

SYLLABUS FOR M.ARCH. (Environmental Design)

(New Regulations -2010)

FIRST SEMESTER

M. 1.1. Planning Development & Research

Evolution of Human Settlements - Historical Perspective. Development of thought processes in Environmental Planning, Indian heritage in Town Planning and Town Building: Planning in history, Indus valley, Harappa and Mohenja - Daro, Mesopotamia, Egypt, Greece and Rome, Medieval Planning; Renaissance planning. Planning theories and Urban forms postulated by Hippodamus. Patrick Geddes, Ebenezer Howard. Le Corbusier and others - their influence on Contemporary planning thought.

Aims and objectives of Town and Country Planning. Planning at various levels - Local, Regional and National -their role in Development of Human Settlements.

Land and Planning - Development of Residential areas, Analyzing, projecting and presenting land use and socio-economic data for Urban and Regional Planning such as statistical inference, geographical analysis, visual reconnaissance, historical studies.

The Development plan-its objectives, scope and contents, implementation tools and techniques Neighborhood planning and sector theories.

Planning of new Towns expansions, Techniques of Planning research - sources of basic and secondary data required in Urban and Regional Planning. Spatial standards for development and Re-development of residential, commercial, Qualitative and Quantitative aspects.

Aspects of Non-Governmental interests.

Means of study and its role in effecting appropriate improvement in the environmental conditions.

Methods and types of Research : Documentary or Historical Research, Normative or descriptive survey. Experimental survey Research. Casual Comparative Research, Correlation method, Case study method. Generic and other methods, Methods of conducting various types of surveys and presenting survey dated sampling, etc.,

Tools of Research: Questionnaires, Schedule, Check list, Rating scale, score card, Attitude Scale, observation, interview, Social distance scale, Guess who technique, Sociometry.

Technical Report and dissertation/writing Bibliography & references.

M. 1.2 Building Byelaws and legislation for Architecture and planning:

Concept of law – source of law (i.e. custom, legislation, precedents) separation of powers – judiciary, legislation and executives. Meaning of terms of law, legislation, ordinance, bill, act, regulations and bye laws.

Brief introduction to legislation process as per Indian constitution- division of subjects between center and states. Articles 19 (1) (f), 19 (5) and 31. Provisions regarding land, property and planning components of state and central Government to enact town-planning acts. Case of Maniklal Chhotla vs H.G. Madhavaiah.

Administrative law – Delegation of powers – principles of Natural justice, its bearing on planning laws.

Model Town planning Act-Planning agencies at National, State and local levels, their functions and inter-relationships, Contents and preparation of development plans. Town Planning Act-and its objectives, contents and procedure for implementation of regional plans, master plans, town planning schemes-development charge-public participation in statutory planning process. Concepts of structure plan and local plan under the English law.

Urban and Metro plan, development board and authority acts – scope overlapping of provisions with other allied acts and provision for prevention of duplicating of authority, urban development authorities Act of A.P. and Establishment of HMDA. VGTM-UDA, VUDA etc.,

Scope of comprehensive housing codes and building bye-laws, contents and critical evaluation of subdivision regulation, building bye-laws, zoning laws and law relating to periphery control. Introduction to law relating to slum clearance. Housing code, National parks system and traffic legislation.

Building estimation Norms for exterior and interior open spaces, setbacks margins, norms for building projections open spaces, FAR norms for vehicular areas, norms for fire protection, building services.

Study of local administrative provisions for obtaining building permissions, regulation for superstructures, building height regulations, regulation for high rise/ structures, large development projects.

M. 1.3 Advanced computer graphics and information system:

Computer systems and languages. Computer organization, computer peripherals, software/Hardware concepts.

Introduction to workstation.

Concepts and working knowledge of application and the usage of software for word-processing, spreadsheets etc.

Introduction to computer aided design (CAAD) and GIS, software like, sketch up, wire frame, modeling photo shop, work things.

Information systems concepts data and information, cost and value of information general system theory systems approach, MIS as a system. MIS for Environmental design.

Estimation of building with computer systems, preparation of structural members, development of frames, loads and loading omalye. Use of software for structural design like staad, build master, etc.

M. 1.4 Advanced Landscape Architecture:

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.,

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

M. 1.5 Seminar:

Due to changes in the social, economic and technological variables, areas of interest and concerns keep emerging in the field of environmental design. Each 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 can be green architecture multistoried development, intelligent architecture, sustainable development etc.

SECOND SEMESTER

M. 2.1 Design and Planning -Lab/Studio:

Concept of Urban space and Urban Design, concept of space in history. The townscape, consideration of density, aesthetics, traffic or circulation, climate and landscape (two weeks).

Scope and objective of master plan, Zonal plans, etc. Surveys and advanced techniques of analysis with case studies. Field study for selected central and fringe areas, Master plan preparation and recommendation (Eight Weeks).

Metropolitan areas planning (Four weeks)

The programme will include studio and field work on one comprehensive problem and other short duration problems covering any one or more aspects mentioned above. The credit for Sessionals will from part of internal evaluation.

M. 2.2 Ecology and Resource Development:

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 resources 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, Valuing 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.

Environmental Impact Assessment (EIA)

Introduction to Environmental Impact Assessment, Defining the role of impact assessment-Rationale for EIA - phases of impact assessment.

Impact Identification Techniques. Various methods used in impact evaluation-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 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 --- categorization of pollutants--- pollutions dispersion--- water quality.

Predicting impact on Biodata; Ecosystem process and impact assessment --- energy fixation and flow.

M. 2.3 Housing and Community planning:

Housing through the ages, problems due to urbanization, problems of congestion, slums and urban renewal.

Housing demands-qualitative and quantitative Housing finance, National Plans resource- mobilization, institutional finances. Housing cooperatives. Housing Policies, situation in developing countries Housing programs-National and local Housing standards- derivation, critical appraisal of existing standards.

Design of Housing areas, housing layouts, site planning techniques, Housing densities, Environmental and climatic aspects, case studies of various types of group housing and other developments Housing techniques - Mass Housing, Prefabrication.

Rural Housing Techniques and approaches. Community facilities, the services and utilities. The observed standards in India, present deficiency and the low effecting

demand. Possible methods of increasing the effective demand particularize for the lower income groups, sociological impact on group dynamics.

The social implications of age and sex differentiation. The primary communities in rural and urban areas. Changes in attitudes, values and behavior patterns from rural to urban way of life. The hierarchy of grouping patterns. The secondary urban communities. The community focal points and their relationship with the housing types and layouts.

M. 2.4 Traffic and Transportation

Objectives

The course strives to give students the basic skills and knowledge base about transportation planning practice. After discussing basic terminologies and concepts, transportation problems etc., the course will focus on the transportation planning methodologies and techniques available to planners. In particular the one step transportation planning models will be discussed in detail. This includes data collection, trip-generation, trip-distribution, model choice and assignment. Students will be required to undertake four exercises designed for the purpose Exposure to relevant policies and programmes will be given.

Evaluation of Urban Structure

Transportation systems infrastructure and management, transportation systems and their types, design and operating characteristics, urban road hierarchy planning, engineering and management; criteria for road and junction improvements, arterial improvement techniques.

Transportation survey and studies

Study area definitions, surveys and their types, sampling methods, survey techniques; designing O-D and other Traffic and transportation surveys, programming and scheduling, processing of travel data, analysis and interpretation of traffic studies.

Management of Transportation system:

Existing organizational and legal framework, traffic and environmental management techniques. Management techniques, review of existing traffic management schemes. Framework for evaluation of system option, plan preparation.

Regional Transport system:

Importance of accessibility in regional transport planning. Role of road, rail, air and water transport systems. Regional transport systems, planning road network, planning for micro regions.

Transport and Environment:

Traffic noise, factors affecting noise, noise abatement measures, standards. Air pollution standards, traffic safety, accident reporting and recording systems. Factors affecting road safety, transport planning for target groups, children, adults handicapped and women. Norms and guidelines for highway landscape, street lighting types, standards and design considerations, transport and environment, EIA of transport project.

Transport policies:

Review of national, state and local level transport policies and their relevance in spatial and economic planning, pricing and funding of transport systems, transport technology, energy and environmental implication in transport planning in developing countries; planning for public transportation; planning for bicyclists and pedestrians.

Regional road network planning, highway project planning and financing Public transportation planning.

Overviews of system technologies, technological options, characteristics choice of technology corridor analysis integrated system plan concept, system selection, legal and institutional provisions, pricing and financing of public transport service.

M 2.5 Construction Management

Principles of construction project management, introduction to human resource management, materials management, financial management, important legal issues like labour welfare, insurance, urban services, company law, etc. project formulation reports.

Prefabrication and mechanization, various systems practiced. Introduction to the concept of organization work-study. Introduction to systems building and

rationalized traditional production.. network analysis (CPM, MPM, PERT) case studies on network analysis process analysis, time scheduling and case studies. Introduction to serial production with building and work units. Site management and case study of multistory housing projects. Industrialized production, visits to traditional and industrialized building works, standardization and modular coordination with various modules such as planning module, basic module, etc. its impact on traditional building and industry in a developing country like India.

Building process design, Company law, estimation, contract process, appraisal of different systems, projecting organization and control.

Building diseases and preservation, preventive and curative methods. Maintenance need, planning and organization, quality control.

THIRD SEMESTER

ED 3.1: Advanced Environmental Design Lab / Studio:

Application of the principles landscape Design, Avenue Plantation, River front Development. Parks and opens space system. Local, district, regional and National Parks, A study of industrial defaced wastelands. Problems of erosion and its control and restoration. The changing needs of industry and structure of future urban environment; problems and prospects.

The programme will include studio work on one comprehensive problem concerning any one or more of the topics mentioned above with seminars. The credits for sessionals will form part of the internal evaluation.

ED 3.2 Geo Information Systems in Environmental Planning:

Objectives

To teach Computer based Geographical Information System as a tool used as decision support system involving integration and co-ordination of natural resources management or urban development planning or disaster management programme which require accurate and timely spatial information on natural resources, urban form or current events..

Introduction - Definition, Components of GIS, Organizational Aspects of GIS

Data Structure For Spatial Data - Nature of Spatial Data, Spatial Data Models and Data Structure, Vector Data Model, Grid Data Model, Irregular Grid Models, Scan Line Models, Hybrid Vector/Grid Models

Database Creation And Organization - Techniques of Database Creation, Steps Involved in Database Creation, Database Organisation and Management, Conventional Techniques of Database Management, Spatial Database Management Requirements, Spatial Database Management in Current Day GIS

Two Dimensional Data Analysis And Manipulation - Techniques of Data Analysis and Manipulation, Generation of Planning Views

Generation Of Map Outputs From Gis - Elements of Cartographic Maps, Making Cartographic Map Layouts in GIS

Making On-Screen Query From Gis Database - Typical Queries in GIS, Modes of Making Queries

Three Dimensional Data in Gis - Inputs of Surface Modeling, Generation of 3-D Model in GIS, Outputs from 3-D Module

Data Quality, Errors and Natural Variation - Obvious Source of Error, Errors Resulting from Natural Variation or from Original Measurements, Errors Arising through Processing

Network Analysis in GIS - Elements and Attributes of Network, Analysis of Networks, Application of Networks in GIS

Customizing GIS - Guiding Factor for Customization, Essential Features of Customization

GIS Application

Various Applications, Applications in India, Issues related to applications, GIS Applications Design and Implementation.

Five topics are selected to undertake group projects. These projects would then use different modules of GIS software. The groups are as follows:

1. Watershed Management
2. District Development Plan
3. Urban Sustenance – Decision Support System
4. Environmental Monitoring
5. Urbanisation Process – A case study of A.P. State.

Preparation of base map, Census information and other data collection, Literature review on GIS and district planning.

ED 3.3 Urban Design and Conservation:

Urban Design:

Role of urban design in the planning process. Principles of structuring urban spaces, locational parameters of activities and urban uses.

Study of evolution of the concepts in Urban Design through history

Imageability of the city.

Determinants of urban patterns and forms: land use density and networks. Energy and urban form; Impact of Technology and construction techniques; Standards and

implications of regulatory control on urban form and design; Design in relation to renewal and re-development of central areas.

Issues related to changing practices of planning human settlements as applied to spatial design. Urban design projects; Identification of scope and relationship with development plan-planning and design parameters for new towns.

Urban Conservation:

Problems of conservation in developing countries. The need for resolving conflicts between development and preservation and to evolve methods which will reduce the costs of preservation by sensitive utilisation.

- a) Conservation and urban renewal: Conflicts and compatibility, changing values, obsolescence, land blight.
- b) Physical restoration, causes of physical deterioration, selection of construction methods, Materials specification.
- c) Role of community in Conservation: Regulation, legislative and revenue aspects. How to minimise costs of preservation and community participation.

Concepts of urban decay social, economic and physical factors affecting urban maintenance. Concept of nature cities-determinants, approaches and strategies for urban regeneration, urban redevelopment and requirements and costs. Potentials and limitations in the Indian context. Urban regeneration as a process for environmental planning and management. Feed back for policy frame work relevant to urban and metropolitan growth.

ED 3.4 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 systems General 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 Assessment 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).

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.

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, Fiber optic and other broadband communications networks, etc.

ED 3.5 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 Impact Assessment and Green concepts:

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 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.