco-friendly indigenous products by applying technical knowledge, ethical principles and sound engineering practices
- ❖ Recognize the need for independent, life-long learning and engage in the broadest context of technological change.

COURSE OUTCOMES (COs)

Regulation	2021
Semester	01
Course Code	MA4159
Course Name	Statistical Methods For Engineers
Course Outcome	<p>After completing this course, students should demonstrate competency in the following topics</p> <ul style="list-style-type: none">❖ Consistency, efficiency and unbiasedness of estimators, method of maximum likelihood estimation and Central Limit Theorem.❖ Concept of linear regression, correlation, and its applications.❖ List the guidelines for designing experiments and recognize the key historical figures in Design of Experiments.❖ Perform exploratory analysis of multivariate data, such as multivariate normal density,❖ calculating descriptive statistics, testing for multivariate normality❖ The students should have the ability to use the appropriate and relevant, fundamental and applied mathematical and statistical knowledge, methodologies and modern computational tools



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Regulation	2021
Semester	01
Course Code	EV4101
Course Name	Environmental Chemistry
Course Outcome	<ul style="list-style-type: none">❖ Students will gain competency in solving environmental issues of chemicals based pollution.❖ Ability to determine chemicals mobility in aquatic systems.❖ Ability to identify contaminating chemicals in air and their fate.❖ Understand the type of soil contaminants and provide remediation.❖ Identify emerging environmental contaminants including speciation.

Regulation	2021
Semester	01
Course Code	EV4102
Course Name	Environmental Microbiology
Course Outcome	<p>On completion of the course, the student is expected to be able to</p> <ul style="list-style-type: none">❖ Explain the basic importance and functional elements of environmental microbiology including the potential applications in the environment and intellectual property rights❖ Understand and describe the type of microorganisms in the environment, their importance in water supplies and the role of microorganisms in the cycling of nutrients in an ecosystem❖ Understand the metabolic processes on carbohydrates, protein and lipids, importance of enzymes, production of energy and the various additional metabolic processes❖ Select and apply appropriate methods for assessing the water, air and soil borne pathogens, their health implications, importance of microbes in aerobic and anaerobic cycles and deterioration of water bodies.❖ Conduct testing and research on toxicology, understand the importance of test organisms, environmental applications such as biomagnifications, biomonitoring and in developing risk based standards.



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Regulation	2021
Semester	01
Course Code	EV4103
Course Name	Physical and Chemical Treatment System for water and Waste Water.
Course Outcome	<p>On Completion of the course, the student is expected to be able to</p> <ul style="list-style-type: none">❖ Explain the significance of various pollutants present in water, wastewater and develop the kinetics for reactor design❖ Choose the relevant physico-chemical systems for effective water and wastewater treatment❖ Design the treatment scheme for municipal and industrial water, wastewater to meet the specific needs on residue management and up gradation of existing plants❖ Identify environmental issues in the society on wastewater treatment and formulate technical solutions that are economically feasible and socially acceptable❖ Conduct research to identify and design most appropriate treatment schemes for the emerging environmental issues on treatment systems in collaboration with municipalities, corporation, pollution control boards and industries

Regulation	2021
Semester	01
Course Code	EV4104
Course Name	Water transmission, water distribution and Sewerage systems
Course Outcome	<p>On Completion of the Course the student will be able to</p> <ul style="list-style-type: none">❖ Understand general hydraulics and need for proper collection and conveyance of water and wastewater❖ Design economic diameters of gravity and pumping mains and storage reservoirs❖ Design and analysis of water distribution networks and apply computer software.



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	<ul style="list-style-type: none">❖ Design sewer networks for various flow conditions❖ Design storm water drain and apply computer softwares for design of sewers.
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Regulation	2021
Semester	01
Course Code	EV4111
Course Name	Environmental Chemistry Laboratory
Course Outcome	<ul style="list-style-type: none">❖ Ability to calibrate and standardize the equipments.❖ Ability to collect proper sample for analysis.❖ The candidate ability to perform field oriented testing of water, wastewater and soil.❖ Able to perform soil testing.❖ Able to perform analysis of water and wastewater.

Regulation	2021
Semester	01
Course Code	EV4112
Course Name	Environmental Microbiology Laboratory
Course Outcome	<p>On completion of the course, the student is expected to be able to.</p> <ul style="list-style-type: none">❖ Explain the basic importance and functional elements of environmental microbiology including the types of microorganisms in air, water and soil❖ Understand and describe the type of microorganisms in the environment, their importance and the method of culturing of microorganisms in the laboratory.❖ Understand the basic biochemical method of identification of microorganisms and to identify them using microscopical tool.❖ Select and apply appropriate methods for detection in the water, air and soil borne pathogens, their health implications, importance of microbes in our daily life.❖ Conduct testing and research on toxicology, the importance of test organisms, environmental applications of such microorganisms in toxicological studies and in developing risk based standards



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Regulation	2021
Semester	02
Course Code	EV4201
Course Name	Biological Treatment Process for Wastewater
Course Outcome	<ul style="list-style-type: none">❖ Understand the microbial process and its kinetics❖ Design and size the different components of conventional aerobic treatment systems❖ Design and size the different components of advanced aerobic treatment systems❖ Understand in detail about the anaerobic treatment of wastewater which includes the design of attached and suspended growth processes❖ Design the different elements of sludge treatment systems and understand the importance O&M issues pertaining to biological treatment systems.

Regulation	2021
Semester	02
Course Code	EV4202
Course Name	Air And Noise Pollution Control Engineering
Course Outcome	<p>After completion of this course, the student is expected to be able to understand.</p> <ul style="list-style-type: none">❖ Various types and sources of air pollution and its effects❖ Methods of source and ambient monitoring and dispersion of pollutants and their modeling❖ The principles and design of control of particulate pollutants❖ The principles and design of control of gaseous pollutant.❖ Sources, effects and control of vehicular, indoor air and noise pollution.

Regulation	2021
Semester	02
Course Code	EV4203



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Course Name	Industrial Wastewater Pollution Prevention And Control
Course Outcome	<p>On Completion of the course, the student is expected to be able to</p> <ul style="list-style-type: none"> ❖ Explain the source and types of industrial wastewater and their environmental impacts and choose the regulatory laws pertaining to environmental protection ❖ Identify industrial wastewater pollution and implement pollution prevention, waste minimization in industries ❖ Apply knowledge and skills to design industrial wastewater treatment schemes ❖ Audit and analyze environmental performance of industries to internal, external client, regulatory bodies and design water reuse management techniques ❖ Conduct research to develop effective management systems for industrial wastewater that are technically sound, economically feasible and socially acceptable

Regulation	2021	
Semester	02	Professional Elective-I
Course Code	EV4001	
Course Name	Solid And Hazardous Waste Management	
Course Outcome	<p>On completion of the course, the student is expected to be able to.</p> <ul style="list-style-type: none"> ❖ Explain the various functional elements of solid and hazardous waste management including the associated legal, health, safety, and cultural issues as well as responsibilities of different stakeholders ❖ Apply the knowledge of science and engineering fundamentals to characterize different types of solid and hazardous wastes, assess the factors affecting variation and assess performance of waste treatment and disposal systems ❖ Design of systems and processes to meet specified needs of waste minimization, storage, collection, transport, recycling, processing and disposal 	



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	<ul style="list-style-type: none"> ❖ Select appropriate methods for processing and disposal of solid and hazardous wastes, taking into account the impact of the solutions in a sustainability context ❖ Conduct research pertinent to solid and hazardous waste management and communicate effectively to different stakeholders as well as engage in independent life-long learning
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Regulation	2021	
Semester	02	Professional Elective-II
Course Code	EV4004	
Course Name	Environmental Impact Assessment	
Course Outcome	<p>On completion of the course, the student is expected to be able to.</p> <ul style="list-style-type: none"> ❖ Understand need for environmental clearance, its legal procedure, need of EIA, its types, stakeholders and their roles ❖ Understand various impact identification methodologies, prediction techniques and model of impacts on various environments ❖ Understand relationship between social impacts and change in community due to development activities and rehabilitation methods ❖ Document the EIA findings and prepare environmental management and monitoring plan ❖ Identify, predict and assess impacts of similar projects based on case studies 	

Regulation	2021	
Semester	02	Professional Elective-III
Course Code	EV4010	
Course Name	Geo-Environmental Engineering	
Course Outcome	<ul style="list-style-type: none"> ❖ Assess the contamination in the soil Explain the concepts of domestic wiring and protective devices. ❖ Understand the current practice of waste disposal. ❖ To prepare the suitable disposal system for particular waste. 	



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	<ul style="list-style-type: none"> ❖ Stabilize the waste and utilization of solid waste for soil improvement ❖ Select suitable remediation methods based on contamination.
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Regulation	2021
Semester	02
Course Code	EV4211
Course Name	Environmental and Processes Monitoring Laboratory
Course Outcome	<p>After the completion of the course the students will be able</p> <ul style="list-style-type: none"> ❖ To conduct treatability studies on water and wastewater treatment ❖ To determine the removal / degradation of pollutants from water and wastewater and arrive at kinetics ❖ To design scaled up reactors for treatment of water and wastewater treatment based on laboratory studies ❖ To determine ambient air quality of given study area in terms of Particulate and Gaseous Pollutants ❖ To determine Equivalent Noise Level by noise monitoring

Regulation	2021
Semester	03 Professional Elective-IV
Course Code	EV4015
Course Name	Operation And Maintenance of Water And Wastewater Treatment System
Course Outcome	<p>On completion of the course, the student is expected to be able to</p> <ul style="list-style-type: none"> ❖ Understand the O&M issues pertaining to STP and WTP ❖ Understand operation and maintenance of water intakes and supply systems ❖ Recognize the O&M issues relevant to sewerage system ❖ Understand operation and maintenance of physico-chemical treatment units ❖ Understand operation and maintenance of biological treatment units

Regulation	2021
Semester	03 Professional Elective-V



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Course Code	EV4019
Course Name	Membrane separation for water and wastewater Treatment
Course Outcome	<p>On completion of the course, the student is expected to be able to.</p> <ul style="list-style-type: none"> ❖ Explain the various main membrane processes, principles, separation mechanisms, and applications ❖ Apply the knowledge of science and engineering fundamentals to analyse the mechanisms of membrane filtration ❖ Design of membrane systems involving microfiltration, ultrafiltration, nanofiltration, reverse osmosis, electro dialysis and membrane bioreactor processes ❖ Select appropriate membrane technologies for water and wastewater treatment taking into account the impact of the solutions in a sustainability context ❖ Conduct research pertinent to membrane technology applications to water and wastewater treatment and communicate effectively to different stakeholders as well as engage in independent life-long learning

Regulation	2021	
Semester	03	Open Elective
Course Code	PX4012	
Course Name	Renewable Resources Technology	
Course Outcome	<ul style="list-style-type: none"> ❖ Ability to classify the solar energy collectors and methodologies of storing solar energy. ❖ Knowledge in applying solar energy in a useful way. ❖ Knowledge in wind energy and biomass with its economic aspects. ❖ Knowledge in capturing and applying other forms of energy sources like wind, biogas and geothermal energies. 	

Regulation	2021
Semester	03



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Course Code	EV4313
Course Name	Project Work I
Course Outcome	❖ At the end of the course the students will have a clear idea of their area of work and they will be in a position to carry out the remaining phase II work in a systematic way.

Regulation	2021
Semester	04
Course Code	EV4411
Course Name	Project Work II
Course Outcome	❖ On completion of the project work students will be in a position to take up any challenging practical problem in the field of engineering design and find better solutions to it.