

**PROGRAMME REQUIREMENT
DEPARTMENT OF CIVIL ENGINEERING
M.TECH. (ENVIRONMENTAL ENGINEERING)**

OVERALL CREDIT STRUCTURE

| Postgraduate core (PC) | | Postgraduate Elective (PE) | |
|--------------------------------|-----------|----------------------------|-----------|
| Category | Credit | Category | Credit |
| DC | 74 | DE | 30 |
| | | | |
| Total | 74 | Total | 30 |
| Grand Total PC + PE 104 | | | |

| Course Code | Course | Structure | Credits |
|----------------------------------|--|-----------|-----------|
| Departmental Core, DC | | | |
| MAL 4xx | Statistics and O. R. Techniques * | 3-0-0 | 6 |
| CEL 501 | Environmental Chemistry & Microbiology | 3-0-0 | 6 |
| CEL 502 | Municipal and Industrial Water Treatment * | 3-0-0 | 6 |
| CEP 501 | Environmental Monitoring Laboratory-I. | 0-0-2 | 2 |
| CEL 503 | Municipal Wastewater Treatment | 3-0-0 | 6 |
| CEL 504 | Water Supply and Wastewater Collection Systems | 3-0-0 | 6 |
| CEL 405 | Industrial Wastewater Treatment, Recycle & Reuse | 3-0-0 | 6 |
| CEL 505 | Municipal Solid Waste Management | 3-0-0 | 6 |
| CEL 506 | Air Pollution Control | 3-0-0 | 6 |
| CED 501 | Project Phase I | - | 6 |
| CED 502 | Project Phase II | - | 18 |
| | | | 74 |
| Departmental Elective, DE | | | |
| CEL 507 | Environmental Engineering System Design * | 0-0-0 | 2 |
| CEL 508 | Environmental Geotechnics | 3-0-0 | 6 |
| CEL 509 | Bioremediation : Principles & Applications * | 3-0-0 | 6 |
| CEL 510 | Environmental Management | 3-0-0 | 6 |
| CEL 511 | Environmental Engineering Systems Optimization | 3-0-0 | 6 |
| CEL 417 | Hazardous Waste Management * | 3-0-0 | 6 |
| CEL 512 | Environmental Biotechnology | 3-0-0 | 6 |
| CEL 513 | Environmental Systems Modelling | 3-0-0 | 6 |
| CE – 5xx | Seminar * | 0-0-0 | 2 |
| CEP-502 | Environmental Monitoring Laboratory-II * | 0-0-2 | 2 |
| CEL 412 | Spatial analysis for Resources Management * | 3-0-0 | 6 |
| CEL 418 | Energy Conversion & Environment * | 3-0-0 | 6 |
| CEL 432 | Environmental Impact Assessment | 3-0-0 | 6 |
| CEL 3xx | Energy Efficient Buildings | 3-0-0 | 6 |

* Subject to Senate Approval

Department : Civil Engineering

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|---|---|--|------------------------|---------------------------|
| Course No. | MAL4xx | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Statistics & O.R. Techniques | | | |
| Course Coordinator | Dr. G. P. Singh | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | A | | | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed | | | | |
| Prerequisite Credits | | | | |
| Equivalent Course Codes. As per proposed Courses & Old courses | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | |
| Text Book (max. 2) | Title | Probability and Statistics | | |
| | Author | M.R. Spiegel | | |
| | Publisher | McGraw Hill | | |
| | Title | Operation Research | | |
| | Author | H.A. Taha | | |
| Reference Books | Publisher | Prentice Hall of India Pvt. Ltd. | | |
| | Title | Introduction to Optimisation : Operations Research | | |
| | Author | J.C. Pant | | |
| | Publisher | Jain Brothers, New Delhi | | |
| | Edition | | | |
| | Title | Probability and Statistics for Engineers | | |
| Content | Author | Miller and Freund | | |
| | <p>Statistics Sampling Theory : Population Parameter, Sample Statistics, Sampling distributions, Sample mean, Sampling distribution of means, the sample variance, the sampling distribution of variance. Estimation Theory: Point estimate and interval estimates, reliability, confidence interval estimates of population parameters, confidence intervals for means, proportions and variance. Tests of Hypothesis and Significance: Statistical decisions, tests of hypotheses and significance, Type I and Type II errors, level of significance, one tailed and two tailed tests. Tests involving small samples and large samples, fitting theoretical distributions to sample frequency distribution, The chi-square test for goodness of fit.</p> <p>O. R. Techniques Linear Programming: Formulation of linear programming problem, Graphical solution- simplex method (including Big M method and two phase method), dual problem- duality theory, dual simplex method, revised simplex method. Transportation problem: existence of solution-degeneracy- MODI method; Assignment problem- traveling salesman problem Nonlinear programming problem (NLPP): Constrained NLPP, Lagrange's multipliers method – convex NLPP, Kuhn-Tucker conditions.</p> | | | |
| Course No. | | | | |

Head of the Department of Civil Engg

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|--|--|---------------------------------------|--------------------|--------------------|--|
| Course No. | CEL 501 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | Environmental Chemistry & Microbiology | | | | |
| Course Coordinator | Dr. (Mrs.) M. V. Latkar | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | G | | - | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | | |
| Prerequisite credits | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL498 | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | Chemistry for Environmental Engineers | | | |
| | Author | C. N. Sawyer and P. L. McCarty | | | |
| | Publisher | McGraw Hill | | | |
| | Edition | Latest | | | |
| | Title | Microbiology | | | |
| | Author | Pelezar Reid & Chan | | | |
| | Publisher | Tata McGraw Hill | | | |
| | Edition | Latest | | | |
| Reference Books | Title | General Microbiology Vol. I &II | | | |
| | Author | Powar & Daginawala | | | |
| | Publisher | Himalaya Publishing House | | | |
| | Edition | Latest | | | |
| | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | | | | |
| | Author | | | | |
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| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>Basic concepts of oxidation and reduction reactions, Gas laws and their application in Environmental Engineering, Osmosis, Dialysis, Principles of solvent extraction, Amphoteric hydroxides.</p> <p>Concept of pH, and its application in Environmental Engineering, Definitions and basic concepts of acids, bases and buffers, colloid chemistry, Basic concepts of carbohydrates, proteins, lipids and enzymes, Definition and concept of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) and Total Organic Carbon (TOC).</p> <p>Chemistry of water treatment processes like coagulation, disinfection, water softening and demineralization.</p> <p>Definitions of Ecology and ecosystem, structure and components of ecosystem, concepts of trophic levels, food chain and food web, types of ecosystem, productivity, sulphur cycle, nitrogen cycle.</p> <p>Introduction to Microbiology, Haeckel's classification, Morphology and structure of bacteria, nutritional requirement and nutritional classification of bacteria, Growth of bacteria, Indicator bacteria, Multiple Tube Dilution (MTD) and Membrane Filter (MF) techniques, Definition and characteristics of viruses.</p> | |
| Course No. | CEL 501 | |

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Department : Civil Engineering

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| Course No. | CEL 502 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | MUNICIPAL AND INDUSTRIAL WATER TREATMENT | | | |
| Course Coordinator | Dr. A. R. Tembhurkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | F | | - | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | - | | | |
| Overlap course codes As per proposed Course Numbers Text Book (Max. 2) | | | | |
| | Title | Water and Waste water Engineering Vol I and II | | |
| | Author | Fair Geyer & Okun | | |
| | Publisher | John Wiley & Sons | | |
| | Edition | 1 st | | |
| | Title | Physiochemical process for water quality control | | |
| | Author | W.J.Weber | | |
| | Publisher | John Wiley & Sons | | |
| | Edition | 2 nd | | |
| | Reference Books | Title | Water treatment plant design | |
| Author | | ASCE, AWWA | | |
| Publisher | | | | |
| Edition | | | | |
| Title | | Manual on Water supply and Treatment | | |
| Author | | CPHEEO | | |
| Publisher | | Govt. of India Publication | | |
| Edition | | | | |
| Title | | Water treatment plant for practising engineers | | |
| Author | | R.L.Sank | | |
| Publisher | | Ann Arbor Science | | |
| Edition | | | | |

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| Content | Water quality criteria and standards, Requirement of water treatment facilities, Unit operation & Unit process, Synthesizing water treatment system, Site selection, Process selection, Theory and Application of water treatment process- aeration, coagulation, flocculation, sedimentation, filtration, disinfection. Hydraulic design of water treatment plant, Advances/ modification/ modern development in water treatment, Control of water treatment process, O&M of water treatment plant, Water treatment plant residuals management. Industrial Water Quality requirement, Specific treatment for industrial purpose; Softening, Lime Soda and Ion Exchange, Desalination- Distillation processes, Reverse Osmosis, Electrodialysis; Flouride Removal, Arsenic Removal, Fe and Mn removal, Taste and Odor and color Removal, Adsorption, Ultrafiltration, Water treatment for Swimming Pool. |
| Course No. | CEL 502 |

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Department : Civil Engineering

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|--|---|--|-----------------|--------------------|
| Course No. | CEP 501 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Environmental Monitoring Laboratory – I | | | |
| Course Coordinator | Dr. (Mrs.) M. V. Latkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | G1, G3 | | - | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 0 | 0 | 2 | 2 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEP452 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| Reference Books | Title | Standard Methods for the Examination of Water & Wastewater | | |
| | Author | - | | |
| | Publisher | APHA, AWWA, WEF | | |
| | Edition | Latest | | |
| | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | | | |
| | Author | | | |
| Publisher | | | | |
| Edition | | | | |

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| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | I) Determination of following parameters in water 1) Alkalinity 2) Chloride 3) Hardness 4) Sulphate 5) Turbidity 6) Dissolved oxygen 7) Kjeldahl nitrogen 8) Iron 9) Manganese 10) Heavy metals II) Determination of COD and BOD of wastewater III) MTD method for enumeration of indicator bacteria in water IV) Heterotrophic plate count for enumeration of bacteria | |
| Course No. | CEP 501 | |

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| Course No. | CEL503 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | MUNICIPAL WASTEWATER TREATMENT | | | |
| Course Coordinator | Dr. V.A. Mhaisalkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| Structure | C | | | |
| | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed | | | | |
| Prerequisite Credits | | | | |
| Equivalent Course Codes. As per proposed Courses & Old courses | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | |
| Text Book (max. 2) | Title | Wastewater Engineering, Treatment, Disposal and Reuse | | |
| | Author | Metcalf and Eddy | | |
| | Publisher | McGraw Hill | | |
| | Edition | Fourth Edition, 2002 | | |
| | Title | Wastewater Treatment and Disposal | | |
| | Author | S.J. Arceivala | | |
| | Publisher | Marcel Dekker | | |
| Reference Books | Title | Introduction to Environmental Engineering | | |
| | Author | Davis & Cornwell | | |
| | Publisher | McGraw Hill | | |
| | Edition | International, 1998 | | |
| | Title | Wastewater Treatment Plant Planning, Design and Operation | | |
| | Author | Qasim S.R | | |
| | Publisher | Holt Rinehart & Winston, N. Y | | |
| Content | Edition | 1990 | | |
| | Objectives of municipal wastewater treatment, constituents of sewage and sewage characteristics, conventional municipal wastewater treatment flow sheet, functions of different unit processes, treatment requirements. Process analysis : Reaction and reaction kinetics, mass balance analysis, reactors and hydraulic characteristics, reactor selection, practical aspects of reactor design. | | | |
| | Preliminary treatment : Screening grit removal; Primary Treatment : Principles of sedimentation | | | |
| Biological treatment : Principles of biological treatment, Role of microorganisms in WWT, types of biological processes for WWT, introduction to microbial metabolism, kinetics of biological growth, aerobic and anaerobic treatment of sewage, suspended and attached growth biological treatment processes - Activated sludge, tricking filters, biological disc. Packed bed and fluidized bed treatment, stabilization ponds, combined biological treatment processes. | | | | |
| Biological phosphorus and nitrogen removal | | | | |
| Sludge treatment : Sludge treatment flowsheets, sludge quality and quantity, various methods of sludge treatment, | | | | |

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| | <p>aerobic and anaerobic sludge digestion, sludge conditioning, dewatering of sludge, conveyance, storage and disposal.</p> <p>Water reclamation technologies</p> <p>Advanced waste water treatment : Principles of tertiary treatment, Reuse and resource recovery, and recent developments.</p> |
| Course No. | CEL503 |

Department : Civil Engineering

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| Course No. | CEL 504 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Water Supply and Wastewater Collection Systems | | | |
| Course Coordinator | Dr. Rajesh Gupta | | | |
| Slot in which offered. If not offered write N | Odd | Even | | |
| | D | - | | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL 499 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | Analysis of Water Distribution Networks | | |
| | Author | Bhave P. R. And Gupta R. | | |
| | Publisher | Narosa Publishing Co., New Delhi (2006) | | |
| | Edition | - | | |
| | Title | Water & Wastewater Engg. Vol. I & II | | |
| | Author | Fair G. M., Geyer J. C. & Okun D. A. | | |
| | Publisher | John-Willey & Sons, New York | | |
| | Edition | - | | |
| Reference Books | Title | Wayter supply and saewerage | | |
| | Author | McGhee N. J. & Steel E. W. | | |
| | Publisher | McGraw hill publications | | |
| | Edition | 1991 | | |
| | Title | Manual on water supply and treatment | | |
| | Author | CPHEEO | | |
| | Publisher | Ministry of urban development , GoI | | |
| | Edition | - | | |
| | Title | Manual on Sewerage and Sewage Treatment | | |
| | Author | CPHEEO | | |
| | Publisher | Ministry of urban development , GoI | | |
| | Edition | - | | |
| | Title | Optimal design of water distributiomn networks | | |
| | Author | Bhave P.R. | | |
| | Publisher | Narosa Publishing Co., New Delhi (2003) | | |
| | Edition | - | | |

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| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>Analysis of flow in pipe network using Hardy Cross, Newton-Raphson and Linear Theory method, Reservoirs, Pumps and Valves in Water distribution systems, Pumps and Pumping Stations, Pipe Appurtenances, Pipe material selection, laying and jointing of pipes, Water supply to multi-storeyed buildings, Water supply during fairs, festivals and emergencies. Maintenance of distribution system.</p> <p>Design of pumping main including water hammer consideration, Critical path method for design of water distribution networks.</p> <p>Objectives, Type of systems and sewers, requisites for sewerage system design, Hydraulics of sewers, Velocity of equal cleansing, Sewer shape vis-a-vis their usefulness, sewer invert drop.</p> | |
| Course No. | CEL 504 | |

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Department : Civil Engineering

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|--|--|---|-----------------|-----------------------|
| Course No. | CEL 405 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | INDUSTRIAL WASTE WATER TREATMENT, REUSE AND RECYCLING | | | |
| Course Coordinator | Dr. A. R.Tembhurkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | - | | E | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | Environmental Engg - I | | | |
| Prerequisite credits | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL454 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | Theories and Practices of Industrial Waste Treatment | | |
| | Author | Nemerow N.L | | |
| | Publisher | Addison Wesley Publishing CO. NY. | | |
| | Edition | 2 nd | | |
| | Title | Industrial Water Pollution Control | | |
| | Author | W.W.Ecenfelder | | |
| | Publisher | Mc-Graw Hill Book Co. | | |
| | Edition | 2 nd | | |
| Reference Books | Title | Industrial Pollution Prevention Handbook | | |
| | Author | Freeman H. M. | | |
| | Publisher | McGraw Hill | | |
| | Edition | 1 st | | |
| | Title | Comprehensive Industry Document Series | | |
| | Author | Central Pollution Control Board, India | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | The Treatment of Industrial Waste | | |
| | Author | E.B. Besselievre | | |
| | Publisher | Mc-Graw Hill Book Co. | | |
| | Edition | 1 st | | |
| Content | Industrial pollution and its measurement; Generation of Industrial wastewater, Disposal standards; Quantification and characterization of wastewater and | | | |

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| | <p>its variations; Environmental impacts due to discharge of wastewater on streams, land and sewerage system; Industrial waste survey; Stream sanitation, stream sampling, Stream survey; Principles and techniques for Industrial Pollution prevention and control; Waste minimization; recent trends in industrial waste management, Cleaner technologies; Reuse, Recycling and Resource recovery; Volume and strength reduction; Equalization and proportioning; Neutralization; Methods of Disposal and treatment for removal of organic, inorganic, solids, pathogens, heavy metals and other pollutants; Alternatives and Synthesizing industrial waste treatment system; Joint treatment of industrial waste; CETP; Pollution control measures and Treatment of wastes from various industries viz. Pulp and paper, tanning, Sugar, Dairy, Chemical, Cement, Petroleum, Fertilizers, Metal Finishing, Etc.</p> |
| Course No. | CEL 405 |

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Department : Civil Engineering

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| Course No. | CEL 505 | Open course (Y/N) | HM Course (Y?N) | Discontinued (Y/N) |
| Course Title | Municipal solid waste management | | | |
| Course Coordinator | Prof. R. R. Gawalpanchi | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | - | | G | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | - | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL453 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | Solid Waste Management, Collection, Processing and Disposal | | |
| | Author | Bhide A.D., Sundaresan B.B | | |
| | Publisher | Mundrashilp offset printers, Nagpur | | |
| | Edition | 2001 | | |
| | Title | Solid Waste Engineering | | |
| | Author | Vesilind A. P., Worrell W., Reinhart | | |
| | Publisher | Thomson Books Cole. | | |
| | Edition | 2002 | | |
| Reference Books | Title | Integrated Solid Waste Management Engineering Principles and Management Issues | | |
| | Author | Techobanoglous G., Theisen H, Vigil S.A. | | |
| | Publisher | Tata McGraw Hill International Editions Civil Engg. Series, | | |
| | Edition | 1993 | | |
| | Title | CPHEEO manual on municipal solid waste managemnt | | |
| | Author | CPHEEO, MoUD | | |
| | Publisher | GoI, New Delhi | | |
| | Edition | | | |
| | Title | Sanitary landfill leachate generation control and treatment | | |
| | Author | Syed R. Qasim, Walterchiang | | |
| | Publisher | Techromic publishing co. Inc. | | |
| | Edition | 1994 | | |

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| | Title | Design of landfills & integrated solid waste management |
| | Author | Amalendu bagchi |
| | Publisher | John wiley & sons. Inc. |
| | Edition | |
| | Title | A text book of environmental chemistry and pollution control |
| | Author | S. S. Dara |
| | Publisher | S. Chand & Co. Ltd. |
| | Edition | 2002 |
| | Title | Municipal refuse disposal |
| | Author | American public works association |
| | Publisher | Public administration service, Chicago |
| | Edition | 1970 |
| Content | <p>Sources, Classification, Composition – Quality – characteristics-Physical, Chemical and microbiology involved , Quantity-generation of municipal refuse, per capita contribution, Density, Sampling; Collection and transportation of waste-refuse transportation vehicles ; optimization of routes, maintenance of vehicles; industrial waste management; reduction, Recycle, Reuse, Recovery and Reporting; hazardous waste management;</p> <p>Disposal of waste by land filling, site selection, leachate and gas collection, lining; composting of waste, methods, factors affecting, Incineration, types, energy recovery and products of incineration; Processing of waste for useful products-pyrolysis, RDF; Legislation and regulatory trends</p> | |
| Course No. | CEL 505 | |

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| Course No. | CEL 506 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Air Pollution Control | | | |
| Course Coordinator | Prof. R. R. Gawalpanchi | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | E | | - | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | - | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL457 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | Air Pollution | | |
| | Author | Rao M.N. and Rao H.V. N. | | |
| | Publisher | Tata Mc-Graw Hill Publsihing Co. New Delhi, | | |
| | Edition | Third Edition, 1992 | | |
| | Title | A textbook of air pollution & control technology | | |
| | Author | Y. Anjaneyulu | | |
| | Publisher | Allied publishers | | |
| | Edition | | | |
| Reference Books | Title | Air Pollution control Engineerg. | | |
| | Author | Nevers N.D | | |
| | Publisher | Editions Civil Engineering series, | | |
| | Edition | 1995 | | |
| | Title | Environmental Pollution Control Engg. | | |
| | Author | Rao C.S. | | |
| | Publisher | New Age International Pvt. Ltd. publishers, | | |
| | Edition | 2006 | | |
| | Title | Air pollution | | |
| | Author | Stern A. C. | | |
| | Publisher | Tata McGraw Hill International | | |
| | Edition | Vol I to IX | | |
| | Title | Air Pollution | | |
| | Author | Kudesia v. P. | | |
| Publisher | Pragati prakashan, meerut | | | |
| Edition | 2 nd 1980 | | | |

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| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | Sources, Classification, Causes and effects of air pollution; Metrological parameters of dilution, dispersion, distribution of emission of stack pollutants, Air quality monitoring, sampling and analysis of air from ambient and other sources of pollutants, Monitoring Instrumentation and principles of operation, Exhaust pollution, Control equipment for gaseous and particulate pollutants, Legislation and regulatory trends, Impacts of air pollution. | |
| Course No. | CEL 506 | |

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|---|---|---|------------------------|---------------------------|
| Course No. | CEL507 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Environmental Engineering System Design | | | |
| Course Coordinator | Dr. V.A. Mhaisalkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | N | | N | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 0 | 0 | 0 | 2 |
| Prerequisite Course Codes As per proposed | | | | |
| Prerequisite Credits | | | | 50 |
| Equivalent Course Codes. As per proposed Courses & Old courses | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | |
| Text Book (max. 2) | Title | Wastewater Treatment Plant Planning, Design and Operation | | |
| | Author | Qasim S.R | | |
| | Publisher | Holt Rinehart & Winston, N. Y | | |
| | Edition | 1990 | | |
| | Title | Water Treatment Plant Design | | |
| | Author | Dr. A.G. Bhole | | |
| | Publisher | Indian Water works Association | | |
| Edition | 1 st | | | |
| Reference Books | Title | Design of landfill & Integrated Solid waste Management | | |
| | Author | Amalendu Bagchi | | |
| | Publisher | John Willey & Sons, Inc. | | |
| | Edition | 2 nd | | |
| Content | Design aspects of water and waste water systems ranging from pipeline to treatment plant; sanitary landfill; a detailed design of atleast one unit will be completed as either an individual or class project | | | |
| Course No. | CEL507 | | | |

Head of the Department of Civil Engg.

Department : Civil Engineering

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|--|-----------------------------------|---|--|--------------------|--|--|
| Course No. | CEL 508 | Open Course (Y/N) | HM courses (Y/N) | Discontinued (Y/N) | | |
| Course Title | ENVIRONMENTAL GEO-TECHNICS | | | | | |
| Course Coordinator | Prof. D. J. Katyayan | | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | | |
| | B | | - | | | |
| Structure | Lecture | Tutorial | Practical | Credits | | |
| | 3 | 0 | 0 | 6 | | |
| Prerequisite Course Codes As per proposed Course Numbers | CEL 501 | | | | | |
| Prerequisite credits | | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL456 | | | | | |
| Overlap course codes As per proposed Course Numbers | - | - | - | - | | |
| Text Book (Max. 2) | Title | Geotechnical Practice for Waste Disposal | | | | |
| | Author | Daniel, D. E. | | | | |
| | Publisher | Chapman and Hall, London | | | | |
| | Edition | 1993 | | | | |
| | Title | Geoenvironmental Engineering - Principles and Applications | | | | |
| | Author | Reddi, L. N., and Inyang, H. F. | | | | |
| | Publisher | Marcel Dekker, Inc., | | | | |
| | Edition | 2000 | | | | |
| | Reference Books | Title | Introduction to Environmental Geotechnology, | | | |
| | | Author | Hsai-Yang Fang | | | |
| Publisher | | CRC Press, | | | | |
| Edition | | 1997. | | | | |
| Content | Title | Journals & research Papers | | | | |
| | | <ol style="list-style-type: none"> 1. Source, Production and Classification of Wastes. 2. Soil Pollution Processes; Physical-chemical and Biological Interactions in Soil. 3. Effects on Geotechnical Properties and Case Studies. 4. Waste Disposal Facilities such as Landfills and Impoundments, Slurry walls, etc. 5. Barrier Systems- Basic concepts, Stability, compatibility and performance, Geo-membranes. 6. Monitoring Sub surface contamination; Stabilization/ Solidification of Wastes. 7. Remediation Methods | | | | |
| Course No. | CEL 5xx | | | | | |

Department : Civil Engineering

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|--|---|---|-----------------|--------------------|--|
| Course No. | CEL 509 | Open Course (Y/N) | HM course (Y/N) | Discontinued (Y/N) | |
| Course Title | Bioremediation: Principles and Applications | | | | |
| Course Coordinator | | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | A | | - | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | | |
| Prerequisite credits | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | - | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | Bioremediation | | | |
| | Author | Baker H. and Herson D.S. | | | |
| | Publisher | McGraw Hill | | | |
| | Edition | 1994 | | | |
| | Title | Bioremediation Principles | | | |
| | Author | Eweis J.B., Ergas S.J., Chang D.P.Y. and Schroeder E.D. | | | |
| | Publisher | McGraw Hill | | | |
| | Edition | 1998 | | | |
| Reference Books | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | | | | |
| | Author | | | | |
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| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>An overview of the current bioremediation practice and its application: Microbial system of bioremediation, Factors influencing bioremediation, Environmental factors (physical and chemical). Microbial transformation reactions: Aerobic and anaerobic biotransformation, Microbial detoxification of specially chemicals like insecticides, herbicides, fungicides, polychlorinated biphenyls, heavy metals. Response of microorganisms to the presence of pollutants: Inducible degradative enzymes and mechanics, Application of genetically engineered microorganisms for hazardous waste management. Bioremediation systems and process: Solid and slurry phase bioremediation (land farming, composting, slurry bioreactors and lagoons), Microbial cleaning of gases (biofiltration and bioscrubbing), Liquid phase bioremediation. In-situ bioremediation: Assessment for an in-situ bioremediation, Microbial activity, Sub-surface delivery systems, In-situ oxygenation. Management of bioremediation projects: Defining project goals, Project team, Review of remediation, Supportive elements of projects.</p> | |
| Course No. | CEL 509 | |

Head of The Department of Civil Engineering

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|---|---|---|------------------|--------------------|
| Course No. | CEL510 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | ENVIRONMENTAL MANAGEMENT | | | |
| Course Coordinator | Dr. V.A. Mhaisalkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | D | | | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed | | | | |
| Prerequisite Credits | | | | |
| Equivalent Course Codes. As per proposed Courses & Old courses | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | |
| Text Book (max. 2) | Title | Corporate Environmental Management Systems and Strategies | | |
| | Author | Richard Welford | | |
| | Publisher | Universities Press(I) Ltd. , Hyderabad | | |
| | Edition | 1996 | | |
| | Title | Pollution Prevention : Fundamental and Practice | | |
| | Author | Paul L. Bishop | | |
| | Publisher | McGraw Hill | | |
| | Edition | International, 2000 | | |
| Reference Books | Title | Industrial Pollution Prevention Handbook | | |
| | Author | Freeman, H.M., | | |
| | Publisher | McGraw Hills | | |
| | Edition | 1995 | | |
| Content | Sustainable development and strategies, Waste minimization and pollution prevention strategies – cleaner technologies, Tools of corporate environmental management; Environmental policy, Environmental management systems; ISO : 14000; Environmental Impact assessment, Indian environmental legislations and environmental acts such as Water Act (1974), Air Act (1981), Environmental (Protection) Act (1986); International Environmental Treaties; Life cycle assessment; environmental labeling, environmental audit, Environmental performance assessment; regulatory standards for industrial wastewaters and atmospheric emission. | | | |
| Course No. | CEL510 | | | |

Head of the Department of Civil Engg.

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|--|--|---|-----------------|--------------------|--|
| Course No. | CEL 511 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | Environmental Engineering Systems Optimization | | | | |
| Course Coordinator | Dr. Rajesh Gupta | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | - | | F | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | | |
| Prerequisite credits | - | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL551 | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | Environmental systems optimization | | | |
| | Author | Haith D. A. | | | |
| | Publisher | John Willey , New York | | | |
| | Edition | 1982 | | | |
| | Title | Optimal design of eater distribution networks | | | |
| | Author | Bhave P.R. | | | |
| | Publisher | Narosa Publishing Co., New Delhi | | | |
| | Edition | | | | |
| Reference Books | Title | Optimization for engineering design | | | |
| | Author | Kalyanmoy Deb | | | |
| | Publisher | Practice Hall | | | |
| | Edition | | | | |
| | Title | Water resources systems-modelling techniques and analysis | | | |
| | Author | Vedula S. And Majumdar Y. P. | | | |
| | Publisher | McGraw Hills Co. | | | |
| | Edition | | | | |
| | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | | | | |
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| Publisher | | | | | |
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| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | Principles of economic analysis, mathematics of economic analysis, discounting factors and different discounting techniques. Optimization methods for environmental engg. Systems e.g. pumping main, water transmission & distribution networks, wastewater collection systems, water treatment systems, wastewater treatment systems, solid waste management systems and air pollution control systems. | |
| Course No. | CEL 511 | |

Head of The Department of Civil Engineering

Course Content Proforma

Department: Civil Engineering

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|--|------------------|--|---|---------------------------|--|
| Course No.: | CEL417 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title: Hazardous Waste Management | | | | | |
| Course Coordinator: Dr. Dilip H. Lataye | | | | | |
| Slot in which offered, if not offered write N | Odd | | Even | | |
| | B | | | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course numbers | | | | | |
| Prerequisite Credits | | | | | |
| Equivalent Course Course Codes. As per proposed Courses & old courses | | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | | |
| Text Book (Max. 2) | | Title | Hazardous Waste Management, | | |
| | | Author | M. D. LaGrega, P.L.Buckingham and J.C.Evans | | |
| | | Publisher | McGraw-Hill, Inc., New York | | |
| | | Edition | 1994 | | |
| | | Title | International Perspective on Hazardous Waste Management, | | |
| | | Author | W.S.Forester and J.H.Skinner | | |
| | | Publisher | Mudra Offset Printers, Bajaj Nagar Nagpur | | |
| | | Edition | 2001 | | |
| | | Title | Hazardous Waste Management, | | |
| | | Author | G.W.Dawson and B.W.Mercer, | | |
| Reference Books | Publisher | Academic Press, Inc., London, England | | | |
| | Edition | 1987 | | | |
| | Title | Standard Handbook of Hazardous Waste Treatment and Disposal | | | |
| | Author | H.M.Freeman | | | |
| | Publisher | McGraw-Hill, Inc., New York | | | |
| | Edition | 1989 | | | |
| | Title | Hazardous Waste Management Engineering, | | | |

| | | |
|-------------------|---|--|
| | Author | E.J.Martin and J.H.Johnson, Jr., |
| | Publisher | Van Nostrand Reinhold Co. Inc. New York. |
| | Edition | 1987 |
| | | |
| Content | Generation, storage, transportation, treatment, disposal, exchanges and minimization, legislative and technical aspects, current management practices; Environmental audits, pollution prevention, facility development and operations, treatment and disposal methods; physical, chemical, thermal, biological processes, land disposal with general applications to the industrial and energy-producing sectors, Site remediation. Special wastes, such as, infectious and radioactive waste. | |
| Course No. | CEL417 | |

Department : Civil Engineering

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|--|---------|--|-----------------|----------------------------|---------|
| Course No. | CEL 512 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | | Environmental Biotechnology | | | |
| Course Coordinator | | Dr. (Mrs.) M. V. Latkar | | | |
| Slot in which offered. If not offered write N | | Odd | | Even | |
| | | - | | H | |
| Structure | | Lecture | Tutorial | Practical | Credits |
| | | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | | Environmental Chemistry & Microbiology | | | |
| Prerequisite credits | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | | CEL499 | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | | Title | | | |
| | | Author | | | |
| | | Publisher | | | |
| | | Edition | | | |
| | | Title | | | |
| | | Author | | | |
| | | Publisher | | | |
| | | Edition | | | |
| Reference Books | | Title | | Concepts in Biotechnology | |
| | | Author | | Balasubramaniyan et al. | |
| | | Publisher | | Sangam Books Ltd. | |
| | | Edition | | Latest | |
| | | Title | | Text book of Biotechnology | |
| | | Author | | Dubey | |
| | | Publisher | | | |
| | | Edition | | Latest | |
| | | Title | | | |
| | | Author | | | |
| | | Publisher | | | |
| | | Edition | | | |
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| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>Basic concepts of Microbial Biochemistry of carbohydrates, proteins and fats; structure of nucleic acids Deoxyribose nucleic acid - DNA and Ribose nucleic acid - RNA</p> <p>Basic concepts of biodegradation, biotransformation, bioleaching and biobeneficiation; Different types of microbial associations or interactions.</p> <p>Environmental monitoring – significance of monitoring bacterial, viral and protozoan pathogens; Techniques of monitoring – gene probes, biosensors and immunoassay.</p> <p>Basic concepts of Genetic Engineering – genes, chromosomal DNA, plasmid DNA, replication of DNA, genetic code, transformation, transduction and conjugation processes in bacteria, mutation, recombinant DNA techniques.</p> <p>Biotransformation of biomass / organic waste into value added chemicals and energy, Single cell proteins, Microorganisms involved and biochemical changes of different pollutants present in liquid wastes, Types of reactors, pathways of bioenergy production – biomethane production, bioethanol production etc.</p> | |
| Course No. | CEL 512 | |

Head of The Department of Civil Engineering

Department : Civil Engineering

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| Course No. | CEL 513 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | Environmental Systems modelling | | | | |
| Course Coordinator | Dr. Rajesh Gupta | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | N | | N | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | | |
| Prerequisite credits | - | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL553 | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | Introduction To Env. Engg. and Science | | | |
| | Author | Gilbert M. Masters | | | |
| | Publisher | Practice hall, india | | | |
| | Edition | | | | |
| | Title | Principles of surface water quality modelling and control | | | |
| | Author | Thomann R. V. And Muller J. A. | | | |
| | Publisher | Harper international edition | | | |
| | Edition | 1987 | | | |
| Reference Books | Title | Water quality | | | |
| | Author | Technobangolous G. , Schroader E. D. | | | |
| | Publisher | Addison-Wesley publishing co. Reading Massachusetts | | | |
| | Edition | | | | |
| | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
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| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>Definition; Classification; Examples and Models of Environmental Systems.</p> <p>Introduction to Air Quality Models; Metrology; Atmospheric Stability and Turbulence; Gaussian Plume Model and Modifications; Numerical Models, Urban Diffusion Models;</p> <p>Introduction to river, estuarine and lake thermodynamics, Stratification of lakes, Dissolved Oxygen Model for streams, Temperature Models, Prediction of fate of organisms and toxic substances.</p> <p>Models for predicting water quality changes in water distribution systems</p> <p>Computational methods in Environmental Modelling</p> | |
| Course No. | CEL 513 | |

Head of The Department of Civil Engineering

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|--|----------------------|----------------------|-----------------|-----------------------|
| Course No. | CE- 5xx | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Seminar | | | |
| Course Coordinator | Dr. V. A. Mhaisalkar | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | - | | - | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 0 | 0 | 0 | 2 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | - | | | |
| Equivalent Course Codes. As per proposed courses and old courses | - | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| Reference Books | Title | | | |
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| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>The seminar should cover in depth study and/or critical review of a specific topic of current interest in the field of environmental engg./science/management assigned by the course coordinator.</p> <p>The study on the topic may be carried out by an individual or a group of two students each having earned minimum 50 credits. The students shall be required to submit a report and deliver seminar.</p> | |
| Course No. | CE- 5xx | |

Head of The Department of Civil Engineering

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|---|---|--|--------------------|--------------------|--|
| Course No. | CEP 502 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | Environmental Monitoring Laboratory – II | | | | |
| Course Coordinator | Dr. (Mrs.) M. V. Latkar/Prof. R. R. Gawalpanchi | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | - | | G1 | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 0 | 0 | 2 | 2 | |
| Prerequisite Course Codes As per proposed Course Numbers | Environmental Monitoring Laboratory – I | | | | |
| Prerequisite credits | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | - | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| Reference Books | Title | Standard Methods for the Examination of Water & Wastewater | | | |
| | Author | | | | |
| | Publisher | APHA, AWWA, WEF | | | |
| | Edition | | | | |
| | Title | IS Code No. 5182 Parts 1 to 20 | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | IS Code No. 10158, 9234 & 9235 | | | |
| | Author | | | | |
| | Publisher | | | | |
| | Edition | | | | |
| | Title | | | | |
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| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <ol style="list-style-type: none"> 1. Collection, preservation and analysis of samples from water treatment plants, municipal wastewater treatment plants or industrial wastewater treatment plants. 2. Collection and analysis of air samples for SPM, RSPM, SO₂ & NO_x 3. Characterization of municipal solid wastes | |
| Course No. | CEP 502 | |

Head of The Department of Civil Engineering

Course Content Proforma

Department: Civil Engineering

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|--|------------------|---|------------------------|---------------------------|----------------|
| Course No.: | CEL412 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title: Spatial Analysis for Resource Management | | | | | |
| Course Coordinator: Dr. Y.B.Katpatal | | | | | |
| Slot in which offered, if not offered write N | | Odd | | Even | |
| | | | | C | |
| Structure | | Lecture | Tutorial | Practical | Credits |
| | | 3 | 0 | 2 | 8 |
| Prerequisite Course Codes As per proposed Course numbers | | | | | |
| Prerequisite Credits | | | | | |
| Equivalent Course Course Codes. As per proposed Courses & old courses | | | | | |
| Overlap Course Codes As per proposed Course numbers | | | | | |
| Text Book (Max. 2) | Title | Concepts and techniques of Geographic Information Systems | | | |
| | Author | C.P LO Albert KW Yeung | | | |
| | Publisher | Pritince Hall of India | | | |
| | Edition | 2002 | | | |
| | Title | Text Book on Remote Sensing | | | |
| | Author | C.S. Agrawal & P K Garg | | | |
| | Publisher | Wheeler | | | |
| Reference Books | Edition | First | | | |
| | Title | Geographic Information Systems and Science | | | |
| | Author | Paul A. Longley, M. Goodchild, David Maguire, David Rhind | | | |
| | Publisher | Wiley | | | |
| | Edition | First | | | |
| | Title | Keith C. Clerk, Bradely O Parks, Michel P Crane | | | |
| | Author | Geographic Informaiton System and Enviornment Modeling | | | |
| | Publisher | Pritince Hall of India | | | |
| | Edition | 2002 | | | |
| | Title | Remote Sensing of the Environment ..an Earth Resource Perspective | | | |
| | Author | John R Jensen | | | |
| | Publisher | Pearson Education | | | |
| | Edition | 2006 | | | |

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|-------------------|---|
| Content | <p>Fundamentals of Geoinformatics: raster and Vector Data, Resolutions of RS data, Thermal and Radar Sensing, spatial and non spatial information, attribute data collection, data formats, data conversions. RS as a technology for data extraction technique, multithematic data extraction using multispectral sensors, thematic map generation.</p> <p>Overlay analyses, Buffer analyses, Query shell. Spatial analysis, Modeling of spatial data, Network analysis, digital terrain elevation models, Customization and Decision Support Systems.</p> <p>Applications of Geoinformatics for spatial management of resources: Run-off estimations, infiltration characteristics, groundwater potential and recharge characteristics, Watershed management, watershed prioritization, Sediment yield estimation, reservoir capacity studies, Spatial analyses for Environment Impact assessment, Monitoring and feedback, Natural indices, Concept of E-Governance using Geoinformatics. Integrated applications using various technologies within Geoinformatics; methods and approach. Real time and temporal analysis using Geoinformatics.</p> |
| Practical | <p>Multidisciplinary applications of Geoinformatics; integration of various segments. Geoinformatics for resources management and utilities management.</p> <p>Spatial Digital Data and its Formats</p> <p>Digital Image analysis and Classification</p> <p>Vector Data generation, topology building and attribution</p> <p>Overlay, Buffer and Network analysis</p> <p>Models for Resource analysis</p> |
| Course No. | |

Head of The Department

Department : Civil Engineering

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|--|--|--|-----------------|--------------------|--|
| Course No. | CEL 418 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) | |
| Course Title | ENERGY CONVERSION AND ENVIRONMENT | | | | |
| Course Coordinator | Dr. A. R. Tembhurkar | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | | |
| | D | | - | | |
| Structure | Lecture | Tutorial | Practical | Credits | |
| | 3 | 0 | 0 | 6 | |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | | |
| Prerequisite credits | | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | - | | | | |
| Overlap course codes As per proposed Course Numbers | | | | | |
| Text Book (Max. 2) | Title | Energy and the Environment | | | |
| | Author | Fowler J. M. | | | |
| | Publisher | McGraw Hill New York | | | |
| | Edition | 2 nd | | | |
| | Title | Biomass for Energy in the Developing Countries, Current Roles, Potentials, Problems, Prospects | | | |
| | Author | D. O. Hall, G. W. Barnard and P. A. Moss | | | |
| | Publisher | Pergamon Press Ltd | | | |
| | Edition | 1 st | | | |
| Reference Books | Title | Energy Management Handbook | | | |
| | Author | W. C. Turner | | | |
| | Publisher | Wiley Newyork | | | |
| | Edition | 1 st | | | |
| | Title | Energy System Analysis for Developing countries | | | |
| | Author | P. Meier | | | |
| | Publisher | Sringer Verlag | | | |
| | Edition | 1 st | | | |
| | Title | Energy from Bioconversion of Wate materials | | | |
| | Author | Dorthy J De Renzo | | | |
| | Publisher | Noyes data Corporation USA | | | |
| | Edition | 1 st | | | |
| Title | Energy from Solid Waste – Recent Development | | | | |

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|------------|---|---|
| | Author | Francis A.Domino |
| | Publisher | Noyes data Corporation USA |
| | Edition | 1 st |
| | Title | Natural Resource Conservation – Management for Sustainable Future |
| | Author | Oliver S. Owen , Daniel D. Chiras |
| | Publisher | Prentice Hall Publications |
| | Edition | 6 th |
| | Title | Integrated Solid Waste Management |
| | Author | George Tachonobanoglous, Hilary Thesin, Samuel Vigil |
| | Publisher | McGraw Hill |
| | Edition | 1 st International Edn. |
| Content | <p>Overview of Global and Indian Energy Scenario; Resource Conservation and Environmental Movement; Flow of Energy Through Ecosystem; Renewable and Non- Renewable Energy Sources; Sustainable System of Energy; Energy and Resources Conservation Strategies and Policies; Energy audit; Energy Conversion Methods: Thermal, hydro, nuclear, solar, wind, tidal, Energy Analysis; Energy economics; Future Energy Systems; Introduction to Fuel combustion fundamentals, formation of Pollutants, Measurements and Control; Alternative Energy sources Utilizations; Classification of Waste as Fuel; Waste to Energy options: Combustion, Gasification, anaerobic digestion, fermentation, pyrolysis; Fuels Derived from Waste to Energy Technology; Power Generation using Waste to Energy technology, Gas generations and collection in landfills, Potential for biomass and Biogas Energy system</p> | |
| Course No. | CEL 418 | |

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|--|---------------------------------|---|--------------------|-----------------------|
| Course No. | CEL 432 | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| Course Title | Environmental Impact Assessment | | | |
| Course Coordinator | | | | |
| Slot in which offered. If not offered write N | Odd | | Even | |
| | - | | H | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 0 | 0 | 6 |
| Prerequisite Course Codes As per proposed Course Numbers | - | | | |
| Prerequisite credits | | | | |
| Equivalent Course Codes. As per proposed courses and old courses | CEL458 | | | |
| Overlap course codes As per proposed Course Numbers | | | | |
| Text Book (Max. 2) | Title | Environmental Impact Assessment of Water Resource Projects | | |
| | Author | Canter L. | | |
| | Publisher | McGraw Hill | | |
| | Edition | 1996 | | |
| | Title | Environmental Impact Analysis Handbook | | |
| | Author | Rau G. L. and Wooten C. D. | | |
| | Publisher | McGraw Hill | | |
| | Edition | 1980 | | |
| Reference Books | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Title | | | |
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| | Author | |
| | Publisher | |
| | Edition | |
| | Title | |
| | Author | |
| | Publisher | |
| | Edition | |
| Content | <p>Evolution and history of EIA at International and Indian level, Definition, benefits and importance of EIA, Environmental clearance process in India, EIA at project, regional and policy level, EIA process in India, Collection of baseline data, Identification of impacts on physical, biological, socioeconomic environment and land use pattern, Prediction and evolution of impacts, Screening and scoping criteria, Prediction models, EIA methodologies: checklist, matrix, overlay, BEES and other techniques of impact assessment, Uncertainties in EIA, Rapid and comprehensive EIA, Public participation in EIA, Environmental management plan, Post project monitoring, EIA reports, Environmental impact statement, Application of EIA for water resource projects, industrial projects, infrastructural projects etc.</p> | |
| Course No. | CEL 4xx | |

Head of The Department of Civil Engineering

| COURSE CONTENT PROFORMA | | | | |
|---------------------------|------------------------------|--|-----------------|--------------------|
| Course No. | CEL3xx | Open Course (Y/N) | HM Course (Y/N) | Discontinued (Y/N) |
| | | | | |
| Course Title | Energy Efficient Buildings | | | |
| Course Coordinator | Dr. Rahul V. Ralegaonkar | | | |
| Slot in which Offered | Even | | | |
| Structure | Lecture | Tutorial | Practical | Credits |
| | 3 | 1 | 0 | 8 |
| Prerequisite Course Codes | | | | |
| Prerequisite Credits | | | | |
| Equivalent course Codes | | | | |
| Overlap Course Codes | | | | |
| Text Books | Title | Energy Efficient Buildings In India | | |
| | Author | Mili Majumdar | | |
| | Publisher | Tata Energy Research Institute | | |
| | Edition | | | |
| | Title | Energy-Efficient Building Systems | | |
| | Author | Lal Jayamaha | | |
| | Publisher | McGraw Hill Publication | | |
| | Edition | | | |
| | Title | Solar Energy Fundamentals & Applications | | |
| | Author | H P Garg, J Prakash | | |
| Publisher | Tata MacGraw Hill Publishing | | | |
| Edition | | | | |
| Reference Books | Title | Solar Energy and thermal processes | | |
| | Author | J A Duffie & W A Beckman | | |
| | Publisher | John Wiley | | |
| | Edition | | | |
| | Title | Solar Energy Applications in Buildings | | |
| | Author | A A M Sayigh | | |
| | Publisher | Academic Press | | |
| | Edition | | | |
| | Title | | | |
| | Author | | | |
| | Publisher | | | |
| | Edition | | | |
| | Content | Theory: 1. Conservation & energy efficiency concepts-overview of significance | | |

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| | <p>of energy use and energy processes in buildings</p> <ol style="list-style-type: none"> 2. Passive solar energy fundamentals & practices in building design- solar astronomical relations and radiation physics and measurements, human thermal comfort, climatological factors, material specifications and heat transfer principles. 3. Passive solar energy practice in building design- design decisions in building-location, orientation, form, material, Thermal performance evaluation 4. Passive Solar technologies- trombe wall, thermosiphoned mass wall, water wall, sunspaces, roof ponds, glazed windows, cool towers, under slab rock beds 5. Design Guidelines & Economic Optimization- Concept of cost/benefit of energy conservation & passive solar technologies 6. Advances in computational energy conservation- implementation of computer energy simulation programs into solar designs. <p>Tutorials: Numerical & Graphical problems will be discussed and solved based on the above mentioned topics.</p> |
| Course No. | |

Head of the Department of **CIVIL ENGINEERING**

Filling this gap in the professional literature, *Environmental Biology for Engineers and Scientists* introduces students of chemistry, physics, geology, and environmental engineering to a broad range of biological concepts they may not otherwise be exposed to in their training. Based on a graduate-level course designed to teach engineers to be literate in biological concepts and terminology, the text covers a wide range of biology without making it tedious for non-biology majors. Teaching aids include: * Notes, problems, and solutions * Problem sets at the end of each chapter * PowerPoints(r) o Environmental chemistry is not only an important subject, but also a necessary one because without this subject, one cannot completely understand other subjects and topics (like water treatment and sewage treatment etc.). However, if you are environmental engineer I think you should know what is going on in our atmosphere and how does it work - e.g. photoreactions, radical reactions and organic chemistry. Water: It's not only BOD, COD, TOC etc. Red-ox potential is essential in water. This is the definitive text in a market consisting of senior and graduate environmental engineering students who are taking a chemistry course. The text is divided into a chemistry fundamentals section and a section on water and wastewater analysis. All Departments Alexa Skills Amazon Devices Amazon Warehouse Appliances Apps & Games Arts, Crafts & Sewing Automotive Parts & Accessories Baby Beauty & Personal Care Books CDs & Vinyl Cell Phones & Accessories Clothing, Shoes & Jewelry Women Men Girls Boys Baby Collectibles & Fine Art Computers Courses Credit and Payment Cards Digital Music Electronics Garden & Outdoor Gift Cards Grocery & Gourmet Food Handmade Health, Household & Baby Care Home & Business Services Home &.