

**ANNA UNIVERSITY, CHENNAI**

**AFFILIATED INSTITUTIONS**

**REGULATIONS -2009**

**M.ARCH. (ENVIRONMENTAL ARCHITECTURE) FLEXIBLE MODE**

**SEMESTER I**

SL NO.	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	EA 9311	<a href="#">Socio Economic aspects of planning</a>	3	0	0	3
2.	EA 9312	<a href="#">Urban &amp; Regional Planning</a>	3	0	0	3
3.	EA 9313	<a href="#">Quantitative Techniques and Research Methods</a>	3	0	0	3
<b>STUDIO</b>						
4.	EA 9316	<a href="#">Environmental Architecture Design Studio I</a>	0	0	12	6
<b>Sub Total</b>			<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

**SEMESTER II**

SL NO.	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	EA 9314	<a href="#">Urban Ecology &amp; Environmental Planning</a>	3	0	0	3
2.	EA 9315	<a href="#">Housing &amp; Community Planning</a>	3	0	0	3
3.	EA 9323	<a href="#">Energy Efficient Building-Materials &amp; Technology</a>	3	0	0	3
<b>STUDIO</b>						
4.	EA 9326	<a href="#">Environmental Architecture Design Studio II</a>	0	0	12	6
<b>Sub Total</b>			<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

**SEMESTER III**

SL NO.	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	EA 9321	Environmental Management & Land Use Planning	3	0	0	3
2.	EA 9322	Building Physics	3	0	0	3
3.	EA 9324	Climate Responsive Architecture	3	0	0	3
<b>STUDIO</b>						
4.	EA 9336	Environmental Architecture Design Studio III	0	0	12	6
<b>Sub Total</b>			<b>9</b>	<b>0</b>	<b>12</b>	<b>15</b>

**SEMESTER IV**

SL NO.	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	EA 9331	Environmental Impact Assessment	3	0	0	3
2.	EA 9332	Energy Efficient Building Services and Management	3	0	0	3
3.	EA 9333	Renewable Energy systems for Building	3	0	0	3
4.	E1	Elective I	3	0	0	3
<b>Sub Total</b>			<b>12</b>	<b>0</b>	<b>0</b>	<b>12</b>

**SEMESTER V**

SL NO.	COURSE CODE	COURSE TITLE	L	T	P	C
<b>THEORY</b>						
1.	EA 9334	Conservation of resources for sustainability	3	0	0	3
2.	E2	Elective II	3	0	0	3
3.	EA 9341	Thesis	0	0	24	12
<b>Sub Total</b>			<b>6</b>	<b>0</b>	<b>24</b>	<b>18</b>

**Total No. of credits to be earned for the award of Degree: 15+15+15+12+18 = 75**

**LIST OF ELECTIVES - M. Arch. (Environmental Architecture) Regular****ELECTIVE I**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	EA 9001	GIS & Remote Sensing	3	0	0	3
2	EA 9002	Predictive Building Modeling Softwares & Passive Strategies	3	0	0	3
3	EA 9003	Environmental Psychology	3	0	0	3

**ELECTIVE II**

SL. NO	COURSE CODE	COURSE TITLE	L	T	P	C
1	EA 9004	Principles of Green Buildings	3	0	0	3
2	EA 9005	Sustainable settlement Planning	3	0	0	3
3	EA 9006	Urban Ecology & Urban Design	3	0	0	3
4	EA 9007	Environmental Auditing	3	0	0	3

**OBJECTIVES:**

To cover basic sociological aspects and theories and its application in the field of planning and development. The focus will be on social issues and problems in the contemporary Indian society, particularly the urban India. The course will be delivered mainly through class lectures. Open discussions and seminars will be held for detailed analysis and case study analysis and discussion.

**UNIT I**

Nature and scope of sociology – Basic concepts of sociology like family, institution, group, association, community, social processes, social norms, Culture, social structure social stratification .

**UNIT II**

Patterns and trends in Indian urbanization and its role, socio-economic transformation in India, Social Problems of slums and housing. Rural Housing and culture in India. Social planning, Policies and Programmes, Pubic Participation in Planning, poverty in India.

**UNIT III**

Basics of Economics – Concepts of Economics and Economic Growth, Demand and Supply Theory, Production Economics, Internal and External Economics, Basic Non-Basic Concept, Economies of scale, Social cost, Urban and Regional Growth, Urban land economics.

**UNIT IV**

Population studies – demography concepts and deformations – population problem in India – source of demographic data in India (Population census, Civil Registration systems, Sample registration systems etc). Population structure – Composition, vital rates like fertility, mortality, birth and death rates.

Migration and urban growth – migration and its implication in spatial planning, population forecasts and projections.

**TOTAL : 45 PERIODS****REFERENCES:**

1. Bottomore , T.B.P.Goode(eds) readings in Marxist Sociology,Oxford,Part 1
2. City and Grassroots:A Cross Cultural Theory of Urban Social Movements ,London Castels ,Manuel
3. Essays on planning theory and education ,Oxford by Faludi
4. The Image of the City by K.Lynch, MIT Press
5. Economics by P.A.Samuelson
6. Economic Analysis and Policy in Underdeveloped countries by P.T.Bauer
7. Economic and social development by S.L.Sinha
8. Economic Development and planning in India K.N.Subramanya
9. Economic planning , principles , techniques ,and practices by A.N.Agarwal
10. Growth Economics by Amartya Sen
11. Socio Economic Base for Planning – Teaching Material prepared by Dr. A.N. Sachithanandan for the Institute of Town Planers, India.
12. Vidya Bhushan & Prof. D.R. Sachdeva – An Introduction to Sociology – Kutab Mahal Publishers.
13. Dr. Ashal A. Bende & Mrs. Tara Kanitkar – Principles of Population Studies – Himalaya Publishing House – Bombay.
14. Dand M. Heu – Society& Population – Eastern Economy Edition, 1978.

**OBJECTIVE:**

To introduce to the students various theories of planning and city design with relevant details of population projection etc. It also exposes the students to the importance of transportation planning and its interface with land use planning.

**UNIT I**

Origin and growth of cities, Relevance of the study of evolution of urban settlements. Socio-cultural, economic, political and religious influence in urban form. Town planning history – ancient Egypt, Mesopotamia and Indus valley. Greece and Rome, Medieval, Renaissance, Industrial and post industrial age, Colonial cities. Town planning in India. Planning philosophies of Ebenezer Howard, Patrick Geddes, Lewis Mumford, Le-Corbusier, C.A. Doxiadis, Clarence Stein etc

**UNIT II**

Planning systems in India, Master plans, Structure plan, Detailed development plans, Comparison of planning systems in UK & USA with that of India.

Planning Surveys, Different types used for data identification for plan preparation, Aerial Photography and Remote Sensing techniques in planning, Urban economic analysis

Population studies, Planning norms and standards, Land surveys.

**UNIT III**

Aims and objectives and need for Regional Planning. Concept of Region, types and classification of regions, delineation of planning regions by various techniques

Regional analysis- Input output analysis – growth model, core periphery model, gravity potential model, industrial location theory, agricultural land use model

**UNIT IV**

Regional planning in India – Multi level planning District planning, special area Development Programme and schemes. Regional planning as a tool to integrate rural and urban areas

**TOTAL : 45 PERIODS**

**REFERENCES**

1. Aurthur J. Gallion – Urban Pattern
2. AEJ Morris – History of Urban Form from Pre-history to Renaissance.
3. Ministry of Urban Affairs & Employment, Govt. of India, New Delhi – Urban Development Plans Formulation & Implementation Guidelines.
4. Aidan Southall – The City Time and Space.
5. Report of the National Commission on Urbanization
6. Le Corbusier – The City of Tomorrow
7. Peter Hall – Urban & Regional Planning
8. Ebenezer Howard – Garden Cities
9. Reading material on Urban Planning – ITPI New Delhi.
10. John Glasson – An Introduction to regional Planning 2<sup>nd</sup> Edition, Hutchinson – London (The Britt Environment Series)
11. Allen G. Noble, et.al, (eds), Regional Development and Planning for the 21<sup>st</sup> Century: New priorities New Philosophies, Aldershot, USA, 1998
12. David Mosse, et.al, Development Process; concepts and Methods for working with complexity, Loutledge, London, 1998

13. Hamilton F, (eds) industrialisation in Developing and Peripheral Regions, Croom Helm, 1983
14. Chand Mahesh and U.K. Puri, Regional Planning in India, Allied Publishers, New Delhi, 1983
15. Isward Walter, Methods of Regional Analysis – An Introduction to Regional Science, MIT Press, Cambridge, 1960

**EA9313**

**QUANTITATIVE TECHNIQUES AND RESEARCH METHODS**

**L T P C**

**3 0 0 3**

**OBJECTIVE:**

Is to provide understanding of the application of quantitative research methods and techniques to analyze planning & Design problems. Data collection, analysis and interpretation are focused on. The course also highlights the various types of data available for planners and its sources in India. The programme also aims to give adequate knowledge for research methodology.

**UNIT I**

Introduction, Scope and methods of statistics relevant for Research. Frequency distribution – Graphic representation of frequency distribution histogram, frequency polygon. Measures of central tendency – mean, median, mode. Dispersion and other characteristics of frequency distribution – Range, Standard deviation – Skewness

**UNIT II**

Elements of probability theory, central tendency and dispersion, correlation and regression, multiple correlation curve fitting sampling techniques, testing of hypothesis, forecasting techniques, time-series analysis, vital statistics.

Population projection, Data collection and presentation, Sources of data in India.

**UNIT III**

**Introduction to Research Methodology:** Objective of Research, Types of Research, Research Methods and Methodology, Scientific method of Research, Research Process.

**Research Problem:** Research Problem and Selection of Research Problem, Need for defining the Problem, Techniques for defining a Problem, Development of hypothesis.

**Research Design:** Meaning and Need of Research Design, Features of a good Research Design, Types of Research Design-Exploratory, Descriptive and Experimental Research.

**UNIT IV**

**Sampling Design:** Census and Sample survey, Implication of Sample design, Steps in Sampling, Characteristics of a good Sample design, Types of Sample design.

**Scaling Techniques & Data Collection:** Attitude Measurement and Measurement in Research, Measurement Scales, Scaling, Scale Classification Bases, Concept of important Scaling Techniques; Data Collection: Primary and Secondary data, Observation Method, Survey Method, Collection of data through Questionnaire and Schedule distinction, Selection of appropriate method of Data Collection

**Report Writing**

Report Writing: Writing and Formulating of Reports, Steps in Report Writing, Types of Report

**TOTAL: 45 PERIODS**

## REFERENCES:

1. Robert Parsons Statistics for Decision makers
2. David.S. Morve – Introduction to the practice of statistics
3. Miller and Freunds - Probability and Statistics for Engineers
4. Walpole Myers – Probability and Statistics for Engineers and Scientists.
5. S.C. Gupta, V.K. Kapoor – Fundamentals of Mathematics & Statistics
6. Taro Yamane – Introduction to Statistics
7. Elhance - Statistics
8. Statistics explained by Perry R. Hinton, Routledge Publishers
9. Statistics in Theory and Practice by L R Connors and Morreu
10. Urban Planning Analysis ,Methods and models by Kruckerberg and Silvers
11. Statistics and urban planning by William Ken
12. Elements of Statistics by E B Mode
13. Research Methodology; C.R.Kothari; New Age International (P) Ltd.
14. Research Methodology; D.K.Bhattachary; Excel Books
15. Research Methodology; Goodday & Hack

**EA9316 ENVIRONMENTAL ARCHITECTURE DESIGN STUDIO I LT P C  
0 0 12 6**

Design of a Housing cluster taking into consideration of various aspects of planning, climate environment, socio economic and other physical characteristics. The project should also aim to achieve the concept of sustainable community development.

The project should be submitted in the form of Drawings, models and reports.

**EA9314 URBAN ECOLOGY & ENVIRONMENTAL PLANNING LT P C  
3 0 0 3**

### OBJECTIVE:

The aim of this course is to make the students understand the basic concepts of ecology, Urban Ecology, natural systems & environment.

To make the students understand the importance of Environmental planning for sustainability, resource planning and allocation and protection of natural resources and their use for sustainability. Also to prepare plans considering preservation, rehabilitation & environmental properties.

### UNIT I

Basis of environmental science. Ecology, Ecosystems, Habitat, structure of the ecosystem, major ecosystems, productivity of ecosystems adaptation. Flow of energy, food chain, ecological pyramids, predation, regulatory forces.  
Components of natural and built environment, Urban Eco-systems, Impact of urbanization and industrialization on nature.

## **UNIT II**

Examination of critical issues underlying the current and future environmental problems. Man's impact on environment. Modification of natural environment – Current conditions of natural resources like land, water, air. Over exploitation of natural resources, agriculture, fishing, mineral resources, energy resource, forest wealth etc.

## **UNIT III**

Population and pollution, Overcrowding, congestions, hygiene and health problems. Sanitation, water supply, solid and fluid waste generation and disposal problem, changing climate of the cities-urban heat island, urban flood, etc. energy and human settlement ,

**Ecological Land Planning:** Preservation and protection of ecologically sensitive areas, Rehabilitation of degraded sites, Development of sites/ land in accordance to their environmental properties.

## **UNIT IV**

Global environmental problems: Global Warming, Ozone Layer Depletion, oceans, fresh water, transboundary air pollution, biological diversity, Carbon Rating. International treaties, Overview of Government of India's policies.

**TOTAL: 45 PERIODS**

## **REFERENCES:**

1. Charles H. Southwick – Ecology and the Quality of our Environment - D.Van Nostrand Company, 1972.
2. D.K. Asthama, Meera Asthma – Environment – S. Chand & Company Ltd., New Delhi, 2001.
3. P.D. Sharma – Ecology and Environment – Rastogi Publications.
4. M.N. Sasthri – Introduction to Environment – Himalaya Publishing House, 1976.
5. Joseph M. Morgan – Introduction to Environmental Science
6. S.D. Maurya – Urbanization and Environmental Problems
7. B.D. Nag Chaudhuri – The Global Environmental Movements
8. Najma Heptulla – Environment Protection in Developing Countries – Oxford & IBH Publishing
9. Eldon D. Enger – Environmental Science
10. Mundanthura Balakrishnan – Environmental Problems and Prospects in India – Oxford & IBH.
11. Cerver Francisco a: world of landscape architects: world of environmental design. Ganduxer,
12. Cerver Francisco Asensio: Environmental restoration landscape.
13. Cever Francisco a: Elements of landscape world of environment.
14. Mukherjee Pippa: Nature Guides Common Trees Of India. Worldwide Fund For Nature
15. Papanek Victor: Green Imperative Ecology
16. Ethics In Design. Thames And Hudson,
17. Randhawa M S: Flowering Trees. India
18. Environmental analysis for land use and site planning. By Marsh Williams M. ( MC Grew hill ( 1978)
19. Climate Change and Biodiversity-Edited by Thomas Lovejoy and Lee Hannah-TERI publication
20. Landscape Planning and Environmental Applications-By M.W.Marsh
21. River Ecology-by Prakash Gole
22. Energy, Ecology & Environment / Wilson, Richards & Jones William
23. Handbook of Environmental Planning / McENRO, James

- 24. Environmental Science / Cunningham, W.P.
- 25. Integrated Environmental Planning / LEIN, J.K.
- 26. Sustainable Development / Khanna, D.D.
- 27. Man & the changing Environment / FRANK, R. G & FRANK D. N

**EA9315**

**HOUSING & COMMUNITY PLANNING**

**L T P C  
3 0 0 3**

**OBJECTIVE:**

Main objective is to introduce the concepts of Environmental Planning and the various emerging issues, also to provide an understanding and relevant techniques formulating urban housing strategies.

The course is aimed at creating awareness of the Environment

**UNIT I**

Concepts, definitions and components of Housing. Role of housing in socioeconomic development of a nation. Housing in relation to non-residential components of settlement. Effects of Urbanization & Industrialization in Housing including problems and possibilities of Slums and Squatters settlement in India and abroad.

**UNIT II**

Housing norms, design and standards, units of housing design, layouts, densities and neighborhood units; infrastructure and community facilities, form and structure of housing as shaped by socio-economic and physical parameters. Social aspects: built environment and human behavior. Evaluation of user's satisfaction. Materials, technology and housing production, Industrialization and future of housing, including cost reduction techniques in housing.

**UNIT III**

Theories and approaches to housing. Housing process and sequence of development. Housing need, demand and supply, formal and non-formal housing. Housing characteristics and situation (indices and statistics), Housing in five year plans and social housing programmes. Urban and Rural housing

**UNIT IV**

Major elements of a housing policy, land, finance, legislation for institutions and housing development, approaches and contents of National Housing Policy. Finance for housing: priority in the national plans – role of public and private agencies, role of cooperatives and various institutions.

**TOTAL: 45 PERIODS**

**REFERENCES:**

1. Financing of Housing and community Improvement Programmers / United Nation
2. Housing Act / H.M.O.S
3. Housing and town and country planning: Urban land Problems and Policies / ABRAMS, C.
4. Town and Country Planning and Housing / Modak, N.V.
5. Low Cost housing in development countries / Mathur, G C
6. Sustainable housing: Principles and Practice / Edwards, Brian
7. The Economics of Housing Policy / Stafford, D C.
8. Urban Housing in Third World / Payne, G K.



9. Reading Material on Housing – ITPI New Delhi
10. Reading Material on Planning Legislation and Professional Practice – ITPL New Delhi.
11. Girish K. Misra, PSN Rao - Housing Legislation on India
12. Harjinder Singh, Leslie Kilmartin – Housing in the Third World
13. National Housing Policy Paper – Government of India, Ministry of Urban Development, New Delhi, May 1988.
14. National Housing and Habitat Policy 1998 – Akalank Publication  
Odeyar D. Heggade - Housing in India

**EA9323 ENERGY EFFICIENT BUILDING - MATERIALS & TECHNOLOGY L T P C  
3 0 0 3**

#### **UNIT I**

Energy Efficiency – Energy Conservation – Recourse Consumption – Introduction – Distribution of Energy use in India – Factors affecting the Energy use in Buildings – Pre Building Stage, Construction Stage & Post Occupancy stages – Concept of Embodied Energy – Energy needs in Production of Materials – Transportation Energy – Concept of light footprint on Environment

#### **UNIT II**

Concept of Recyclable materials – Sustainable Building Materials – Life Cycle Design of Materials – Biodegradable & Non-Biodegradable Materials – Green rating and Building Materials – LEED and other Green rating Systems – Concept of Resource rescue, Recycled content, Regional materials, Rapidly renewable materials – Fly ash bricks, Cement – Recycled Steel, Bamboo based products

#### **UNIT III**

Passive Design and Material Choice – Traditional Building Materials – Importance of envelope material in internal temperature control – Specification for walls and roofs in different climate – Material and Humidity Control

#### **UNIT IV**

Energy Efficient Construction Technology – Filler Slab – Rat trap Bond – Technologies developed by CBRI – Traditional Building Construction Technologies – Introduction to other Technological interventions to save Energy – Intelligent Buildings – Energy Conservation through Technological intervention – Saving Energy used for lighting by design innovation – Case studies

**TOTAL: 45 PERIODS**

#### **REFERENCES:**

1. Koenigsberger O.H, T.G. Inger Soll, “Manual of tropical Housing and Building”.
2. Bansal Naveendra K., Hauser Gerd and Minke Gernot, “Passive Buildings Designs : Handbook of Natural Climatic Control”, Elsevier Science, Amsterdam 1997.
3. Givonji B., “Man, Climate and Architecture”, Elsevier, Amsterdam, 1986.
4. Watson Donald, ‘Climatic Design: Energy Efficient Building Principles & Practices’, Mc Graw Hill Book company, New York, 19

Detailed theoretical study of Global, Macro and Micro level Climate – Elements of climate and its qualification – Earth energy balance – Climatic data and its interpretation – Energy balance of human and built Environment – Thermal Environment – Adaptive model of thermal comfort and its application to sustainable design of building – Design of any type of building – hotel / commercial buildings,etc. – with the above principles.

The submission should be in the form of Drawings, models and reports.

### ELECTIVE – 1

EA 9001

GIS &amp; REMOTE SENSING

L T P C  
3 0 0 3

#### OBJECTIVE:

To educate the students on the principles and applications of Remote sensing and GIS in environmental Architecture

#### UNIT I GEOGRAPHICAL INFORMATION SYSTEM & REMOTE SENSING:

GIS Concepts – Spatial and non spatial data, Vector and raster data structures, Data analysis, Database management – GIS software, Monitoring and management of environment, Conservation of resources, Sustainable Architecture land use &, Coastal zone management – Limitations to Architecture.

#### UNIT II OVERVIEW OF REMOTE SENSING:

Historical Perspective, Principles of remote sensing, components of Remote Sensing, Energy source and electromagnetic radiation, Energy interaction, Spectral response pattern of earth surface features

#### UNIT III REMOTE SENSING TECHNOLOGY:

Classification of Remote Sensing Systems, Energy recording technology, Aerial photographs, Photographic systems – Across track and along track scanning, Multispectral remote sensing, Thermal remote sensing, Microwave remote sensing – Active and passive sensors, RADAR, LIDAR, Satellites and their sensors, Indian space programme - Research and development

#### UNIT IV DATA PROCESSING:

Characteristics of Remote Sensing data, Photogrammetry – Satellite data analysis – Visual image interpretation, Digital image processing – Image rectification, enhancement, transformation, Classification, Data merging, GIS- RS Integration, Image processing software.

**TOTAL: 45 PERIODS**

#### REFERENCES:

1. Lillesand, T.M. and Kiefer, R.W, Remote sensing and image interpretation, John Wiley and sons, New York, 2004.
2. Golfried Konechy, Geoinformation: Remote sensing, Photogrammetry and Geographical Information Systems, CRC press, 1st Edition, 2002.
3. Burrough, P.A. and McDonnell, R.A., Principles of Geographic Information systems Oxford University Press, New York, 2001.



### **UNIT III**

**Concept of Beauty And Human Attitude:** Philosophies of beauty, aesthetics and psycho-psychological association to it and the human mind, simulated by 'pull' and 'push' factors of the environment physical manifestation and emotional impact .attitudes towards typical physical settings from, space and attitude relations .

### **UNIT IV**

**Application of Psychology in Architecture Design:** Evaluation of the satisfactory levels of a residential building. Parameters to provoke desired emotions in the built environment application of the knowledge in the design of a residence, community, neighborhood in all stages of design.

**TOTAL: 45 PERIODS**

### **REFERENCES:**

1. Morgan T. of Clifford, "Introduction to Psychology", Tata McGraw –Hill publications New York, 1983
2. Kayem, S.M., "Psychology in relation to design", Dowden, Hutchinson and Ross, 1973
3. Hall E.T. "The Hidden Dimension" New York, Doubleday, 1966.
4. Canter D.V & Lee.T. "Psychology and the built Environment", ArchitecturalPress, London, 1974.
5. Proshansky.H.IH Ieson.W.H." Environment Psychology-people and their physical settings", Newyork, Holt, Rinchat and Winston, 1976