JAWAHARLAL NEHURU ARCHITECTURE AND FINE ARTS UNIVERSITY
HYDERABAD.
(Syllabus – 2017)
MASTER OF ARCHITECTURE in Environmental Design 2017-18

M.Arch. (Environmental Design)
ED 1.1 Environmental Design Studio-I
ED 1.2 Energy Simulations E.C.B.C – I
ED 1.3 Building Physics
ED 1.4 Resources Management and Ecology
ED 1. **5** Sustainable Development and Planning
ED 1.6 Seminar
ED 2.1 Environmental Design Studio – II
ED 2.2 Energy Simulations E.C.B.C – II
ED 2.3 Research Methods - I
ED 2.4 Building Energy Management
ED 2.5 Environmental laws
ED 2.6 Sustainable Site planning and landscape design
ED 3.1 Advanced Environmental Design / Studio
ED 3.2 Environmental Impact Assessment
ED 3.3 Environmental Rating Systems
ED 3.4 Sustainable practices in Waste Management
ED 3.5 Environmental Infrastructure
ED 3.6 Research Methods -II
ED 4.1 Environmental Economic feasibility
ED 4.2 Environmental Design Thesis

JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS UNIVERSITY, HYDERABAD.

Course Structure for Master of Architecture Environmental Design
(New Regulations – 2017)

FIRST SEMESTER:

Course No.	Course Title	No.of Hours			Credits	Marks		Total
		Lecturers	Tutors	Studios		Internal	External	
ED 1.1	Environmental Design Studio-I	-	-	12	24	100	100	200
ED 1.2	Energy Simulations E.C.B.C – I	6	-	-	6	50	50	100
ED 1.3	Building Physics	3	-	-	12	50	50	100
ED 1.4	Environmental laws	3	-	-	6	50	50	100
ED 1.5	Sustainable Development and Planning	3	-	-	6	50	50	100
ED1.6	Seminar-I	-	3	-	6	100	--	100
	Total:	**15**	**3**	**12**	**60**	**400**	**300**	**700**

JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS UNIVERSITY, HYDERABAD.

Course Structure for Master of Architecture Environmental Design

(New Regulations – 2017)

SECOND SEMESTER

	Course Title	No.of Hours			Credits	Marks		Total
		Lecturers	Tutors	Studios		Internal	External	
ED 2.1	Environmental Design Studio – II	-	-	12	24	150	150	300
ED 2.2	Energy Simulations E.C.B.C – I	3	-	-	6	50	50	100
ED 2.3	Research Method - I	6	-	-	12	50	50	100
ED 2.4	Building Energy Management	3	-	-	6	50	50	100
ED 2.5	Resources Management and Ecology	3	-	-	6	50	50	100
ED 2.6	Sustainable Site planning and landscape design	-	3	-	6	100	--	100
	Total:	**15**	**3**	**12**	**60**	**450**	**350**	**800**

JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS UNIVERSITY, HYDERABAD.

Course Structure for Master of Architecture Environmental Design

(New Regulations – 2017)

Third Semester:

Course No.	Course Title	No.of Hours			Credits	Marks		Total
		Lecturers	Tutors	Studios		Internal	External	
ED 3.1	Advanced Environmental Design lab/Studio	-	-	12	24	150	150	200
ED 3.2	Environmental Impact Assessment	3	-	-	6	50	50	100
ED 3.3	Environmental Rating Systems	6	-	-	12	50	50	100
ED 3.4	Sustainable practices in Waste Management	3	-	-	6	50	50	100
ED 3.5	Environmental Infrastructure	3	-	-	6	50	50	100
ED 3.6	Research Method -II	-	3	-	6	100	--	100
	Total:	**15**	**3**	**12**	**60**	**450**	**350**	**800**

JAWAHARLAL NEHRU ARCHITECTURE AND FINE ARTS UNIVERSITY, HYDERABAD.

Course Structure for Master of Architecture Environmental Design

(New Regulations – 2017)

FOURTHSEMESTER

Course No.	Course Title	No.of Hours			Credits	Marks		Total
		Lecturers	Tutors	Studios		Internal	External	
ED 4.1	Environmental Economic feasibility	3	-	3	12	50	50	100
ED 4.2	Environmental Design Thesis	4	-	20	48	250	250	500
	Total:	**7**	**-**	**23**	**60**	**300**	**300**	**600**

	Grand Total (All Semesters):	**52**	**9**	**59**	**240**	**1600**	**1300**	**2900**

SYLLABUS FOR I SEM M.ARCH.

Environmental Design (New Regulations -2017)

FIRST SEMESTER

ED 1.1 ENVIRONMENTAL DESIGN STUDIO–I

Objective

To understand and analyze, climate and its elements at both micro and macro level and design project s of varied scales with passive strategies.

Course contents

Macro level

Climatic Design of Neighbourhood which includes designing group of buildings, clusters with total understanding of interaction of Built Environment and ambient environment. Application of site level strategies to create built mass to achieve positive influence on micro climate.

Micro level

Climatic design of unit with understanding of thermal behavior of walls, facade roof etc., and fenestration design.

Design demonstration shall necessarily include the optimization of shadow mask to harness the advantages of mutual shading and to understand the wind pattern generated.

A report to be prepared on the Thermal calculations and qualitative and quantitative passive cooling/heating techniques used .

Sessional/Term Work Design outcome for both projects will be assessed as per the project brief

References

1. G.K.Brown and Mark DeKay ; Sun,Wind and Light, John Wiley and Sons, INC
2. O.H.Koenigsberger; Manual of Tropical Housing & Building, University Press
3. Arvind Krishnan: Climate Responsive Architecture
4. Bansal. N; Passive building design, London
5. Givoni; Man, Climate and Architecture

ED 1.2 ENERGY SIMULATIONS E.C.B.C - I

ECBC objective Compliance and approach: Energy efficiency performance levels, building systems, precedence, building classifications, energy performance index, compliance approaches and requirements, approved analytical tools, administrative requirements, compliance documents, Benchmarking and StarLabelling.

Course Content

ECBC Building Envelope: Mandatory requirements-fenestration, opaque construction, daylighting, building envelope sealing, Prescriptive requirements-roof, opaque external walls, vertical fenestration, skylights.

Shading Equivalent Factor (SEF), Building Envelope trade- off method ,Understanding refrigeration cycle, and overview of HVAC components - Pumps, Chiller, Piping, Ducting, Air Handing Units (AHU), Cooling tower ,Packaged and Central HVAC systems ,Comfort Systems and Controls: Mandatory requirements-ventilation,minimum space conditioning equipment efficiencies, controls, additional controls for ECBC + and super ECBC, additional controls for super ECBC buildings, piping and duct work, system balancing, ondensers, service water heating ,Prescriptive requirements-pumps, cooling towers, conomisers, variable flow hydronic systems, boilers, energy recovery. Total system efficiency-alternate compliance approach. Low energy comfort systems.Lighting and Controls: Mandatory requirements-lighting controls.

Exit signs.

Prescriptive requirements- interior lighting power, building area method, space function method, Installed interior lighting power, Exterior lighting power, Electrical and renewable systems: Mandatory Requirements-Transformers, energy efficient motors, Diesel generators sets, check metering and monitoring, power factor correction, power distribution systems, uninterruptible power supply, renewable energy systems

Whole building performance method -General, Scope, compliance, annual energy use, trade-off limited to building permit, documentation requirements, Mandatory requirements, Simulation requirements-energy simulation program, climate data, compliance calculations, Calculating energy consumption of proposed design and standard design-energy simulation model, HVAC systems, compliance thresholds for ECBC Compliant, ECBC+ and super ECBC Buildings, Maximum allowed EPI ratios, Schedules.

Practical Sessions : How simulation software works, geometry of buildings, Material and construction, Openings and shading, lighting and controls. Daylight Simulation, Heating and cooling design, Unitary HVAC Systems, Central HVAC System, Building energy code compliance, project: small office, Building energy code compliance, project large office

References

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition. 2010.

2. Vishal Garg, JyothirmayMathur, SurekhaTetali, Aviruch Bhatia. Building Energy Simulation: A workbook using DesignBuilder. CRC Press. 2017
3. Energy Conservation Building Code 2017. Bureau of Energy Efficiency. New Delhi. 2017
4. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.1-Energy Standards for Buildings except Low-rise residential buildings.2016
5. American Society of Heating, Refrigerating and air conditioning Engineers, Inc. Standards (ANSI/ASHRAE) 90.2-Energy Standards for Low-rise residential buildings.2016
6. Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008
7. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press

ED. 1.3 BUILDING PHYSICS

Objective

The aim of the course is to introduce climatic parameters and to understand in depth the factors affecting comfort and strategies that lead to around/outside and inside the built space.

Course contents

Climate Analysis

Earth-Sun relationship, Global Climate, Elements of Climate, Climatic zones in India, Analysis of macro & micro climate. Interpretation of climatic data through Climate Data, Solar Path Charts, Psycho metric Charts, Bioclimatic charts.

Principles of Thermal Design Thermal quantities, Heat exchange in buildings, balance point temperature and periodic heat flow , in terms of live examples and calculations of heating/cooling loads based on the building materials typologies , calculation of U value for various combination of building materials and contemporary construction methods.

Vernacular and Contemporary Case Studies & Appraisal to be done with the analytical studies made pertaining to the above mentioned calculations.

Design Strategies (Outdoor and Indoor) Modifications of Architectural elements for thermal comfort-orientation, Open spaces, built spaces, building envelope, fenestrations, shading devices, roofs, walls etc. Natural ventilation, Cross ventilation, stack ventilation etc.

Acoustics

Terminologies, measurement and transmission, noise, reverberation time, passive and active noise control, design strategies for classroom, auditorium and amphitheatre acoustics.

Instruments:

Use of instruments like data loggers/ anemometer for thermal/ wind data recording and carrying out related studies/exercises.

Sessional/Term Work

Journal with exercises to elaborate the above mentioned theories and concepts.

References

1. G.K.Brown and Mark DeKay ; Sun,Wind and Light, John Wiley and Sons, INC
2. O.H.Koenigsberger; Manual of Tropical Housing & Building, University Press
3. Arvind Krishnan: Climate Responsive Architecture
4. Bansal. N; Passive building design, London
5. Givoni; Man, Climate and Architecture

ED 1.4 RESOURCE MANAGEMENT AND ECOLOGY

Objective

Evaluation of Ecology, Man and Ecosphere, Components of nature and some basic concepts, process of ecology, flow of material, water, energy, invasion, succession, predictim, regulatory forces, adoption, tropic levels, food chain, food web, ecological pyramids.

Eco-system and their relevance to environment, causes and consequences. Impact of advance architectural methods, urbanization and industrialization on nature. Pollution: Types, sources, remedies.

Urban eco-system approach, evolution and significance.

Introduction to quantitative ecology:

Identification of ecological parameters for planning at different levels, site planning, settlement planning, regional planning.

Data needs, formats for data collection. Types of analyses required to evolve ecological parameters.

Environmentally compatible regional development ; An approach.

Ecological awareness in India; traditional, indigenous methods, contemporary trends.

Endowments and resources, definition and classification according to different criteria, renewable, non-renewable energy sources, etc.

Human welfare and development as functions of resurces in terms of physical environment, way of living and technology. Space bound and flow resources. Preparation and analysis of inventories and resource materials. Finiteness of resources, examples of transfer from one resources to another in history at different parts of the world, development, utilization and

conservation of resources planning, integrated planning approach to resources development management, traditional and contemporary approaches to resource development in India, some selected case studies.

Physical Environment

Air Environment – Air resources, Atmospheric systems, climate, Emission standards, global warming, ozone depletion, nuclear wars, problems,

Water Environment – Water resources – types, water resources- renewal, use, Drinking water standard, Health Aspects, water pollution, sanitation, disposal standards of Treated wastewater.

Soil environment – soil types, soil yield, soil pollution.

ED 1.5 SUSTAINABLE DEVELOPMENT AND PLANNING

Objective

To introduce the scale of macro planning and its relationship with micro level planning (site planning). To develop an understanding to mitigate climate change issues at neighbourhood level and to expose to the steps involved in sustainable urban design projects.

To expose the students with the cross sectoral relationship between various components of urban planning, viz. transportation planning, land suitability analysis, infrastructure planning and socioeconomic planning. Introduce the concept of environmental planning and expose to the emerging concepts in sustainable planning like, smart city concept, eco-city concept, etc.

Course contents

Introduction to the theory of social planning and study various examples of socially inclusive planning projects, community participation in planning process, etc.

Study examples / case studies of social infrastructure planning (Chandigarh, Ghandinagar, Naya Raipur, Navi Mumbai, etc.) Principles of urban planning, classifications of human settlements (Indian context) and study

national planning standards like UDPFI guidelines,Broad Theory of transportation planning and road network theory and principles,Environmental policies and initiatives – national and international, Housing theory and policies in India, Theory and principles of sustainable planning, Issues and tools of sustainable urban design and neighbourhood planning, Case study analysis of smart cities, eco=cities (national and international) , Formulating sustainable strategies for an existing city at macro level (city level) and at micro level (neighborhood

level). Group submission based on above exercise, Seminar / presentation of various aspects, issues of sustainable development (individual assignment).

References

1. Stephen Wheeler; *Planning for Sustainability,*
2. Simon Presner, *Principles for Sustainability*
3. Cecilia Tacoli; *Urban Linkages*
4. Monto & Ganesh; *Sustainability by human settlements*
5. Sampson; *The WTO and sustainable development*
6. Achieving sustainable cities in SE Asia region
7. Antonio Layards; *Planning for Sustainable future*
8. D Farr; *Sustainable Urbanism*
9. Tifiin J; *Transport communications*
10. Brain; *Transport in Cities*
11. K.Lynch; *The Image of the City,* MIT Press
12. Edington John; *Ecology and Environmental Planning*
13. Alexander Christopher; *A pattern Language The Environment ,Public Health and Human Ecology consideration for Economic Development.*

ED 1.6 SEMINAR:

Objective :

To understand the basics of technical paper presentation, investigation and research.

Course Contents:

Due to changes in the social, economic and technological variables, areas of interest and concerns keep emerging in the field of environmental design. Individually every student should present a seminar and a term paper at the end of the semester, for the final assessment. This should be based on extensive literature reviews, site visits, and interviews with experts. Topics shall be green architecture multistoried development, intelligent architecture, sustainable development, sustainable urban design and conservation strategies, sustainable housing etc.

SECOND SEMESTER

ED 2.1 ENVIRONMENTAL DESIGN STUDIO–II

Objective

The purpose of this Studio is to involve the students in small urban / environmental planning projects where they will be able to apply the theoretical knowledge of environmental & sustainability planning to a specific project. The Studio will look at urban development and evolve an exercise that will address environmental issues arising in urban areas and search for solutions under urban environmental planning.

Course contents

Urban Environmental Assessments, Environmental Status Reporting and identification of environmental issues in urban areas. Conceptual master planning for Sustainable Development of neighborhoods, eco-sensitive are as etc.

Detailed Micro planning for specific projects under the theme of Urban Environmental Planni ng, which may include River front development, ecological restoration projects, sustainable urban blocks, Heritage conservation for sustainability, Sustainable City Development Strategies etc. Sessional/Term Work

Identification of area of intervention, Concept presentations for the same, technical drawing portfolio and report to elaborate the sustainable design scheme.

References

1. Kevin Lynch, Image of the CityED

ED 2.2 ENERGY SIMULATIONS ECBC – II

Objective

Simulation in early design stage – Orientation, Window to Wall (WWR) ratio, Overhang and Fins, Glass type, Overhang, Roof and wall insulation. Daylighting design and controls - Electrochromic glazing, Dynamic facades, Glare analysis and control, Annual solar exposure, Spatial daylight autonomy.

Course contents

Introduction to Heating Ventilation and Air Conditioning (HVAC) system selection, Concept of thermal storage, radiant cooling systems, and Under Floor Air Distribution (UFAD).

Introduction to HVAC controls, Overview of Demand Control Ventilation (DCV),VAV Control, VFD controls on AHU, VFD control on pumps, Energyrecovery controls,and Economiser controls. Interior lighting design and performance evaluation using steady state

simulation , Exterior lighting design and performance evaluation. Designing for reducing light pollution and trespass. Natural ventilation and mixed mode ventilation, Passive features – Earth air tunnel, Stack ventilation, Cool roof. Renewable energy systems, Sizing Photovoltaics and Wind energy systems. Advance simulation parameters, Weather data, Life Cycle Costing Analysis (LCCA).

Parametric simulation for envelop design optimization, Designing and evaluating daylighting strategies,

Simulating mixed mode building, Designing and evaluating passive features

Simulation of interior and exterior lighting design,Designing roof top photovoltaic system, Design a Net Zero small office

References

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition. 2010.
2. Vishal Garg, JyothirmayMathur, SurekhaTetali, Aviruch Bhatia. Building Energy Simulation: A workbook using DesignBuilder. CRC Press. 2017
3. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press
4. ISHRAE IEQ Standard. 2017

ED. 2.3 RESEARCH METHOD - I

Objective

To introduce methods and process of research in order to understand the significance of the same with reference to environmental architecture.

Course contents

Introduction to the types of research and the process of formulating a research project

Introduction to research design, sampling types and methods etc.

Introduction to various methods of research, their relative advantages and disadvantages and their applications , Introduction to methods of data collection, analysis and presentation

Introduction to technical writing and presenting a research paper ,

Development of research writing and presentation skills

To undertake a focused study based upon a research question and to present it in form of a research paper, compilation of study material, along with brief assignments demonstrating the steps in the research process.

References

1. Creswell, J. W. Research Design: Qualitaitve, quantitative and mixed methods approaches, 2nd Ed., Thousand Oaks: Sage. 2003.
2. De Vaus, D. A. Surveys in Social Research, Jaipur :Rawat Publications. 2003
3. Groat, L. & Wang, D. Architectural Research Methods, NY: John Wiley and Sons Inc. 2002.
4. Kothari, C.R. Research Methodology: Methods and Techniques, New Delhi: WishwaPrakashan.2005.
5. Sanoff, H. Methods of Architectural Programming, Dowden Hutchinson and Ross, Inc. Vol. 29, Community Development Series. 1977.

ED. 2.4 BUILDING ENERGY MANAGEMENT

Objective

To introduce the supply side of energy and its integration with planning and design of buildings.The purpose of this subject is to introduce the students, global energy scenario and various alternative in renewable sources. It aims at introducing the options of renewable resources and appropriate technologies for harnessing them for our benefit. To improve the energy security and ensure environment protection, these technologies are gaining importance in our day to day applicative lifestyle.

Course contents

Energy Scenario

Current global scenario, Global meets ,Need at global, country, state and city level.

Identification of resources at country and state level.

Conventional Source – limitations

The renewable comparative advantages, Renewable large scale production.

Solar Energy/ Wind Energy/ Bio Mass

Potential, Technology, Limitations,Applications on generic level,Building integration applications

Other resources

Geothermal, Tidal, Mechanical Nuclear Energy, Cogeneration

Bio fuels

Alternative Fuels, CNG & LPG

Energy Efficient HVAC Systems

Air Cycle, Refrigerant cycle, Basics of Cooling load estimation. Types of systems to include unitary, central, CAV, VAC, VRF etc. air cooled, water cooled, and ducting design. Air conditioning system and components. Energy conservation measures and technologies.

Plumbing for Green Buildings Pump types, factors affecting pump performance, efficient pump operation systems, flow control strategies. Energy conservation opportunities in pumping systems. Energy Efficient Electrical Utilities

Electrical Energy basics, Electricity billing, Electrical load management and maximum demand control, Power factor improvement and its benefit.

Sessional/Term Work

Studies taken up by students individually and/or in groups will be presented and submitted along with compilation of study material in the form of reports/ notes/ assignments.

References

1. R.K. Narang; Cleaner is cheaper, TERI
2. VV Kishore ;Renewable energy, engineering and technology,TERI
3. Sophia and Stefen Behling; Solar Power
4. Martin Kalstchmitt; Renewable Energy
5. Ursula Eicher; Solar technology and buildings
6. Falk Antony; Photovoltaic for Professionals
7. Paul Gipe; Wind Power
8. Renewable energy and Environment, CEE Publication
9. Renewable energy technology development and implications, TERI
10. Sustainable building Manual, Vol 1 and 2, TERI
11.Turner and Doty; Energy Management Handbook.
12.Martin Greenwald; Residential energy systems and climate control technology.
13. Jan Kreider; Solar heating design.
14. Hegger and Fuchsen;. Energy Manual
15. Green awareness, Ferris State University.

ED 2.5 RESOURCE MANAGEMENT AND ECOLOGY

Objective

Evaluation of Ecology, Man and Ecosphere, Components of nature and some basic concepts, process of ecology, flow of material, water, energy, invasion, succession, predictim, regulatory forces, adoption, tropic levels, food chain, food web, ecological pyramids.

Eco-system and their relevance to environment, causes and consequences. Impact of advance architectural methods, urbanization and industrialization on nature. Pollution: Types, sources, remedies.

Urban eco-system approach, evolution and significance .

Introduction to quantitative ecology:

Identification of ecological parameters for planning at different levels, site planning, settlement planning, regional planning.

Data needs, formats for data collection. Types of analyses required to evolve ecological parameters.

Environmental impact assessment, Methods and their appraisal.

Environmentally compatible regional development ; An approach.

Ecological awareness in India; traditional, indigenous methods, contemporary trends.

Endowments and resources, definition and classification according to different criteria, renewable, non-renewable energy sources, etc.

Human welfare and development as functions of resurces in terms of physical environment, way of living and technology. Space bound and flow resources. Preparation and analysis of inventories and resource materials. Finiteness of resources, examples of transfer from one resources to another in history at different parts of the world, development, utilization and conservation of resources planning, integrated planning approach to resources development management, traditional and contemporary approaches to resource development in India, some selected case studies.

Environmental Planning:

Planning and Environment – Planning, planning contexts, types of planning, planning process and tools, definition of environment, types of environment, population, resources, environmental degradation and pollution, pollutants and their effects and control, environmental planning – types.

Physical Environment

Air Environment – Air resources, Atmospheric systems, climate, Emission standards, global warming, ozone depletion, nuclear wars, problems,

Water Environment – Water resources – types, water resources- renewal, use, Drinking water standard, Health Aspects, water pollution, sanitation, disposal standards of Treated wastewater.

Soil environment – soil types, soil yield, soil pollution.

Energy – Evaluation of Energy Resources, Types of Energy Sources – Renewable, Non-Renewable, Conventional and Non – conventional.

Environmental policies, protocols and regulatory mechanisms – fundamentals of Environmental Acts, Rio Earth Summit, Stockholm conference, Kyoto protocol, Copenhagen conference 2009 and after.

Environmental Technology

Technology options for mitigation of environmental pollution, Environment by "End of pipe Treatment systems". Like effluent treatment plants, use of scrubbers to minimize air pollution load. Versus combating environmental pollution, through "waste minimization", "Re-use" and "Recycle".

Different aspects of "End of pipe Treatment Options", their environmental and financial implications, need for waste reductions and the concept of waste Minimization at source through case studies, Energy planning and management and conservation issues.

Domestic waste water, industrial waste water, solid and hazardous wastes, Environmental, economic and financial implications of "End of pipe Treatment systems")

Need of "In-Process waste reduction/Minimization (Concept of cleaner production and cleaner Technologies, Environmental benefits environmentally sound Technologies" case study) Concept of End of pipe 3-Rs; "Recycle – Reuse and Recovery". (Towards sustainable Development – Development – concepts of industrial symbiosis and ecology, case study of waste recycling, it's cost effectiveness and options).

Environment Management systems, ISO – 14001 and its planning implications, why do we need ISO. Case study of a ISO certified industry, environmental and financial benefits of ISO.

Principles of Energy (Energy-Environment-Pollution linkages, Energy Demand and supply planning Management, Energy Conservation Issues and Need of Energy Audit.)

Sustainable development

The basic objective of the course is to get through the issues of sustainable development and bio-diversity management. The course aims to give holistic approach for bio-diversity management and also gives broad view of various national and international policies and instruments of bio-diversity. Systems Diversity. Species Concept & Inventory. Habitats & Systems change. Use of Bioresources. Valving Biodiversity, Conservation, National and international policies and instruments. Assistance and Aid. Biodiversity convention,

Associated inputs, Biodiversity Planning, costing Targets, Agro and Forestry Systems/Forests Interface. Monitoring Systems, Biosphere World views.

ED 2.6 SUSTAINABLE SITE PLANNING AND LANDSCAPE DESIGN

Review of Landscape Elements and principles of Landscape Design of Landscape Architecture as a profession.

Study of various styles of Landscape Design and their relevance to the current pattern of development.

Landscape Design with particular reference to housing and community developments, parks and playgrounds, industrial landscape recreational areas, etc.

Aspect of urban design – creation of elements of spatial interest, vistas, other spatial definitions.

Contemporary attitudes to development and design of open spaces, urban landscape, park, rural landscape etc.,

Sustainable site planning concepts

Introduction to concept of green architecture and micro climate planning. The rock as landscape component in modifying micro climate with respect to temperature, humidity, participatation and percolation.

THIRD SEMESTER

ED 3.1: ENVIRONMENT DESIGN STUDIO-III:

Objective

To develop creative skills, abilities, judgment and control in the design of built environment. The student should be able to have a whole building design approach for energy efficiency.

Course contents

Design/Retrofitting of buildings/campuses for energy efficiency. Focus should be on buildings/campuses which are conventionally energy guzzlers.

Sessional/Term Work

Concept presentations, technical drawing portfolio and report to elaborate the design scheme as per the project brief.

Case Studies and Other recommended reading based on the topic selected for the year and the project brief.

ED 3.2 ENVIRONMENTAL IMPACT ASSESSMENT

Introduction to Environmental Impact Assessment: Defining the role of impact assessment --- Rational for EIA --- Phases of impact assessment.

Impact Identification Techniques: Various methods used in impact identification --- detailed techniques of using these techniques --- strengths and weaknesses of the various techniques used as impact identification process.

Impact Evaluation Techniques: Techniques used in impact evaluation --- Weighting-Scaling techniques, ecological rating systems --- Goals-achievement matrix, priority-trade-off-scanning matrix.

Predicting Impact on the Physical Environment: Land --- indicators for land suitability and vulnerability --- Landscape characteristics and indicators of landscape process --- Mapping landscape characteristics --- Techniques for evaluating alternative land use plans.

Air --- calculating pollutant emission --- predicting ambient concentration --- predicting ecological response to air pollutant --- predicting human health risks.

Water --- categorisation of pollutants --- pollution dispersion --- water quality.

Predicting Impact on Biota: Ecosystem process and impact assessment --- energy fixation and flow.

Lead Rating, Griha Rating, (Green Rating for Integrated Habitat Assessment)

Energy Efficient Buildings, intelligent buildings, energy audit, National Mission on sustainable Habitat, Jawaharlal Nehru Urban Renewal Mission, issued in Urban and Environmental conservation.

ED 3.3 ENVIRONMENTAL RATING SYSTEMS

Objective

To introduce the various tools and methods associated with the field of environment and to prepare students for new skills and upcoming trends in the field of environment.

Course contents

1. Energy Audit
2. Life Cycle Assessment
3. Carbon Footprint and Mapping
4. Green Building Rating Systems
5. GRIHA
6. LEED Ratings

* This list is not exhaustive and further topics could be added if required over time.

Sessional/Term Work

Assignment will be in the form of notes/ assignments covering all the topics mentioned above with suitable examples, sketches and supportive material.

References

GRIHA; Griha Manual, Vol 1 to 5,TERI Publication

IGBC Manuals, CII Publication

LEED Manuals

ECBC Manual

ECBC User Manual

ED 3.4. SUSTAINABLE PRACTICES IN WASTE MANAGEMENT

The primary goal is to provide a comprehensive understanding of waste management from an environmental public health perspective. Identify and discuss the public health, regulatory, planning, technical and economic principles that influence the solid waste management system. Describe appropriate methods to minimize the impact on the public's health from solid waste related activities. Analysis of an integrated solid waste handling system including source reduction, recycling and reuse, composting, land filling and combustion. Develop a more

informed opinion on a variety of waste related issues such as electronic waste, industrial waste, medical waste and C&D (construction and demolition) waste etc. Sustainable techniques in municipal solid waste management and others: Introduction, Segregation, Sorting, Composting, Vermi composting, Home composting, Recycling and Reuse. Incineration method, Scientific Land filling, Energy development and Management of urban waste services.

Solid waste disposal and management:

Resource recovery, technology options and determination of type and choice of systems as related to land use, density, economic levels and location of urban industrial and commercial activity areas.

Quantity of sewage, quantity of storm water, run off, time of concentration, design of sewers, flow diagrams, laying of sewers, sewer appurtenances. Design and layout of sewerage system.

Project Management (Need Assessment, Structure, MIS, Project Management Packages (Brief Introduction to MSPROJ/WINPROJ).

Integrated Infrastructure Planning: Case Studies in India.

Reference Books:

1. Constitutional Law of India – J.N. Pandey 1997 (31st Edition.) Central Law Agency, Allahabad.
2. Administrative Law U.P.D. Kesari 1998. Universal Book Trade, Delhi.
3. Environmental Law H.N. Tiwari, Allahabad Law Agency, 1997.
4. Environmental, A., Divan and Noble M. Environmental Law and Policy in India (cases, Materials and Statutes) 1991 Tripathi, Bombay.
5. Environmental Policy. Forest Policy. Bare Acts – Government Gazette notification.
6. Environmental Laws of India-C.P.R. Environmental Education Centre
7. DEWATS, Auroville.
8. Publications by Vastu Shilpa Foundation, Environmental Sanitation Institute, Ahmedabad.

ED 3.5 ENVIRONMENTAL INFRASTRUCTURE:

Objectives

This course is designed to provide a general understanding of various issues and approaches to planning, designing, and maintenance of Infrastructure. The major emphasis in this course will be on water supply, sewerage, storm water drainage, roads and solid water management.

Introduction:

Concepts of basic needs, formation of objectives and standards. Data requirements for programme planning of urban networks and service; feasibility planning studies for structure

the infrastructure systemsGeneral Introduction to Infrastructure and its components and overview of the course contents.

Water Supply:

Planning water supply; resource analysis quality of water system design; technological choices of alternatives – Issues related to the choice of centralized city water supply versus decentralized systems.

Water demand (Context, Need Assessment and Planning requirements) - data to be collected, rate of demand, variations in rate of demand and effects of variations on design. Measurements of water qualities, forecasting demand. Conveyance and distribution system - General considerations, methods of distribution, service reservoirs, systems of supply, methods of lay out distribution pipes, wastage of water and permissible factors. Maintenance of distribution system. Filtration, disinfection, storage and distribution and their building complexes.

Sewerage and Storm Water Drains (Need Assessent in the context of Urbanisation, Planning Considerations and Norms, Basic Design Parameters and Appurtenances). Waste generation process in cities. Waste water disposal systems including storm water drainage, system designs, nodal facilities, technological and environmental considerations. Issues related to hydrological and geographical and development parameters – eutrophication. Biological concepts in environmental sanitation.

Sanitation technologies, their relevance to incremental growth of urban areas. Low cost sanitation technologies and concepts as related to Indian and third world country contexts

Sewage Treatment Plant and Water Treatment Plant (Components, Planning Considerations, Basic Design Parameters).

Urban Roads (Planning Considerations, Road Categories, Design Parameters/Cross Sections, Transportation).

Other Infrastructure:

Concepts and theories for design and operation of electricity networks, power generation (conventional and non-conventional) communication networks like telephone facilities, WLL, cable TV, Fibre optic and other broadband communications networks, etc.

ED 3.6 SEMINAR -II:

The candidates will present two term papers on any of the areas of environmental design to employ effectively the methods of research in environmental design. The subjects of papers may be selected in consultation with the faculty to contribute substantiality to the major area of investigation and candidate opts of the Master Thesis / Dissertation.

FOURTH SEMESTER

ED 4.1 ENVIRONMENTAL ECONOMIC FEASIBILITY

Introduction to Project finance & Management. Project Management: Construction projects, Project development process, project management, main causes of project failure. . Project formulation: Generation and Screening of Project Ideas - Project identification – Preliminary Analysis, Market, Technical, Financial, Economic and Ecological - Pre-Feasibility Report and its Clearance, Project Estimates and Techno-Economic Feasibility Report, Detailed Project Report. Project Planning Process: Plan development process, time planning process, work scheduling process, resource planning process, Importance of planning, scheduling and controlling projects. Project Finance: Introduction to project finance, Means of financing, Costs associated with projects, estimates, Economic analysis of project, economic studies, sensitivity analysis. Cost estimating principles. Detailed estimates, cost concepts, classification of costs, elements of costs, Private sector participation in Infrastructure Development Projects - BOT, BOLT, BOOT Working Capital Management: Concept, Need and types of Working Capital; Determination of Working Capital; Estimation of Working Capital Needs; Financing of current assets – Matching, Conservative Approach, Aggressive Approach (Problem and Theory) .

Reference Books

1. Gupta, B.L. and Gupta, Amit., Construction Management, Machinery and Accounts, 3rd ed. Standard Pub, 2005.
2. Loraine, R.K, Construction Management in Developing Countries. Thomas Telford, London, 1993
3. Srinath, L.S., PERT and CPM Principles and Applications, 3rd ed. Affiliated East-West Press, New Delhi, 2003.
4. Singh, Harpal., Construction Management and Accounts 14th ed. Tata McGraw-Hill Pub., New Delhi, 1981
5. Gould, E.Frederick and Joyce, E.Nancy., Construction Project Management. Prentice Hall, New Jersey, 2000
6. Shrvastava, U.K., Construction Planning and Management, 3rd ed. Galgotia Pub., New Delhi, 2004
7. Chitkara, K.K, Construction Project management: Planning. Scheduling and Controllling. Tata McGraw-Hill Pub., New Delhi. 1999. 8. Sharma, S.C, Construction Equipment and its Management, 4th ed. Khanna Pub., New Delhi, 2004

ED 4.2 THESIS / PROJECT / DISSERTATION:

Each student is required to prepare a Project on a subject approved by the department. The general format and guidelines shall be as laid down by the department.

The topic should be on current research and professional planning interests and the work contained shall be the students, original work.

Each student has to choose / formulate and work on a Environmental Design project independently. The project may be related to any sector and be of any scale , but it is desirable that the approach be multidisciplinary and preferably relate to ‘live’ and current contexts.

The main thrust of the project should be to identify an Environmental design project addressing a current or immediately future context, review related theoretical approaches, collect, document and analyze relevant data and formulate proposals to address the problems identified.

The key word is ‘project’ in terms of definable program of actions, implementation strategy and mechanism, beneficiaries etc. Research may be limited to literature review case studies and analysis of readily available data with limited primary data focused on the immediate demands of the ‘project’

Selection of Guide:

Students are suggested to consult internal faculty members based on their own areas of interest. It is also possible for students to consult external faculty actively participating in academic programme. To know the research interests of internal faculty students can meet them individually. Taking up academicians of other Institute/Research Organizations, as External Guide is permitted. However, in that case, a Core Faculty should be chosen as Internal Guide.