

Department of Civil Engineering

Course Structure

Master of Technology in "Disaster Assessment & Mitigation"

| Subject Code | Course Title | Credit |
|---------------------------------------|--|----------------|
| Semester 1 (Core Courses) | | |
| CE561 | Spatial data collection and analysis | 3 (3 0 0) |
| CE563 | Understanding natural and manmade disaster | 3 (3 0 0) |
| CE 567 | Hazard, vuluranability and risk analysis | 3 (2 1 0) |
| CE 573 | Environmental and Resources Economics | 3 (2 1 0) |
| CE566 | Disaster preparedness and response | 3 (3 0 0) |
| CE 570 | Rehabilitation, reconstruction and recovery | 3 (2 1 0) |
| CE579 | Spatial data analysis lab | 2 (0 0 3) |
| Total Semester Credits | | 20 |
| Semester 2 (Elective Courses) | | |
| | | Credits |
| CE562 | Geoinformatics for natural resources/disaster management | 5 (2 1 3) |
| CE 568 | Water Conservation | 3 (3 0 0) |
| CE 571 | Environmental Modeling | 3 (2 1 0) |
| CE 572 | Introduction to Sustainable Development | 3 (3 0 0) |
| CE564 | Climate change variability and adaptation | 3 (2 1 0) |
| CE 574 | Governance and Management of Natural Resources | 3 (3 0 0) |
| CE 577 | Aseismic Designing and Construction of Structures | 3 (2 1 0) |
| CE565 | Drinking water and sanitation under emergencies | 3 (3 0 0) |
| Total Semester Credits | | 18-20 |
| Semester 3 | | |
| | | Credits |
| CE601 | Seminar | 4(0 0 8) |
| ST603A | Dissertation | 16(0 0 32) |
| Total Semester Credits | | 20 |
| Semester 4 | | |
| | | Credits |
| CE603B | Dissertation | 16(0 0 32) |
| Total Semester Credits | | 16 |
| Total Credits of all semesters | | 74-76 |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE561 | Course Name: Spatial Data Collection and Analysis |
| Credit:3 | L-T-P:3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Basics of map reading, types and sources of map, cartographic representation of data, map coordinate system, projections and their types, and guidelines for preparing a base map, thematic mapping.</p> <p>Aerial photographs, Mosaic, Image interpretation - Elements and methods, Stereo-model.</p> <p>Physics of remote sensing: Electro magnetic spectrum and spectral signatures, Types of remote sensing, Platforms and sensors; active and passive sensors; aerial photographs, satellite images, radars; sensor characteristics, Resolution- spatial, spectral, radiometric and temporal, Image interpretation - Elements and methods, Image correction-geometric, Digital image enhancement techniques (stretching, filtering), Classification: supervised and unsupervised, Application of remote sensing techniques in resource and environment mapping, monitoring case studies.</p> <p>Global Positioning Systems (GPS): Introduction to the GPS functions, Field operation of GPS and data collection using GPS, Basic concepts and components of GIS</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Remote Sensing & DIP: by Lillesand & Keifer, John Wiley & Sons, Inc. 2. Lillian, Thomas M (2003), Remote sensing and image interpretation, New York: John Wiley & Sons. 3. J. R., Jensen, Introductory digital image processing: a remote sensing perspective, Prentice Hall 4. G. S. Rao, Global Navigation Satellite Systems (GNSS), Tata McGrahill Publications | |

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| UG | Department: Civil Engineering |
| Course Code: CE 579 | Course Name: Spatial Data Analysis Lab |
| Credit:3 | L-T-P: 0-0-3 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <ol style="list-style-type: none"> 1. Demonstration of different type of remote sensing data products. 2. Collection of radiometric data from different surfaces using digital spectral radiometer or available data and preparation of spectral reflectance curve – Two exercises 3. Learning how to identify correct remote sensing data product and their referencing schemes 4. Visual interpretation of remote sensing imageries to extract different information. 5. Demonstration of scanning of TOI Toposheets and other maps on A0 size scanner. 6. Demonstration of Remote Sensing software (ERDAS Imagine). 7. Pre-processing of remote sensing data using ERDAS Imagine software. 8. Learning image enhancement and feature extraction techniques using digital image processing techniques. 9. Unsupervised classification of remote sensing images. 10. Use GPs for collection data/surveying – two exercises <p>Books:</p> <ol style="list-style-type: none"> 1. Remote Sensing & DIP: by Lillesand & Keifer, John Wiley & Sons, Inc. 2. Lillian, Thomas M (2003), Remote sensing and image interpretation, New York: John Wiley & Sons. 3. J. R., Jensen, Introductory digital image processing: a remote sensing perspective, Prentice Hall | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE565 | Course Name: Drinking Water and Sanitation Under Emergencies |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus General aspects of conservation of water quality; Disinfection of water sources and storage tanks; Rehabilitating piped water distribution systems; Emergency treatment of drinking-water at the point of use; Hygiene promotion in emergencies; Measuring chlorine levels in water supplies; Planning for excreta disposal in emergencies; Technical options for excreta disposal in emergencies; Cleaning wells after seawater flooding.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Shaw, R. (1999). Running water: more technical briefs for health, water and sanitation. London, UK, IT Publications. 2. Harvey, P.A., Baghri, S., Reed, R.A. (2002), Emergency sanitation: assessment and programme design. Loughborough, UK : WEDC, Loughborough University of Technology. 3. Wisner, B., Adams, J. (2002), Environmental health in emergencies and disasters: a practical guide. Geneva, Switzerland : World Health Organization (WHO). 4. Davis, J. ; Lambert, R. ; (2002). Engineering in emergencies: a practical guide for relief workers . 2nd ed.. London, UK . | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-563 | Course Name: Understanding Natural and Man-made Disasters |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Introduction to natural resources, their distribution and challenges, natural disasters and their classification. Definition and scales of disasters, Disaster Management Act and Policy, Institutional Framework and Mechanism, History and Status of Disaster Management in India, Terminology and Concepts in Disaster Risk Management</p> <p>Earthquakes Physics: Wave propagation, Wave types (compression, shear, surface), Attenuation; Causes: Tectonic plate motions, Magma movement, Isostatic rebound, subsurface fluid changes; Effects: No damage or massive damage, Tsunamis, Subsidence, Detection, Seismic network, Warning, Recovery, Updated building codes, Man mitigate damage; Tsunamis Physics: Pressure, Wave propagation, Causes: Earthquakes, Underwater landslides; Effects: Sudden rise and fall in sea level, Coastal damage, Loss-of-life; Detection: Seismic networks, Pressure gauges, Wave-height buoys, Warning, Siren, Recovery: Hampered by loss of infrastructure, Rebuild with knowledge that it can happen again, upgrade facilities and infrastructure; Volcanic Eruptions Physics: Pressure, Density, Causes: Tectonic plate interactions, Hot spots; Effects: Lahars (hot mud flows), Nue Ardente (firey clouds), Lava flows over roads and buildings, Ash flows, Earthquakes, Detection: Small seismic network, Tilt meters, Laser ranging; Landslides Physics: Friction, Causes: Saturated soil, Unstable snow; Effects: Destroys buildings, roads, trees; Detection: Geologic profiles identify candidate areas, Snow depth, cohesion, etc.</p> <p>Floods Physics: Response time, Fluid flow, Causes, Excessive rain upstream, Channelizing Effects: Property loss, Life loss, Sedimentation, Change in course of river, Detection: Stream gauges, Forecast models of stream flow; Recovery: Move people & buildings, Build dykes, Flood control; Nuclear accidents (TMI and Chernoble) Physics: Nuclear energy, Half-life, Causes: Operational mistakes, Poor construction, Poor design; Effects: Radioactive fallout, Radiation sickness, Increased cancer rate, Detection: Radiation monitors, Radionuclide observations; Recovery: Clean-up & disposal of contaminated material, Iodine tablets; Droughts: Classification of droughts, Causes of droughts, Effects of droughts, Preventive measures of droughts, Drought management strategies</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Mohamed Gad-el-Hak, Large-Scale Disasters: Prediction, Control and Mitigation, Published by Cambridge University Press, 2008, ISBN 0521872936, 9780521872935. 2. Natural Disasters, 5th Edition, Patrick Leon Abbott, San Diego State University, ©2005, ISBN 0072921986 3. William G. Ramroth Planning for disaster: how natural and man-made disasters shape the built environment, Published by Kaplan Publishing, 2007, ISBN 1419593730, 9781419593734 | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-574 | Course Name: Governance and Management of Natural Resources |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Overview of conceptual issues and approaches: Establishing the rationale for natural resource management (NRM) regimes: Introducing concepts of carrying capacity, ecological foot-print, resilience, tragedy of the commons; Conceptual distinctions and nuances: Institutions and organizations, Governance and Government, Management and Governance; Theoretical approaches to governance and contribution of different disciplines: Rational Choice and New Institutional Economics, Public Administration and Management, Socio-technical Perspectives, Legal Anthropological Approaches, legal pluralism in governance, Influence of neo-liberal ideologies on governance; The Bureaucracy and Natural Resource: The relevance and appropriateness of the bureaucratic set-up for NRM (Weberian conceptions); Understanding accountability and transparency, rent seeking perspectives; Reform of public institutions; Role of the bureaucracy in reform processes. Lessons from water, forestry and pollution control; Decentralisation and changing role of the State: Distinction between decentralization and devolution. The participation paradigm; Understanding resource user organisations. Lessons from JFM and Irrigation Management Transfer in India; The 73rd and 74th Amendments to the Constitution of India; Collective Action and Management of common property resources: The emergence and survival of common property institutions Understanding conditions for collective action; Collective action as a socially embedded process, understanding social, power and gender relationships in Natural Resource Management; Mainstreaming gender and equity considerations in Natural Resource Management; Case studies/lessons from water-surface and groundwater, land and forestry; Markets as a form of natural resource allocation: Equity, efficiency and sustainability implications; Market creation as a reform strategy. Issues and perspectives; Role of NGOs and civil society in Natural Resource Management: The emphasis on partnerships for sustainable development, Issues and lessons for replication.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. North, D.C. 1990. Institutions, institutional change and economic performance. Cambridge University Press 2. Ostrom, E. (1990). Governing the commons. The evolution of institutions for collective Action. Cambridge University Press. Cambridge. 3. Bac, M. Property Rights Regimes and the Management of resources. Natural Resources Forum. 22(4): 263-269 4. Merry S.E. 1998. Legal Pluralism. Law and Society Review 22(5): 869-896 5. Wade, R. 1988. The management of irrigation systems: how to evoke trust and avoid prisoners' dilemma. World Development 16(4): 489-500 6. Paul, S. 1992. Accountability in public services: exit, voice and control. World Development. 20 (7): 1047-1060. | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-567 | Course Name: Hazard, Vulnerability & Risk Analysis |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Introduction to Hazard: Definition of hazard, Hazard estimation, Effect of hazard on structures; Vulnerability: Definition of vulnerability, Methodologies of vulnerability assessment, Evaluation, Building Types, Micro & Macro methods, Intensity Scales, Damage probability matrix, Vulnerability functions; Risk: Definition and components of risk, Fundamentals of risk analysis, Element at risk and their attributes, Seismic risk evaluation The assessment for different disaster types, the extreme event analysis, hazard ecology, chemical load and environmental health risk, carcinogenic materials and environment risk adjustment, choice and loss acceptance; Disaster: Direct and indirect damages, Ground failures in the past earthquake, Damage to structures, Associated damage due to fire and flooding, failure of embankments, dams and bridges, tsunamis; Disaster Mitigation: The collection of data and information, quantified risk assessment for industrial accidents; release of toxics products, Dispersion analysis, and HAZOP study.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Reiter, L (2001)., "Earthquake Hazard Analysis, Issues and Insights", Columbia University Press. 2. "Prestandard and Commentry for The Seismic Rehabilitation of Buildings," FEMA 356 (2000), Federal Emergency Management Agency, Washington, D.C. 3. William, P. L.; and J. L. Burson, 1985, Industrial Toxicology, Safety and Health Applications in the work place, Van Nostrand Reinhold, New York. 4. Willson , R; and E. A. C.Crouch, 1987, Risk assessment and comparisons: An Introduction, Science 17, 1987, pp 267-270. 5. Petak, W. J. and Atkisson, A, A. Natural Hazard Risk Assessment and Public Policy: Anticipating and Unexpected, Springer; New York. 1982. | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-565 | Course Name: Introduction to Sustainable Development |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Definitions, Changing Perspectives & Principles of Sustainable Development including safety from disasters, Millennium Development Goals and their relevance for development policy and practice, Agriculture and Nutrition , Public Health Challenges in the Developing World, Environmental and Climate Science, Technology and Engineering, Economics and Policy Coherence, Community Participation and Participatory Learning, Public-Private Partnership Approach.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. World Commission on Environment and Development. 1987. Our Common Future. Oxford: OUP 2. UN Millennium Project 2005. Investing in Development: A Practical Plan to Achieve the Millennium Development Goals. Overview. 3. Hazell, P. and X. Diao (2005). "The Role of Agriculture and Small Farms in Economic Development," Washington, D.C.: International Food Policy Research Institute 4. World Bank (2006) Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems, World Bank: Agriculture and Rural Development | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-566 | Course Name: Disaster Preparedness and Response |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Global Disaster: Science and Policy, Institutional framework for disaster preparedness and mitigation- Global and Indian scenario, Managing natural and anthropogenic disasters , risk assessment and analysis, Principles and Practice of disaster response operations and management , Disaster Planning , Public Administration/Policy and Emergency Management, Incident Command Centre, Training Need Analysis and Human Resource Development Plan, corporate/public agency coordination, the human element in preparedness planning , Current trends in disaster preparedness. Hazard monitoring, tracking and modeling, Early warning systems, warning protocols, India Disaster Resource Network, Environmental Hazards, public health aspects of disaster management and emergency services systems urban hazards and disasters: an introduction to disaster planning, fire services preparedness, Emergency Sanitation/ Shelter environments . Conceptual and Applied Issues in Emergency Management: Operational decision making, Introduction to Emergency Management and planning, organization and structure for Emergency Management , Emergency Management research - Methods/Analysis , Public Information for Emergency Management, Principles and Practice of Disaster Relief and Recovery , Logistic support system, Computer Applications in Emergency Management. Principles of natural hazard reduction, Toxicology and Biohazards in Emergency Management, Terrorism Preparedness: Critical Infrastructure and Emergency Management ,Emergency Preparedness, Response, and Planning for Hazardous Materials, Terrorism, WMD, and other contemporary Issues, Incident Management Systems and Emergency Operations Center ,Contingency Planning, Community Emergency Response Team, Community Relations for Environmental and Emergency Managers , Contingency Planning for Business and Industry, International Disasters.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Collins Larry R. and Schneid Thomas D., Disaster Management and Preparedness Taylor and Francis 2000 2. Goel S.L. and Kumar Ram, Disaster Management, Deep and Deep Publications, 2001 | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-564 | Course Name: Climate Change Variability and Adaptation |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Climate Change policy framework: Climate change as a problem, impacts of climate change, climate variability and natural resources. The United Nations Framework Convention on Climate Change (UNFCCC). The background to the Convention and its aims, The Kyoto Protocol and the Flexibility Mechanisms, Emission Trading.</p> <p>Mitigation: Defines mitigation and evaluates policies, strategies and technology options. Climate change case studies.</p> <p>Adaptation: Defines adaptation and evaluates policies, strategies and technology options. Case studies of adaptation. Evaluation of the effectiveness of approaches to managing climate change risk. Effectiveness of policy approaches to reducing climate change and variability risk.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Jon Hovi, Olav Stokke and Geir Ulfstein (eds) 2005, Implementing the climate regime : international compliance, Earthscan 2. F. Yamin (ed), 2005. Climate change and carbon markets : a handbook of emission reduction mechanisms, Earthscan 3. G Boylr, B Everest, J Ramage (eds), 2003, Energy Systems and Sustainability: Power for a Sustainable Future, Oxford 4. Climate Change 2007: Mitigation of Climate Change, Summary for Policymakers, IPCC. Available at: http://www.ipcc.ch/SPM040507.pdf 5. Climate Change 2007: Impacts, Adaptation and Vulnerability, Summary for Policymakers, IPCC. Available at: http://www.ipcc.ch/SPM13apr07.pdf 6. Climate Change, The Physical Science Basis, IPCC. Available at: http://ipccwg1.ucar.edu/wg1/wg1-report.html | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-562 | Course Name: Geoinformatics for Natural Resources/Disaster Management |
| Credit:3 | L-T-P: 3-0-3 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Geographical Information System: Components of GIS; Feature types, Spatial data models (raster & vector) - their advantages and disadvantages; Spatial data creation and management- methods, topology creation, editing and manipulation, attaching attribute data, Spatial analysis: single and multiple layer spatial analysis, Spatial querying; arithmetic and logical operations, 3D analysis, Spatial data visualization –map design and layout for thematic layers and display of tables and graphs using GIS software, Application of GIS in Natural Resources Assessment and inventory, change detection. Applications of GIS for assessment of disasters, preparation of vulnerability maps for different type of disasters, prioritization analysis for mitigation of different type of disasters.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Burrough, P 1998 Principles of geographical information system, Oxford: Oxford University Press. 2. Chou, Yue-Hong. 1997, Exploring spatial analysis in geographical information systems, OnWord Press, USA 3. Christopher Jones. 2002, Geographical information systems and computer cartography Longman, London. | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE 573 | Course Name: Environmental Resource Economics |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>The Economic Foundation: Basic consumer & producer theory; different market forms, Welfare analysis, Externalities & public goods; Roots of environmental degradation: inefficient resource allocation with reference to market and policy (government) failures; Economy-environment interface: framework of how environment and economy interact with each other; complementarities & trade-offs. Introducing Environmental & Resource Economics: Introduction to differences between environmental, ecological and resource economics, Introduction to links between environmental economics and environmental policy, Allocation of natural resources and measuring resource scarcity, Economics of sustainable development, Introduction to green accounting. Valuing the Environment & Natural Resources: How can environment have an economic value, Market and non-market benefits, user benefits, non-user benefits, and option value benefits, Methods of valuation: physical linkage methods; hypothetical behavioural and stated preferences methods; observed behavioural or revealed preferences methods. Design of Environment Policy: Command and controls, Economic instruments: pollution taxes or Pigouvian taxes; marketable pollution permits; pollution standards, taxes and permits, Property rights and the Coase theorem, Informal regulation- voluntary participation. Introduction to resource extraction policy.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Varian Hal R. Intermediate Microeconomics. East-west Press. 2. Varian Hal R. Microeconomic Analysis. John Wiley. 3. Kolstad C. D. Environmental Economics. Oxford University Press. 2002 4. Nick Hanley, Jason F Shogren and Ben White. Introduction to Environmental Economics. Oxford University Press. March 2001. | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE-568 | Course Name: Water Conservation |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Introduction to water conservation and assessment Severity of water crisis, importance of conservation, Soil, Plant, Atmosphere Continuum (SPAC); Water use efficiency (WUE), Methods of water resources assessment (hydrology cycle, surface flow assessment, groundwater recharge assessment). Water stress: principles and indicators for assessing water stress, Water quality assessment: indicators for assessing water quality. Water resources conservation and management: Water conservation measures, Soil moisture retention and conservation (cover crop, mulching, etc), Traditional systems and manmade structures (ponds, tanks, reservoirs), Rainwater harvesting, Groundwater recharging, minimizing evaporation loses, Irrigation: types, scheduling and efficiency. Case studies in various ecosystems: Arid, semi arid and humid ecosystems. Water auditing; Water treatment, recycling and reuse leading to water conservation Institutional mechanisms for water management: collective action and decentralization, river basin organizations, WUAs, multiple stakeholder platforms, programmes and policies for integrated water management</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Larry Mays. Urban Water Supply Management Tools, ISBN: 0071428364. McGraw Hill Publication, 2003, 208 pages 2. Larry Mays. Urban Stormwater Management Tools, ISBN: 0071428372, McGraw Hill Publication, 2003, 320 pages. 3. Zdzislaw Kaczmarek, Kenneth M. Strzepek, László Somlyódy, Valentina Priazhinskaya. Water Resources Management in the Face of Climatic/Hydrologic Uncertainties. Kluwer Academic Publishers, Dordrecht, ISBN 0-7923-3927-4, 1996, 408 pp. 4. David Stephenson. Water Supply Management, ISBN 0-7923-5136-3, Kluwer Academic Publisher, Dordrecht, 1998 5. David C. Major, Harry E. Schwarz, Large-scale region regional water resources planning. ISBN 0-7923-0711-9, Kluwer Academic Publishers, Dordrecht, 1990. 6. Freeze, A., Cherry, J.A. Groundwater. Prentice Hall, 1979. 7. Russell John. Soil Conditions and Plant Growth, 635 p., ISBN 81 7622-057-4. | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE 571 | Course Name: Environmental Modelling |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Water Pollution: Sources and effects of water pollutants in Indian context, Principles of water quality modeling: River hydrology and derivation of basic stream equations, surface water pollutants, physical laws and their use in modeling, Surface Water Quality Modeling: Distribution of water quality in rivers and lakes, measurements and evaluation of DO and BOD in rivers. Basic understanding of ground water quality modeling: Contaminant transport in groundwater; basics and fate of pollutants in ground water, site specific groundwater quality problems in India, case studies and applications of water quality models, Ecological modeling.</p> <p>Air pollution: Sources and effects of air pollutants, air quality standards, Meteorological aspects related to air pollution: Wind circulation, lapse rate, stability conditions, turbulence, Richardson number, boundary layer structure, mixing height, plume behavior, heat island effect, wind rose, Air quality modeling and its application: Model classification, box models, dispersion models, dispersion parameters, plume rise, removal mechanisms, point, line and area sources.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Chapra, S: Surface Water-quality modeling, Tata McGraw-Hill, 1997. 2. Thomann, Robert V., John A. Mueller. Principles of Surface Water Quality Modeling and Control, HarperCollins Publisher Inc., New York, 1987 3. Todd, D.K. Groundwater hydrology. John Wiley and Sons, 1980 4. Zheng, C and Bennett, G.D. Applied Contaminant Transport Modeling: Theory and Practice. Van Nostrand Reinhold. 1995 5. Boubel, R W, Fox, D L, Turner, D B (Ed.) and Stern, A C (Ed.) (1994) Fundamentals of Air Pollution, 3rd edition, Academic Press Inc. 6. Turner, D B (1994) Workbook of Atmospheric Dispersion Estimates: An introduction to dispersion modeling, 2nd edition, and Lewis publishers. 7. Wark, K, Warner, C F, and Davis, W T (1997) Air Pollution- Its origin and control, Addison Wesley Longman, Inc. 8. Rao C S (1991), Environmental pollution controls engineering, New Age International (P) Ltd., Publishers, New Delhi. 9. Pasquill, F and Smith, F B (1983) Atmospheric Diffusion, Ellis Horwood Ltd., Chichester. 10. Heinsohn R J and Kabel R L (1999) Sources and control of air pollution, Prentice hall, NJ | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE 570 | Course Name: Rehabilitation, Reconstruction and Recovery |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Recovery and reconstruction: Introduction, medium term and long term recovery aspects, community participation in defining objectives and their priorities.</p> <p>Rehabilitation: Physical and social infrastructure: Relocation and reconstruction of housing, public buildings, bridges, dams, archives and monuments, services such as water supply, electricity, waste management, communication, capacity building for self help construction, Numerical condition surveys for foundation, structural and functional deterioration, design criteria, materials and techniques. Predictive performance models, Repair and retrofitting: Earthquake damages of buildings, their retrofitting, restoration, Superficial repair, structural repair, structural strengthening of habitable spaces, public buildings, roads, bridges, dams, culverts etc.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Sharma, Vinod K. Disaster management, NCDM, IIPA, New Delhi, 1994 2. Mathur, G.C. Housing in Disaster prone areas, National Building Organization and U.N. Regional Centre. ESCAP, New Delhi, 1986 3. Mishra, P.K. Transforming adversity into opportunity: experiences from Gujarat earthquake reconstruction program World congress on Natural disaster mitigation proceedings, February 2004 | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE 577 | Course Name: Aseismic Designing and Construction of Structures |
| Credit:3 | L-T-P: 2-1-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Earthquake effects on the structures, classification of loads, Seismic methods of analysis, seismic design methods. Seismic damages during past earthquakes and effect of irregularities and building architecture on the performance of RC structures.</p> <p>Basic design considerations for multi-story RC structure with foundation as per latest IS: 1893. Introduction to Time history method. Capacity based design of soft story RC building. Ductile detailing as per latest IS:13920. Ductility requirements, types of ductility, factors affecting ductility. BIS code provisions.</p> <p>Design considerations for multi-storeyed steel structures. Design considerations for masonry buildings. Seismic retrofitting, Sources of weakness in RC framed buildings, Classification of retrofitting techniques, Conventional and non-conventional methods, Comparative study of various methods and case studies. IS code provisions for retrofitting of masonry structures, failure modes of masonry structures and repairing techniques.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. BIS code : IS13920 and other concrete and building codes 2. George G. Penelis, Andreas J. Kappos, Earthquake-resistant Concrete Structures, Published by Taylor & Francis, 1997, ISBN 0419187200, 9780419187202. 3. Minoru Wakabayashi, Design of earthquake-resistant buildings, Published by McGraw-Hill, 1986. 4. Pankaj Agarwal, Manish Shrikhande, Earthquake Resistant Design of Structures, Published by PHI Learning Pvt. Ltd., 2006, ISBN 8120328922, 9788120328921 | |

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| PG (DAM) | Department: Civil Engineering |
| Course Code: CE 572 | Course Name: Flood and Drought Management |
| Credit:3 | L-T-P: 3-0-0 |
| Version: | Approved on: |
| Pre-requisite course: | |
| <p>Syllabus</p> <p>Flood Control and Management: Detailed study of flood control methods - Flood plain zoning - Flood disaster monitoring and mitigation procedure - Methods of forecasting -Data communication and warning - Flood fighting.</p> <p>Drought Assessment: Drought definitions - NCA classification -Direct and indirect losses, Hydrology of arid and semi-arid zones, Drought indices, Drought severity assessment in meteorological, hydrological and agricultural aspects.</p> <p>Drought Monitoring and Management: Drought monitoring - Supply and demand oriented measures - Drought Prone Areas Programme (DPAP) - Drought management.</p> <p>Remote Sensing Applications: Principles of Remote Sensing - Satellites and sensors - Data products - Applications to flood and drought studies – Flood mapping - NDVI concepts.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Ven - Te Chow, David R. Maidment and Larry W. Mays, Applied hydrology, McGraw Hill Publications, 1995 2. Vijay P. Singh, Elementary Hydrology, Prentice Hall of India, 1994 3. Ven Te Chow, Hand book of Hydrology, McGraw Hill Publications, 1995 4. Yevjevich V., Coping with Droughts, Water Resources Publications, 1997 5. Yevjevich V., Drought Research Needs, Water Resources Publication, Colorado State University, USA, 1977 | |