



**MANIPAL SCHOOL
OF ARCHITECTURE AND PLANNING**
MANIPAL
(A constituent unit of MAHE, Manipal)

Course Content

FIRST YEAR / SEMESTER ONE

ARC 6201 URBAN DESIGN STUDIO I (2-4-4-10)

Objective:

The studio intends to expose the student to the complexities of urban design process. The student will be able to read, understand, organise and synthesis the tangible and intangible networks in an urban setting. The studio outcome should lead to understanding of urban (housing, transport, environment) etc.) and infrastructure dynamics by reading them with the critical debates in urban design and city planning

Outcome:

- CO1: To interpret the urban systems and identify the urban issues
- CO2: To identify and construct appropriate methodology for the urban design process
- CO3: To organize the essential data to be collected
- CO4: To appraise various methods of design analysis
- CO5: To evaluate and conclude the study through effective presentations

Outline:

Unit 1 : Understanding Urban fabric: To read and understand the textures and places that make an urban area; comprehend the various tangible and intangible networks linking the urban fabric; Identify multifaceted urban issues; to reach at strategic and critical analysis using principles/methods of urban design, urban planning, humanities and allied domains. Literature review and poster presentation.

Unit 2: Urban Design Study methodology: Frame methodological processes to design and develop strategies for complex urban issues in order to meet the specific needs with appropriate consideration of societal and sustainable environmental aspects.

Unit 3: Urban design Tools and Techniques -Data collection: To explore the various tools and techniques available for data collection; field studies; sampling; Use of evidence based research, ethnography and anthropological data.

Unit 4: Urban design Tools and Techniques -Data Analysis: Apply and seek appropriate spatial and digital tools, quantitative, qualitative, mixed methods to simulate, map and analyze urban dynamics

Unit 5: Urban design Tools and Techniques -Communication: To evaluate and explore techniques for effective communication of compilation and presentation of data and conclusions.

Along with the regular studio, the course plan shall include in-semester term paper, poster or seminar presentation of selected topics.

References

1. Time Saver Standards for Urban Design, 2012, Tata-McGraw Hill
2. Jacobs, Jane, 1968, Death and Life of American Cities
3. Alexander, C, 1977, A Pattern Language: Towns, Buildings, Construction
4. Lynch, K , 1960 The Image of the City, Harvard-MIT Joint Centre for Urban Studies, Cambridge, Ma
5. Kostof, S 1991, 'The City Shaped: Urban Patterns and Meaning Throughout History', Bulfinch, Boston
6. Whyte, William, 1980, Social Life of Small Urban Places
7. Jon T. Lang, 2002, A Concise History of Modern Architecture in India
8. Rahul Mehrotra, 2011, Architecture in India Since 1990, Pictor

ARC 6203 SUSTAINABLE DEVELOPMENT & CLIMATE CHANGE (2-0-2-3)

Objective:

The objective of this course is to enable students:

- To understand and relate components of urban ecosystems and make them aware of the impact of urbanization and industrialization on natural environment.
- To sensitize them about physical, social, economic, infrastructure, environmental, ecological, and institutional aspect of sustainable development and climate change.
- To explain the principles and strategies for contemporary challenge towards sustainable urban development.
- To gain knowledge on evaluating the environmental impacts of urban development.
- To be aware of best practices in urban development in relation to sustainable development and climate change.

Outcome

CO1: **Relate** sustainability concepts and actual urban development challenges faced.

CO2: **Examine** critical dimensions of sustainable development and key spatial and temporal connections and their integration for successful policy and practice of sustainable development.

CO3: **Compare** urban development cases based on knowledge of climate change and resilience.

CO4: **Apply** knowledge on urban disaster risk reduction and climate resilience through vulnerability and risk assessment tools and techniques, key components relating to disaster risk reduction adopted by cities.

CO5: **Interpret** cases of urban development in terms of sustainability, footprint, environmental impact, and policies.

Outline

Unit 1: Conceptual Background: Historical background behind environmental activism and its impacts, Changing Perspective & Debates in Sustainable Development; Need for Sustainable Development; Evolution of the concept of Sustainable Development: Eco-Development, World Conservation Strategy and responses, The Brundtland Report, Agenda 21 and response (Capacity 21); Human Development; Issues of Population, Urbanization, Resource Depletion and Pollution; Carbon Footprint; Ecological Footprint; Concepts of Carrying Capacity Based Development; Climate Change and challenge for Sustainable Development.

Unit 2 : Sustainable Development: SDGs; Environment & Biodiversity aspects (referring IUCN, CBD, etc.); Global, national and regional issues on conservation of nature; Economic well-being in urban areas (with relevant SDG indicators); Development, Inequality and Marginalization: Urban – Rural Divide; Social Inclusion and divisive role of poverty and social stratification (issues of caste, class, gender, ethnicity, indigenous communities, etc.) as major hindrance for SDGs; Food, Hunger, Farming, Forestry, Economy issues and related sustainable practices; Role of SDGs in guiding urban governance.

Unit 3: Climate Change: Introduction to Climate Change; Climate Change on Tectonic, Orbital, Glacial/Deglacial, Millennial and Historical Timescales; Modern Climate Change/ Global Warming and its effect on Urban Areas; Impact of Climate Change on Biosphere; Climate Change And Earth Processes; Societal Impacts of Climate Change; Mitigation, Resilience And Sustainability; Economics of Climate Change; Climate Change in the Humanities; with focus on urban areas.

Unit 4 : Urban Disasters and Climate Risk Reduction: Concepts on disasters and climate impacts – Slow onset climate impacts, and Extreme events and disaster; Vulnerability and risk assessment in urban areas – vulnerability relating to the slow onset, climate risks and disaster/extreme events risks; Disaster risk reduction – Disaster preparedness and response mechanisms, Urban cyclone and flood risk reduction; Urban earthquake risk reduction; Resilience and sustainability – Climate risk mitigation and adaptation, and Risk resilience housing and infrastructure planning in cities.

Unit 5 : Issues, Policies and Practices: National and Regional Issue- Cases; Role of EIA, Methods of EIA- advantages & limitations; EPA Guidelines; Ecological Footprint Analysis of Cities; Sustainable Lifestyle Assessment; Global concerns for environment and bio-diversity, International Environmental Policies and initiatives including policies, strategies, protocols, treaties, and agreements (referring UNFCCC, IPCC, COP 15, COP 21, Paris Summit, Agenda 2030); Overview of Government of

India's Development Policies and Programmes towards Sustainable Development and Climate Change– (India's National Biodiversity Action Plan, Policies & Programmes under 5-year Plans; National Commission on Urbanization's Recommendations; Progress towards Sustainable Cities & Communities (SDG11); National Urban Housing and Habitat Policy; National Urban Sanitation Policy; National Urban Transport Policy; National Policy on Urban Street Vendors; JNNURM; PMAY-HFA; RAY; Swachh Bharat Mission Urban (SBM); Atal Mission for Rejuvenation and Urban Transformation (AMRUT); Smart Cities Mission (SCM); Heritage City Development and Augmentation Yojana (HRIDAY); Shyama Prasad Mukherji National Rurban Mission (NRuM)).

References:

1. Bell, S., & Morse, S. (2012). Sustainability indicators: measuring the immeasurable?. Routledge.
2. Gadgil, M., & Guha, R. (2013). Ecology and equity: The use and abuse of nature in contemporary India. Routledge.
3. Gilbert, O. (2012). The ecology of urban habitats. Springer Science & Business Media.
4. Hostetler, M. (2004). Cities and natural process: A basis for sustainability.
5. Jenks, M., & Jones, C. (Eds.). (2009). Dimensions of the sustainable city (Vol. 2). Springer Science & Business Media.
6. Jenks, M., & Jones, C. (Eds.). (2009). Dimensions of the sustainable city (Vol. 2). Springer Science & Business Media.
7. Kahn, M. E. (2007). Green cities: urban growth and the environment. Brookings Institution Press.
8. Lehmann, S. (Ed.). (2014). Low carbon cities: Transforming urban systems. Routledge.
9. Mechler, R., Schinko, T., Awasthi, K., Bhatt, S., Chaturvedi, A., Toast, J., ... & Rao, V. (2019). Climate Risk Management [CRM] Framework for India: Addressing Loss and Damage (L&D).
10. Moore, S. A. (2007). Alternative routes to the sustainable city: Austin, Curitiba, and Frankfurt. Lexington Books.
11. Odum, E. P., & Barrett, G. W. (1971). Fundamentals of ecology (Vol. 3, p. 5). Philadelphia: Saunders.
12. Pillai, P., Philips, B. R., Shyamsundar, P., Ahmed, K., & Wang, L. (2010). Climate risks and adaptation in Asian coastal megacities. Washington, DC: World Bank.
13. Rosenzweig, C., Solecki, W. D., Romero-Lankao, P., Mehrotra, S., Dhakal, S., & Ibrahim, S. A. (Eds.). (2018). Climate change and cities: Second assessment report of the urban climate change research network. Cambridge University Press.
14. Ruddiman, W. F. (2014). Earth's climate: Past and future. New York: W.H. Freeman & Co.

15. Toman, M. A., Chakravorty, U., & Gupta, S. (Eds.). (2003). India and global climate change: perspectives on economics and policy from a developing country. Resources for the Future.

ARC 6205 RESEARCH METHODOLOGY (2-0-0-2)

Objectives:

To introduce rigour of basic research, in order to understand the significance of the same with reference to various attributes of a city and its built form and to develop skills of conducting and communicating research. Students will be exposed to the need of research in Urban Design, essentials of any research and various research methodologies used in Urban Design along with developing the skill of technical writing.

Outcome:

CO1: To understand concepts and framework of city analysis and its built form

CO2: To learn basics of research in the critical analysis and interpretation of urban design

CO3: To learn various techniques of research and analysis in Urban Design

CO4: To understand how to prepare and execute and communicate a feasible research project

CO5: To learn application of result of research outcome

Outline:

Unit 1: Introduction to Urban Design terminologies, Understanding city context-determinants of urban form, components of urban structure, character and identity, Urban morphology, City and its multiple interpretations, Urban Design Theory and Frameworks w.r.t city analysis

Unit 2: Introduction to relevance of research in Urban Design, Process of formulating a research project. Introduction to research methodologies in Urban Design; Literature review and subsequent evolution of a theoretical framework; defining scope of research and outline of research, Approach for data collection & analysis

Unit 3: Research methodology – Objectives and types of research - Streams of research; applied, theoretical, empirical, historical interpretative, observational; Quantitative, qualitative & mixed method approach; Overview of statistical sampling procedures; Methods of Survey; Mapping and Documentation; Socio-economic research techniques such as surveys, questionnaires, interviews, focused group discussions, participant observation, Tools & Techniques of urban design analysis, Stakeholder analysis techniques

Unit 4: Introduction to technical writing, Application of results of research outcome: Environmental impacts –Professional ethics - Ethical issues -ethical committees. Commercialization of the work - Copy right - royalty - Intellectual property rights and patent law - Trade Related aspects of Intellectual Property Rights - Reproduction of published material - Plagiarism - Citation and acknowledgement - Reproducibility and accountability

References:

1. Lynch, Kevin (1960), *Image of the City*, Harvard University Press, Massachusetts
2. *Urban Design Toolkit*, Third Edition, Ministry for the Environment, New Zealand
3. Cliff, Moughti (1999), *Urban Design Methods and Techniques*, British Library Cataloguing in Publication Data
4. Kothari, C.R (1990), *Research Methodology*, Sultan Chand & Sons, New Delhi
5. Creswell, J. W. (2003) *Research Design: Qualitative, quantitative and mixed methods approaches*, 2nd Ed., Thousand Oaks
6. De Vaus, D. A. (2003) *Surveys in Social Research*, Jaipur
7. Littau, Paul (2015) *Managing Stakeholders in Megaprojects, The MS Working Group Report*, University of Leeds, April 2015

ARC 6207 URBAN DESIGN HISTORY AND THEORY (2-0-0-2)

Objectives:

To expose students to the historical evolution of Urban Settlements and related development theories while understanding the morphological dimension of Urban Spaces and patterns and increase their awareness about the influence of socio-cultural, socio-political and socio-economic processes within which urban realm exists.

Outcomes:

CO1: Examine the nature of the city form through historical development theories & examples of traditional attempts of urban design

CO2: Analyse factors influencing the evolution of cities and the background of Urban Design and various forces that played a crucial role in the evolution of cities

CO3: Examine the issues of Urban Design in the present-day context of the globalized city

CO4: Assess comprehensive study of urban form and urban spaces and Explore spatial, functional and historical transformation in built environments

CO5: Assess urban morphology involving studies of human-environmental relationship in multiple dimensions like perceptual, social, visual, functional, philosophical, cultural and temporal dimensions in particular.

Outline:

Unit 1: Locating urban design within the comprehensive city development process; Urban design theories; Industrial revolution and its influence on the city; emergence of town planning, zoning and building regulations; Morphology of the industrial city; Rise of the suburbia, Garden City movement; City Beautiful

Unit 2: Post-war reconstruction; Automobiles and urban sprawl; New Urbanism and urban revitalization; Post-industrial city and compact city, Bauhaus, Corbusier's Radiant City etc. Indian historical developments- principles of city and town planning- Nine square plan of Jaipur, colonial cities- Chennai, Mumbai & Calcutta. Ethical Urbanism and post planning in Asian Cities like Bangkok, Shanghai and Hong Kong etc.

Unit 3: Objectives, scopes and functions of Urban Design; Locating urban design within the comprehensive city development process; Urban design theories; Relationship between urban activities, land use and urban forms; Relationship between human being and the urban environment; Concepts of place and space; Ideas of urban, urbanization and urbanism.

Unit 4: Theories of development, agglomeration and clustering; Debates of development, growth and conservation; Space as a contested domain; Private and public spaces; Social sustainability and urban space; Urban aesthetics and civic design.

Unit 5: Introduction to morphology - Determinants of urban form and structure - Size, shape and form of cities, components and structure. Meaning and morphology- Symbolism, in-depth inquiry into the patterns and processes of urbanism as well as connected production of urban form and space. Understanding of the historical evolution of urban settlements and connected development theories towards a clear understanding of the morphological dimensions of urban patterns and spaces.

References:

1. Broadbent, Geoffrey. Emerging Concepts of urban Design
2. Bacon, Edmund, N. Design of Cities Gosling,
3. David & Maitland, Barry, Concepts of Urban design
4. Morris, Anthony, J.E. History of Urban Form
5. Kostof, Spiro, The City Assembled: The Elements of Urban Form Through History
6. Kostof, Spiro, City Shaped: Urban Patterns and Meanings through History
7. Jon Lang , Urban Design Typology and procedures, Architectural Press
8. A.E.J. Morris , History of Urban Form, Longman Scientific and Technical.
9. Kevin Lynch , Good City Form, MIT Press
10. Edmund Bacon, Design of Cities.
11. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.

ELECTIVE MODULE -1 (6 Credits)

ARC 7009 HOUSING AND COMMUNITY PLANNING (2-0-2-3)

Objectives:

This course enables the students:

1. To familiarize with a wide spectrum of aspects related to housing viz., housing scenario, housing needs, housing design, building legislations and relevant methods for formulating housing strategies.
2. To gain basic knowledge of issues of urban development relevant to housing planning in India.
3. To explain the issues involved with changing contextual policies for housing and generalize the new directions of opportunities
4. To apply the standards, norms and statutory regulations affecting the housing development and design of housing neighborhoods.

Outcome:

CO1: To **outline** basic elements of housing, neighbourhood, community and slums.

CO2: To **explain** various housing policies and programmes.

CO3: To **explain** housing typologies or differentiate community design in terms of local context (Physical, economical, socio-cultural, ecological, environmental aspects).

CO4: To **illustrate** the process for housing planning.

CO5: To **Apply** zoning regulations and sub-division techniques and computation for density, FAR, built-up area, as per development norms.

Outline

Unit 1- Introduction to Housing : Definition & concept of Housing, Housing typologies, Form of Housing provision (Plotted, Group Housing, Cooperative, Self Help, Leasehold, Freehold / Condominium, Rental Housing etc.) and Special Housing types (Barrier free, Mobile homes, congregate housing for assisted living, disaster housing, Student & public housing, Guest house, Night shelters, Incremental Housing etc.). Theories and approaches to housing.

Unit 2 -Housing and City: Understanding housing as an important land use component of city plan / master plan, considerations for carrying out city level housing studies, projections, land use provisions. Suitability of land for housing,

housing stress identification, projecting housing requirements, calculating housing shortages, housing allocation. Understanding the causes of growth of Slums, Squatter settlements & Urban sprawl, Types and generic characteristics of slums, An overview of measures & approaches to slums & squatter settlements, Objectives of National Slum Policy (2002), Concept of few schemes e.g.: Site & Services, EIUS, BSUP, VAMBAY, IHSDP.

Unit 3-Affordable Housing, new trends & Housing Policy: Components of Housing Cost & approach for affordable housing, Characteristics of Urban housing vis-à-vis Rural housing, Goals, Objectives & contents of National Housing & Habitat Policy (2007), Examples of housing schemes & programmes e.g., IAY, IHSDP etc.

Unit 4- Planning for Neighborhoods: Approaches to neighbourhood living in traditional and contemporary societies, elements of neighbourhood structure, Planning and design criteria for modern neighbourhoods, norms and criteria for area distribution, housing and area planning standards, net residential density and gross residential density, development controls and building byelaws, URDPFI guidelines, NBC 2005 provisions.

Unit 5- Norms& Standards for Urban & Housing Development : Town & Residential density, FAR, Different types of codes/ norms affecting settlement development planning, Land –use Classification & compatibility of uses (e.g., compatible uses in residential zone), Factors affecting space standards / land requirements for facilities, Land area requirement for different uses in a town & for community facility in a sector/ residential planning area, Design Considerations based on subdivision norms / regulations.

References

1. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.
2. N.V.Modak, V.N.Ambedkar, Town and country planning and Housing, orient longman, 1971
Text books:
3. Modak & Ambedkar; Town & Country Planning & Housing
4. Bawa R. L., Fernandes B. G.; Design for Living: A Guide for Planning of Residential Neighbourhoods; Galgotia Publishing Company; N. Delhi
5. Abrams, C., Housing and town and country planning: Urban land Problems and Policies T4 - Payne, G. K., Urban Housing in Third World
Reference books:
6. Financing of Housing and community Improvement Programmers / United Nation
7. Poulouse K T(compiled); Reading Material on Housing; Institute of Town Planners, India; New Delhi;
8. URDPFI guidelines.
9. National Building Code,

ARC 7011 INFRASTRUCTURE AND TRANSPORT MANAGEMENT (2-0-2-3)

Objectives

The objective of the course is to expose students to various urban level infrastructure and transport related considerations for sustainable urban development.

Outcome

CO1: Explain the role of infrastructure in the process of sustainable development

CO2: Interpret the various approach and strategies for a physical infrastructure design.

CO3: Identify the requirements for water, waste and transport infrastructure design in an urban context.

CO4: Analyse the static and dynamic factors of traffic design through a scientific data collection process.

CO5: Make use of data interpretation and modelling techniques to understand traffic behaviour.

Outline

Unit 1: Introduction to Urban infrastructure: Importance of infrastructure design, physical and social infrastructure in an urban context, challenges of urban infrastructure, Introduction to policies/ guidelines/ codes for infrastructure development like URDPFI guidelines, IRC codes, NUTP etc. Discussion of concepts of Walkable cities, pedestrianization, TOD etc and importance of infrastructure design in approaching Sustainable cities.

Unit 2: Water management: Different sources of water, uses of water, quality and quantity standards for water, municipal water infrastructure, water treatment plants – location, size, capacity; water distribution networks. Storm water management – infrastructure approaches for collection and disposal, surface runoff, catchment area, water harvesting strategies, recycling and reusing of storm water. Wastewater management - different types of wastewater management systems, characteristics/ properties of wastewater, Industrial pollutants, categorization of industries based on pollution, treatment plants, different methods/approaches to dispose municipal and industrial effluents, guidelines for disposal of effluents in water bodies.

Unit 3: Solid waste management: Source of waste, type of waste – municipal solid waste, Industrial waste, hazardous waste etc. Handling and storage of waste, collection and transportation of waste, sorting, processing and disposal of waste.

Guidelines for solid waste management, different methods/ networks and approaches for managing solid waste in an urban area.

Unit 4: Introduction to transportation planning: Traffic characteristics, volume and capacity, traffic calming, Intersection design, parking management, different traffic surveys, geometric design of roads, Public transport and mass transport systems.

Unit 5 : Transport Management Systems : Traffic management, feeder hierarchy, transport analysis – Quantitative and Qualitative, Signages, road markings, signaling, travel demand management, modal choice modeling, multimodal hubs, Intelligent transport systems (ITS)

References

1. Black, J. (2018). Urban transport planning: Theory and practice (Vol. 4). Routledge.
2. Burton, E., Mitchell, L., & Lynne Mitchell, M. E. S. (2006). Inclusive urban design: Streets for life. Elsevier.
3. Corcoran, E. (Ed.). (2010). Sick water?: the central role of wastewater management in sustainable development: a rapid response assessment. UNEP/Earthprint.
4. CPHEEO, G. (2013). Manual on Sewerage and Sewage Treatment Systems.
5. Goodman, A. S., & Hastak, M. (2006). Infrastructure planning handbook: planning, engineering, and economics. New York: ASCE Press.
6. Hutchinson, B. G. (1974). Principles of urban transport systems planning.
7. Larsen, T., Udert, K., & Lienert, J. (2013). Source separation and decentralization for wastewater management. Iwa Publishing.
8. Massoud, M. A., Tarhini, A., & Nasr, J. A. (2009). Decentralized approaches to wastewater treatment and management: applicability in developing countries. *Journal of environmental management*, 90(1), 652-659.
9. O'Flaherty, C. A. (Ed.). (2018). Transport planning and traffic engineering. CRC Press.
10. Peavy, H. S., & Tchobanoglous, G. (1985). Environmental engineering (No. 628 P4).
11. Richardson, A. J., Ampt, E. S., & Meyburg, A. H. (1995). Survey methods for transport planning (p. 314). Melbourne: Eucalyptus Press.
12. Savic, D. A., & Savic, D. (Eds.). (2005). Sustainable water management solutions for large cities (No. 293). International Assn of Hydrological Sciences.
13. Tchobanoglous, G., Theisen, H., & Vigil, S. (1993). Integrated solid waste management: Engineering principles and management Issues. McGraw-Hill.
14. Tiwari, G., & Mohan, D. (Eds.). (2016). Transport planning and traffic safety: making cities, roads, and vehicles safer. CRC Press.
15. Ujang, Z., & Henze, M. (Eds.). (2006). Municipal wastewater management in developing countries . IWA Publishing.

ARC 7013 CRITICAL DEBATES IN URBAN DESIGN AND CITY PLANNING -I (3-0-0-3)

Objectives:

The objective of this course is to make students aware of contemporary discourse and debates in urban design and related disciplines. It intends to impart critical thinking so that contribution to such deliberations can be undertaken.

Outcomes:

- CO1: **Relate** debates in urban design and challenges faced by Indian Cities
- CO2: **Examine** critical dimensions of urban development and connections and their integration for successful policy and practice
- CO3: **Compare** context of urban design debates
- CO4: **Apply** knowledge on of urban design concepts in situating within urban development and design deliberations
- CO5: **Interpret** specific cases of urban development in terms of social cohesion, livability, walkability and similar concepts

Outline:

Unit 1: The Nature, Role and Value of Urban Design: Urban Design as a Field or In-Between Field? The Principles of Urban Design; Attributes of Physical Form (Aspects of Development Form); Ambiguities of urban design.

Unit 2: Density, diversity and mix of uses: Design for Diversity: Evaluating the Context of Socially Mixed Neighborhoods, Informal Spaces, Bazars and market places, socio-religious centers etc.

Unit 3: Layout and form: urban structure and grain: Morphological investigations: Cutting into the substance of urban form.

Unit 4: Qualities of Urban design: Character and sense of place: The Sensory Experiencing of Urban Design: The Role of Walking and Perceptual Memory.

Unit 5: Visual evaluation of urban streetscapes: How do public preferences reconcile with those held by experts? What is a walkable place?

References:

1. What is critical urban theory? in City by Neil Brenner
2. An Introduction to Critical Thinking by Steven D. Schafersman
3. Marshall, S. (2012) Science, pseudo-science and urban design
4. Whose Urban Design? in Journal of Urban Design by Alexander Cuthbert 08/2010

5. Urban design: requiem for an era – review and critique of the last 50 years in Urban Design International by Alexander R Cuthbert 12/2007

ARC 5105 ADVANCED ELECTIVE – I, (WITH B. ARCH)

ARC 5105.2 Smart Cities

ARC 5105.3 Urbanism

ARC 5105.4 Sustainability

ELECTIVE-I, (WITH M.DES)

ARC 7001 Data Science

ARC 7003 Material Science (Refer Annexure -1)

FIRST YEAR / SEMESTER TWO

ARC 6202 URBAN DESIGN STUDIO-II (2-4-4-10)

Objective:

The course introduces and exposes students to the intricacies and complexities in terms of pressing issues such as conflict between old and new areas, fragmentation, transformations, lack of character and image. The complications and implications arising out of urban contestations surrounding management of common pool resources (such as environment or cultural) are understood and studio seeks way forward to manage the challenges of urban futures.

Outcome:

CO1: Students shall address a mixed use urban design and development assignment, understand the tools and mechanism of development, the global versus local concerns, the importance of public participation in effecting the urban design process in an existing city and to develop both practical skills and critical thinking.

CO2: Study of a city with respect to understanding of its evolution in historic context, change and continuity, present issues and conflicts by analyzing the land use, movement pattern, socioeconomic and demographic patterns, visual environment, spatial structure and typology.

CO3: Analyzing the various factors that determine the morphology of the city and the referencing of selected sites to the study.

CO4: Identification and design of action areas and implementation in light of prevailing government policies and programmes including socio-economic indices of development.

Outline:

Unit 1: Introduction to understanding the Indian City, analysing various factors that determine the structuring of the city, an intense process of site mapping, methods such as surveys, documentation and representation, cognitive mapping – contemporary and traditional, analysing and identify patterns in a chosen urban context. The analysis should be expanded to study urban contestation through street art, public art, graffiti and societal utterance (discourse study)

Unit 2: Documentation and presentation techniques, space analysis, determinants of urban form, components of urban structure, concepts of layering, size, shape and form of cities, typological studies and architectural expression.

Unit 3: Synthesis of study area, identification of problems and issues and coming up with a vision statement.

Unit 4: Understand conditions in an urban area, learning process, assessing needs and programming for design intervention.

Along with the regular studio, the course plan shall include in-semester term paper, poster or seminar presentation of selected topics.

Reference:

1. Alexander, C (1987), "A New Theory of Urban Design" Oxford University Press, New York.
2. Bacon, E N. (1967), "Design of Cities" Viking Press, New York.
3. Barnett, J (1982), "An Introduction to Urban Design" Harper & Row, New York.
4. Broadbent, G (1990), "Emerging Concepts in Urban Space Design" Van Nostrand Reinhold (International), London.
5. Cullen, G (1961), "Townscape" Reinhold, New York.

ARC 6204 URBAN GOVERNANCE AND MANAGEMENT (2-0-0-2)

Objectives

To understand the framework of Indian governance and administrative set up.

To learn the hierarchy of powers among centre, state and local governance.

To identify urban issues and relate them with urban management methods/techniques.

To interpret solutions for urban issues based on comparative analysis.

Course Outcome

CO1: Outline the existing framework of Indian governance.

CO2: Compare & explain the concepts of urban governance and legislative provisions of Urban India.

CO3: Identify the existing issues in urban management.

CO4: Demonstrate the basic concepts of urban finance.

CO5: Analyse the best practices in urban governance and management.

Outline

Unit 1: Introduction to Governance: Meaning of governance and government; Scope of governance; evolution of concept of governance, historical governance, structure, order and hierarchy of governance federal governance. Administrative set up of Indian governance – Administration and political boundaries – national, state and local governance; local, state, centre relations in urban governance. Decentralization of local government; recommendations of various committees; politics and progress of decentralization.

Unit 2: Urban governance, Legislative provisions: Theories of Local Government; history of urban local bodies; Evolution of modern urban local governments during British Rule. Urbanization and Urban environment & governance (Definitions, concepts and types) – Administrative set up of Indian governance – Administration and political boundaries – national, state and local governance - Municipal governance – division of powers, 73th and 74th (243P-243ZG)CAA, UDA. Rights to property versus power of eminent domain – Land acquisition act – Statutory Acts, Regulations and Notifications – natural resources and its governance – e - governance and good governance – environmental jurisprudence in India (Acts and constitutional articles). 74th Constitutional amendments-XII schedule; decentralisation of powers and functions; local and participatory planning; Decentralised Planning; best practices of planning and governance.

Unit 3: Urban management : Concepts of planning and management of urban governments; issues in urban management; need for urban local government Evolution of ULB's, organisational structure, functions and management practices of urban local bodies in India. Existing institutional and organisational setting for urban management in India; significance of organizational framework. Process of urbanization, development conflicts, resource constraints and system deficiencies. City development authorities, scope of their powers, functions, resources and working with case studies. Public participation – PPP in urban governance – resource management – real estate management – urban risks and disaster management – urban land resource management. Decision making processes: need for openness and transparency; Citizens charter and other instruments; people participation, collaborative management; local governance.

Unit 4 (CO4): Development Finances : Overview of development finances – its implementation and management – municipal finances – source of revenues – pooled finance development funds – national urban infrastructure fund. Urban poverty and exclusion from development process; impact of globalisation and economic reforms; defects in planning approaches.

Unit 5 (CO5): Best Practices in Urban Governance and Management: Municipal infrastructure development of service delivery systems (water, sanitation, health,

security and poverty reduction) — best practices in urban management. Centrally sponsored programmes and schemes – smart cities concept and vision – identification of renewal areas – conservation, rehabilitation and redevelopment of renewal areas, five years Plans, Planning commission, NITI Aayog. E-governance. Determinants and indicators of Good governance. Best Models of Urban Governance in Developing Countries. Sustainable urban governance, policies.

References

1. Evelin, H. & Michael Mann 'Urbanization and Governance in India'. French Research Institute in India & South Asia Institute. 2005. (Introduction) (BOOK)
2. Timmermans, H., (ed.) 'Decision Support Systems in Urban Planning'. Spon Press. 1997. (Chap 13,14) (Book)
3. Regional Centre for Urban and Environmental Studies. 'History of Urban Local Bodies'. Lucknow
4. Fredrick Esko Lange.'Urban Governance'-An essential determinant of city Development. World Vision Institute for Research and Development.2010. 5. United Nations Economic and Social Council. 'Definition of basic terminology in governance and public administration'.2006
5. Rumi Aijaz. 'Challenges for Urban Local Governments in India'. Asia Research Centre. Working Paper 19.2007. Chaubey P;K.,'Urban Local Bodies in India: Quest for making them Self Reliant. Indian Institute of Public Administration.2003
6. Delhi Development Authority Act, 1957.
7. Evelin, H. & Michael Mann 'Urbanization and Governance in India'. French Research Institute in India & South Asia Institute. 2005. (Chap 1,2,) (BOOK)
8. Evelin, H. & Michael Mann 'Urbanization and Governance in India'. French Research Institute in India & South Asia Institute. 2005. (Chap 1,2,) (BOOK)
9. Thomas Isaac T.M. & Richard W. Franke., 'Local Democracy and Development'. People campaign for decentralized planning in Kerala. Left Word. 2001. (Chap 1) (BOOK)
10. Baud I.S.A., &WIT J. DE. New Forms of Urban Governance in India. Sage Publications.2008.(Chap 2,3,4,5)(Book)
11. Various state municipal acts.

ARC 6206 POLICY PLANNING AND LEGISLATION (2-0-0-2)

Objective:

To understand the purpose, scope, means and effectiveness of urban design policy planning processes.

To identify urban issues that signify urban conditions with emphasis on policy-management frameworks.

To interpret the public policy, guidance, legislation and related processes of incentive and regulation.

To intervene in the design of urban policy and legislation.

Outcome:

CO1: To classify the tools and methods required for implementing policy management framework

CO2: To categorize the various concepts of urban design relating to the Law and Indian Constitution

CO3: To interpret the processes involved in framing the policy and legislation

CO4: To outline the Development Control Rules, Zoning Laws, Form based Codes

Outline:

Unit 1: Nature and Making of Urban Policy : Introduction to the Policy Framework – policy analysis and process: Six Steps in Policy Analysis: How a policy making is initiated, stakeholders involved in the preparation of policies, identification of pros and cons in the draft of policy making, preparation of SWOC, comparative analysis of policies in approaching a similar context issue in global and relative domain, Theoretical frameworks, the role of institutions (World Bank) in the policy process, and the motivation of policy actors.

Unit 2 : Indian Constitution and Legislation: Indian Constitution: Concept and contents, provisions, regarding property rights, Evolution of urban development legislation, An overview of legal tools connected with Urban Design and Development, Improvement Trusts Act, Town and Country Planning Act, Parastatals, Development Authorities Act - objectives, content, procedures for preparation and implementation of Urban Design tools, Master Plans and Town Planning schemes.

Unit 3: Public Policy Analysis and Strategic Policy Planning: Overview of Policy Process Models, Policy Initiation: Multi-Stream Approaches, policy implementation analysis, life-course approach to policy analysis, Case studies in Policy Process Analysis, Mission statements, Visioning and goal-setting techniques. Strategic decisions and evaluation, strategic leadership. Co-ordination and networks. Crisis Management. Transformational strategic Management. Flagship urban projects

Unit 4: Land and other Legislation: Concept of Arbitration, Land Acquisition Acts – Basic concept, procedure for compulsory acquisition of property and determination of compensation, Significance of Land Development Control – objectives, contents and legal tools, critical evolution of zoning, land pooling/land readjustment and plot reconstitution, sub-division regulations, building regulations and byelaws, Development Code, Zoning law and law relating to periphery control. 73rd and 74th Constitutional Amendment Act, 1992.

References:

1. Birkland, T. A. (2015). An introduction to the policy process: Theories, concepts, and models of public policy making. Routledge.
2. Sabatier, P. (2019). Theories of the policy process. Routledge.
3. MoUD. (2015). Urban and regional development plans formulation and implementation (URDPFI) guidelines.

4. Hansson, S. O., & Hadorn, G. H. (2016). Introducing the argumentative turn in policy analysis. In *The Argumentative Turn in Policy Analysis* (pp. 11-35). Springer, Cham.
5. Punter, J. (2007). Developing urban design as public policy: Best practice principles for design review and development management. *Journal of Urban Design*, 12(2), 167-202.
6. Carmona, M. (1996). Controlling urban design—part 1: A possible renaissance?. *Journal of Urban Design*, 1(1), 47-73.
7. Bijlani, H. U., & Balachandran, M. K. (Eds.). (1978). *Law and urban land*. Centre for Urban Studies, Indian Institute of Public Administration.
8. India, C. (1949). *The Constitution of India*.
9. Jayal, N. G., Amit, P., & Sharma, P. K. (2006). *Local governance in India: decentralization and beyond*. Local governance in India: decentralization and beyond.
10. *Laws and Acts, their Amendments related to Urban Design and Development*.

ELECTIVE MODULE –II (8 Credits)

ARC 7006 CONSERVATION PRINCIPLES AND PRACTICES (2-0-2-3)

The course focuses on the basic theories in the practice of conservation, an understanding of which is vital for responsible conservation of architectural heritage. It includes an introduction to the evolution of theories in conservation, and an introduction to planning theories and practice. It introduces the students to personalities, ideologies and philosophies that helped formulate the evolving principles and theories of conservation. It acquaints the students with national and international normative frameworks for conservation.

Objectives

The objective of the course is to prepare the students to read and understand a historic settlements as heritage, with a focus on the Indian context. The emphasis is on holistic comprehension, using the integrated systems approach, of the relationship of the physical, social, economic, infrastructural and administrative aspects influencing the formation and transformation of historic habitats. Students are prepared to address the complex realities and dynamic nature of Indian historic towns and cities.

Outcome

CO1: Relate to the understanding of basic theories in the practice of conservation

CO2: Compare different National and International policies used for conservation of historic precincts, sites and buildings

CO3: Relate to the physical, social, economic, infrastructural and administrative aspects influencing the formation and transformation of historic habitats

CO 4: Analyse the complex realities and dynamic nature of Indian historic towns and cities

Outline

Unit 1: Theories of Conservation Practice - Rationale for conservation; History of conservation movements in India and World View. Pioneers of conservation: Viollet Le Duc, John Ruskin, William Morris, and others. Scope, principles and approaches to conservation: from material based to value based to living heritage approach. International and National approach to conservation: Role of UNESCO, other allied bodies and institutions, ASI, INTACH. World Heritage sites and nomination processes. Historic urban landscapes approach: Urban conservation as an interdisciplinary and multidisciplinary process.

Unit 2: Heritage Legislations and practices - Approaches to integrated conservation in India with select examples explaining urban conservation tools and methods: Inner city regeneration, adaptive reuse, infill development etc. Institutional framework for urban conservation and renewal strategies in India Methods of documentation and archiving technique- scientific and manual systems, destructive and non-destructive techniques, tools for documentation

Unit 3: Morphology of historic settlement - Reading the morphology of a historic settlement and its associated region. Parameters/systems that shape historic settlements and their architectural form: the city assembled and the city shaped in the Indian context. The discourse on traditional and contemporary urbanism. Historic cities as repositories of knowledge: the Indian context

Unit 4: Integrated urban conservation approaches - History of integrated urban conservation approaches in the world with select examples: York, Chester, Bath, Bologna, Ferrara, Cairo. Approaches to integrated conservation in India with select examples explaining urban conservation tools and methods: Inner city regeneration, adaptive reuse, infill development etc. Role of anthropology in Urban Conservation: people and place concepts, identity, and functionality of spaces in city.

References

1. Material and Skills for Historic building Conservation, Blackwell Publishing, 2008. Forsyth, Michael
2. Measurement and Recording of Historic Buildings – Donhead, 1993 Swallow, Peter
3. Surveying Historic Buildings, Donhead, 1996 Watt,D & Swallow P
4. Guide to recording Historic Buildings, Butterworth, 1990. ICOMOS
5. Architectural Heritage: Inventory and Documentation, Methods in Europe, Council of Europe, 1992 Proceedings, French Ministry for education and culture

6. Manual on Systems of Inventorying Immovable Cultural Property, UNESCO, 1984 Meredith H. Sykes

ARC 7008 SPATIAL INFORMATION MAPPING AND ANALYTICS (1-0-3-3)

Objectives:

To introduce the concepts of geo-informatics and to familiarize with the associated scientific tools, their relevance and applicability in urban designing. Working knowledge on the relevant image processing and GIS software through hands-on experience will be taught. Project/s will be assigned to enable students to understand and learn the applications in the field of urban designing and development.

Course Outcome

- CO1 Explain the concepts of Geoinformatics and its application in Decision Making
- CO2 Illustrating about the remote sensing technologies
- CO3 Choose various data capturing platforms
- CO4 Analyze with spatial analytical tools and image processing techniques
- CO5 Evaluate and present the information for decision making.

Content

Unit 1 Introduction to Geoinformatics: Spatial and non-spatial data, Raster versus vector data. Planning Information Systems (PIS): Components, data needs; PIS in India – NNRMS, NUIS, NSDI, National Urban Observatory, etc. Spatial Data Infrastructure (SDI): Framework of geo-spatial data, Users and tools, Agreements on geo-spatial standards, Policies for geo-spatial data, Institutional arrangements, use of SDI for urban and regional planning.

Unit 2 Introduction to remote sensing: Introduction to Remote Sensing (RS): Types of RS (active and passive), electromagnetic spectrum (LiDAR and RADAR). Introduction to software: Coordinate systems, Geo-referencing and projections, geodetic data, Digitization and topology creation.

Unit 3 Data Capturing Platforms: Land observation satellites, aerial, ground), image interpretation, resolutions, etc. Satellite data sources – LANDSAT, IRS-LISS, CARTOSAT, IKONOS, QUICKBIRD, DEM

Unit 4 Digital Image processing: Digital image processing: enhancement, rectification, segmentation, transformation, etc. Image classification (supervised and unsupervised) and analysis (change detection), image sub-setting and mosaicking

Unit 5: Mapping: Stereo satellite data, Digital Elevation Models, etc. Introduction to Project on mapping

References

1. Peter M Atkinson. 'Geoinformatics'. Eolss Publishers. Oxford,UK. 2009. (Chap 1) (BOOK)
2. Official websites/ data sources: urbanindia.nic.in, www.isro.org, censusindia.gov.in, www.surveyofindia.gov.in, bhuvan.nrsc.gov.in, www.nuis.com, nsdiindia.gov.in, nrsc.gov.in, www.nnrms.gov.in, www.usgs.gov, etc.
3. Ian Masser, Joep Crompvoets, 'Building European Spatial Data Infrastructure', Third Edition, ESRI Press, California, USA. 2015. (Chap 1) (BOOK)
4. George Joseph. 'Fundamentals of Remote Sensing'. Universities Press. 2005. (Chap1) (BOOK)
5. Jan Van Sickle. 'Basic GIS Coordinates'. Second Edition. CRC Press. US. 2010. (Chap 1) (BOOK)
6. Kennedy, Michael. 'Introducing Geographic Information Systems with ArcGIS: A Workbook Approach', Third Edition, Wiley, US. 2013. (Chap1) (BOOK)
7. Cambell, James.B, Wynne, Rudolph R. 'Introduction to Remote Sensing'. The Guilford Press. New York. 2011. (Chap 1,2,4,5,6,10) (BOOK)
8. Official websites/ data sources: bhuvan.nrsc.gov.in,
9. Earthexplorer.usgs.gov earth.google.com, bing.com
10. Jensen, J.R. 'Introductory Digital Image Processing: A Remote Sensing Perspective' Prentice-Hall, New Jersey, US. 2005. (Chap 1 3) (BOOK)
11. Cambell, James.B, Wynne, Rudolph R. 'Introduction to Remote Sensing'. The Guilford Press. New York. 2011. (Chap 4, 12) (BOOK)
12. David Francis Maune (Eds). 'Digital Elevation Model Technologies and Applications: The DEM Users Manual'. ISBN1570830827, 9781570830822. American Society for Photogrammetry and Remote Sensing, University of Minnesota. 2007. (Chap 1) (BOOK)

ARC 7010 CRITICAL DEBATES IN URBAN DESIGN AND CITY PLANNING - II (3-0-0-3)

Objectives:

The objective of this course is to make students aware of contemporary discourse and debates in urban design and related disciplines. It intends to impart critical thinking so that contribution to such deliberations can be undertaken.

Outcomes:

- CO1: **Relate** debates in urban design and challenges faced by Indian Cities
 CO2: **Examine** critical dimensions of urban development and connections and their integration for successful policy and practice
 CO3: **Compare** context of urban design debates
 CO4: **Apply** knowledge on of urban design concepts in situating within urban development and design deliberations
 CO5: **Interpret** specific cases of urban development in terms of social cohesion, livability, walkability and similar concepts

Outline:

Unit 1: The Nature, Role and Value of Urban Design: The Problem with Thinking about or for Urban Design; Urban Design and Public Imaginary; Urban Contestation and Public Art; Urban Graffiti.

Unit 2: Density, diversity and mix of uses: The urban density assemblage, livability and density, politics of density; Politics of Land use, bye-laws and codes; Urban Politics and city structuring; Urban Genealogy and urban futures.

Unit 3: Layout and form: urban structure and grain: Making a city: Urbanity, vitality and urban design; Concept of livability and urban Indices; Urban Visions and Urban Design; Politics of Urban Futures; Gentrification, Urban – renewal, revitalization or regeneration

Unit 4: Qualities of Urban design: Character and sense of place: The characters of place in urban design; Methods of speculative cognition; Urban Ethnography to record spatial experiences; Urban Rhythms

Unit 5: Visual evaluation of urban streetscapes: Urban Design and walkability. The walkability debate in urban design. How to involve stakeholders in urban design process? Spatial justice and streetscape; Urban Graffiti and public art

References:

1. What is critical urban theory? in City by Neil Brenner
2. An Introduction to Critical Thinking by Steven D. Schafersman
3. Marshall, S. (2012) Science, pseudo-science and urban design
4. Whose Urban Design? in Journal of Urban Design by Alexander Cuthbert 08/2010
5. Urban design: requiem for an era – review and critique of the last 50 years in Urban Design International by Alexander R Cuthbert 12/2007

ARC 5104 ADVANCED ELECTIVE – II (WITH B. ARCH)

ARC 5104.2 Smart Cities,

ARC 5104.3 Urbanism

ARC 5104.4 Sustainability

ARC 5106 ADVANCED ELECTIVE – III (WITH B. ARCH)

ARC 5106.2 Smart Cities,

ARC 5106.3 Urbanism

ARC 5106.4 Sustainability

ELECTIVE-II, (WITH M.DES)

ARC 7002 Renewable energy systems,

ARC 7004 Environment and Behavior

Refer Annexure -1

SECOND YEAR / SEMESTER THREE

ARC 7201 URBAN DESIGN STUDIO-III (2-4-4-10)**Objective:**

The course deals with the complexities of the large cities, addressing the importance of its existing and future engagement with respect to stakeholders, globalization and environmental agenda. The interventions be addressed in the context of social fabric, networks (formal and informal), urban equity (infrastructure) and spatial justice.

Outcome:

CO1: Understand and critically analyse the city through the lens of Policies, Urban Design and allied domains.

CO2: Analyse the complex urban systems and develop sustainable strategies for the city.

CO3: Apply the appropriate graphical tools, research methods and representation techniques to demonstrate both analytical and proposed projects for the city.

CO4: Demonstrate the knowledge and understanding of skills learnt in the form of proposals.

Outline:

Unit 1: Introduction to the cities and their fixation both ant local and global scales, w.r.t, demographics, networks, geographical extents, socio-cultural-political affiliations, etc. through book reviews and papers published in relevant subjects/fields.

Unit 2: Literature study of urban networks (formal, informal, social etc.), stakeholder roles, urban politics, social configuration and urban contestation to analyse the city form, its periphery and growth trajectory.

Understand the urban governance structure, city-state relationship, implementation of legal statutes such as 73rd and 74th amendment and flagship schemes implemented to understand the various forces structuring everyday life in the city.

Unit 3: Through the study of the various aspects underlined in the previous units, develop a sustainable futures strategy and interventions required to face challenges of the future.

Unit 4: Prepare final report of the study along with proposals and models, demonstrating the knowledge and understanding of the city and society. Outline various interventions and demonstrating them through predictive models

Along with the regular studio, the course plan shall include in-semester term paper, poster or seminar presentation of selected topics.

References:

1. Ghel, J. (n.d.). Cities for People.
2. Ghel, J. (n.d.). Life between Buildings.
3. Heng, C. K. (n.d.). Re-Framing Urban Space: Urban Design for Emerging Hybrid and High Density Conditions.
4. Mumford, L. (n.d.). The city in History.

ARC 7203 URBAN LAND ECONOMICS (2-0-0-2)

Objectives:

To develop basic understanding of economic ideas related to land-use, land use policy and its economic significance.

To identify issues related to Real estate market, demand and supply analysis, and profitability with emphasis on Policies.

Outcomes:

CO1: Explain the concepts of urban Economics, Land value capture, Cash flow, Cost benefit analysis, profitability.

CO-2 Identify the determinants of Demand for land

CO-3 Evaluate the importance of Government intervention in Land market with housing policy.

CO-4 Suggest measures to regulate real estate market, budgeting and financing policy of the government.

Outline

Unit 1: Basics of Economics; Land as a Resource- Introduction of Land as a Resource, natural, economic and productive resource, Concepts of land resource management, Concern for land, Land Value Capture, Changing Land values in urbanized and urbanizing areas and their effects; Role of Land market economy and urban processes, Informal land market economy, land value capture taxes, Legislations – UCLRA, urban land Ceiling, Land use conversion and its effects.

Unit 2: Land as a fiscal tool, Transit oriented development and town planning schemes; Concepts of land rent, Valuation of Property- Principles and practice, Market mechanisms which influence/regulate the urban land use valuation of Property & development charges.

Unit 3: Welfare economics, principles, land values, rents, development charges, betterment fees, and property taxation. Distributive policies for social structuration and urban equity, Right to City, Tenancy and urban poor.

Unit 4: Speculative urbanism and urban entrepreneurialism, FDI in real estate sector and its long term effects. Taxes on land – property tax, stamp duty and their effect on land markets. Land use regulations and welfare; Land acquisition; Urban land policies. Cost Benefit Analysis, Risk analysis, social cost benefit analysis;

References:

1. Benjamin, S. (2008). Occupancy urbanism: Radicalizing politics and economy beyond policy and programs. *International Journal of Urban and Regional Research*, 32(3), 719-729.
2. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. *Theoretical and Empirical Researches in Urban Management*, 4(2 (11), 87-94.
3. Hubacek, K., & van den Bergh, J. C. (2006). Changing concepts of 'land'in economic theory: from single to multi-disciplinary approaches. *Ecological economics*, 56(1), 5-27.
4. TCPO (2007), "Model Guidelines for Urban Land Policy", Government of India, Ministry of Urban Development, New Delhi.
5. M.L.Singhal, (1995), "Right to property and compensation under the Indian Constitution", *J.T.R.I. Journal*, Issue -2, Luknow.
6. Martim O.Smolka, (2013), "Implementing Value Capture in Latin America: Policies and Tools for Urban Development". Lincoln Institute of Land Policy, Massachusetts, US.
7. Sebastian Morris and Ajay Pandey, (2009), "Land Markets in India: Distortions and Issues", *India Infrastructure Report*, 3iNetwork, IDFC, Oxford University Press, New Delhi.
8. Bimal Patel, Shirley Ballaney, C.Koshy and Matthias Nohn, (2009), "Reforming Urban Land Management in Gujarat", *India Infrastructure Report*, 3iNetwork, IDFC, Oxford University Press, New Delhi.
9. Vidyadhar K.Phatak, (2013), "Land Based Fiscal Tools and Practices for Generating Additional Financial Resources", Ministry of Urban Development, World Bank & Gol.
10. Directorate of Income Tax (2009), "Guidelines for Valuation of Immovable Properties", Ministry of Finance. New Delhi.
11. RICS, (2011), *RICS Valuation Standards –Global and India*, Royal Institution of Chartered Surveyors, RICS Books Imprint. UK
12. Prasanna K. Mohanty, (2014), 'Using Urban Land as a Resource', "Cities and Public policy – An Urban Agenda for India, Sage publications India Pvt. Ltd, New Delhi, pp.217-186.
13. National Institute of Urban Affairs, (2010), "Best practices on property tax reforms in India", *Research Study series No.111*, MOUD, New Delhi.
14. George E. Petreson, (2006), "Land leasing and land sale as an infrastructure financing option",
15. Dr. A. Sachithanandan, "Reading Material on Project Formulation and Appraisal", *Institute of Town Planners India*, New Delhi. (2007)

ARC 7205 THESIS PREPARATION SEMINAR (1-0-2-2)

Objectives

The programme aims to guide third semester students to undertake various reading and writing exercises in the process of identifying and refining their thesis topics.

Course Outcome

CO1: To inculcate the spirit of research in architecture by providing opportunities to read on various issues.

CO2: Methods of analysis should have a scientific basis and thorough investigative research is required from primary and secondary sources.

CO3: To train the students to the finer details of technical writing which will provide an introduction to the 'Design Thesis'.

Outline

Unit 1: This course is intended to help students to arrive at a conceptual framework for their thesis.

Unit 2: The student is expected to present the topic in the beginning of the semester which will have to be approved and reviewed periodically to a jury at the end of the semester.

Unit 3: The dissertation must comprise of an aim, the objectives, the scope and limitations of their dissertation, hypothesis (if any), methodology followed by extensive review of literature through references and documentation.

Unit 4: The extensive analysis of the project should be conducted either by observation based on data or through extensive arguments.

Unit 5: The final report at the end of course shall be a proposal that provides a detailed thesis proposal.

References:

1. Iain Borden and Kaaterina Ruedi; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2000.
2. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons 2001.

ARC 7207 INTERNSHIP SEMINAR (MLC)

Objectives

The training aims to introduce the various project based and policy based discipline in planning, architecture, landscape architecture, urban design, conservation, real estate, or other allied disciplines to expand the professional education.

Course Outcome

CO1: The student is expected to work in an architectural and urban design firm handling the large scale architectural projects to acquaint the real time practices in Urban Design related projects.

CO2: To provide a platform for critical thinking that extends beyond regulatory considerations, and instead embraces wider social, economic, environmental and political concerns, with a focus on urban design theories and principles.

Outline

Unit 1: The student is expected to conduct himself/herself with the following; a) administration of office, b) soliciting and obtaining projects, c) client meetings, d) site visits, e) drawings and detailing and f) design process and presentation

Unit 2: For the viva examination, the following items need to be presented a) statement indicating the various types of works done by the student, b) drawings related to projects with which the student was associated c) photographs of project sites and d) any other material in support of student's involvement in the work.

Unit 3: The practical Training is of - week duration and student should immediately precede the commencement of regular course work of third semester. On the completion of training period the students should submit a report that would be evaluated

Reference:

1. Bureau of Indian Standards. National Building Code, 2010.
2. Barnett, Jonathan. Introduction to Urban Design, Icon (Harpe); 1st edition, 1982. ISBN: 978-0064303767.
3. Barnett, Jonathan. Urban Design as Public Policy, McGraw-Hill Inc.,US, 1974. ISBN: 978-0070037663.

ELECTIVE MODULE-III

ARC 7015 URBAN SOCIOLOGY (2-0-2-3)

Objective:

The students will be able to understand and apply knowledge of socio-spatial, socio-cultural and socio-economic aspects to comprehend urban development.

Outcome

CO1: Apply theories of urban social formations to analyze social production of space

CO2: Apply theories to comprehend **Space and Urban Social Structure**

CO3: Apply theories of migration and urban informality to understand their relationship with the urban pattern and politics

CO4: Outline theories of urban citizenship, terrain of law and concepts such as right to the city

Outline

Unit 1- The Field of Urban Sociology: Theories of urban social formations in the city; Schools of Urban Sociology – Chicago, Frankfurt etc. Social Production of Space; Contestations over urban space; Ethnography; Theories of Urban - Assemblage, Planetary, Networked, Post-Colonial, Neo-Liberal; Bourgeois Urbanism;

Unit 2- Space and Urban Social Structure: Urban space, race, ethnicity and gender; Gender mainstreaming in urban discourses; Space and politics; Urban Contestations; Governmentalities of Urban; State and Space; Neo-liberal space; elites, political power, and urban dynamics; Urban Imaginaries and spatial visions; Discourse on Good Anthropocene; Climaginaries; Algorithmic Cities; Platform urbanism

Unit 3- Space and Politics: Review of flagship urban development projects and city making in post-independent India- Politics and Visions; Urban Entrepreneurialism; Comparative Urbanism; Southern Urbanism; Rebel Cities; Globalization and cities

Unit 4-Urban Contestation: Conflicts between quality of life, environmental conservation, and livelihood of the people; Migration to the city, Urban poverty, Informality and homelessness; Social networks, Spatial Dispossession; Occupancy Urbanism; ethnic conflicts, immigration, housing and slums, transport justice ,

Unit 5-Space and Terrain of Law: Questions of urban citizenship and Right to the City; Eminent Domain; Policy brokers and policy entrepreneurs; Space, capital and Globalization (capitalism and urban dynamics)

Reference

1. Lefebvre, H., & Nicholson-Smith, D. (1991). The production of space (Vol. 142). Blackwell: Oxford.
2. Roy, A. (2011). Slumdog cities: Rethinking subaltern urbanism. *International journal of urban and regional research*, 35(2), 223-238.
3. Bhan, G. (2019). Notes on a Southern urban practice. *Environment and Urbanization*, 0956247818815792
4. Aylett, A. (2010). Conflict, collaboration and climate change: participatory democracy and urban environmental struggles in Durban, South Africa. *International Journal of Urban and Regional Research*, 34(3), 478-495.
5. Harvey, D. (2003). The right to the city. *International journal of urban and regional research*, 27(4), 939-941.
6. Harvey, D. (2008). The right to the city.

ARC 7017 URBAN ENVIRONMENT & LANDSCAPE DESIGN (2-0-2-3)

Objective:

- To comprehend urban environment as a whole & landscape a part of it.
- To familiarise with essentials of urban landscape.
- To understand incorporation of landscaping concerns in the process of site planning.
- To explore various details required to design an urban landscape.
- To learn various concepts & factors related to sustainability in urban landscape.

Outcome

CO1: Ability to define urban landscape & landscape as a component of urban environment.

CO2: Knowledge of fundamentals of urban landscape

CO3: Ability to incorporate of landscaping Concerns in the process of site planning

CO4: ability to give details required to design an urban landscape.

CO5: Understanding of various concepts & factors related to sustainability in urban landscape

Outline

Unit 1: Understanding Urban Environment - Urban Environment, Basis of Urban Environment. Components of Urban Environment. Organization and Process, Urban Socio-Economic structure, Urban Development, Policies and Strategies, Legal Framework. Landscape in Urban Environment.

Unit 2 : Fundamentals of Urban Landscape - Ecology and Urban Nature, Historical Perspective of Landscape Design, Perception of Landscape through Ages, Natural & Man-Made Elements of Landscape, Principles of Landscape Design. Socio-Ecological interactions & Place Making.

Unit 3: Site Planning & Landscape - Introduction to Site planning & Ecology, Site planning principles, Ecological factors in Site Evaluation, Site resource systems, Landscape Illumination. Landscape & it importance in the city's ecological Structure

Unit 4: Factors of Urban Landscape Design- Physiography, Geomorphology, Hydrology, Microclimate, Vegetation, Wild Life, Cultural Resources, Urban Vegetation, Planning & Maintenance, Ecological Planning Processes, Road Layout and Parking, Site Grading and Drainage, Sewerage, Water Supply and Electricity. Development of landscape drawing & Details.

Unit 5 (Co5): Sustainable landscape Design - Water conserving landscape, Site design for energy conservation sustainable landscape, Conservation of embodied energy thro landscape design. Human thermal comfort in outdoor spaces, etc (Use of software like Envi-met for to analyze impact of landscape on outdoor thermal comfort).

Reference

1. Harris, C. W., & Dines, N. T. (1998). Time-saver standards for landscape architecture. McGraw-Hill.
2. LaGro, J. A. (2013). Site analysis: Informing context-sensitive and sustainable site planning and design. John Wiley & Sons.
3. MEBsh, W. M.(1991). Landscape Planning Environmental Applications, John Wiley & Sons Inc.
4. Robers D. Brown & Terry J. Gillespie. (1995). Microclimatic Landscape Design, John Wiley & Sons Inc.
5. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.

ARC 7019 PROJECT MANAGEMENT (2-0-2-3)

Objective

To understand project management principles relevant to urban design and development

To understand project formulation and feasibility analysis and social cost benefit analysis.

Outcome

CO1: Procurement in Urban Development

CO2: Understanding of Management, teamwork and roles of professionals

CO3: Techniques of Resource Management

CO4: Entrepreneurship in Urban Development

CO5: Understanding Project Feasibility

Outline

Unit 1: Applied management techniques in large scale urban projects. Application of project management tools like CPM and PERT networks in urban infrastructure and development projects.

Unit 2: Concept of project management, relevance of project management to urban planning and design realm. Role of Urban Designers in the project management. Role of Consultants in urban development projects.

Unit 3: Introduction to networking of projects and use of CPM and PERT networking and scheduling tools. Project monitoring – updating of networks, advantages and limitations of Bar and Milestone charts. Detailed study of project management in flagship urban projects – housing (PMAY), urban renewal (JNNURM), infrastructure (AMRUT), Smart Cities .

Unit 4: Project management and capacity building, urban innovations, Corporate Social Responsibility and cities

Unit 5: Project formulation and feasibility analysis; Social cost benefits analysis; IRR and EIRR

References

1. Grabher, G. (2004). Learning in projects, remembering in networks? Communitarity, sociality, and connectivity in project ecologies. *European urban and regional studies*, 11(2), 103-123.
2. Achterkamp, M. C., & Vos, J. F. (2008). Investigating the use of the stakeholder notion in project management literature, a meta-analysis. *International Journal of Project Management*, 26(7), 749-757.
3. Berg, S. V., & Mugisha, S. (2010). Pro-poor water service strategies in developing countries: promoting justice in Uganda's urban project. *Water policy*, 12(4), 589-601.
4. Durand-Lasserve, A., & Royston, L. (Eds.). (2002). *Holding their ground: Secure land tenure for the urban poor in developing countries*. Earthscan.
5. Lloyd-Jones, T., & Rakodi, C. (2014). *Urban livelihoods: A people-centred approach to reducing poverty*. Routledge.
6. Awomeso, J. A., Taiwo, A. M., Gbadebo, A. M., & Arimoro, A. O. (2010). Waste disposal and pollution management in urban areas: a workable remedy for the environment in developing countries. *American Journal of Environmental Sciences*, 6(1), 26-32.

ELECTIVE-III (WITH M.DES)

ARC 7005 Net Zero Energy Buildings,

ARC 7007 Energy Management

Refer Annexure -1

SECOND YEAR / SEMESTER FOUR

ARC 7202 THESIS

The project mainly deals with demonstration of acquired skill set. The thesis project would define the final project representing the knowledge gained and wisdom to implement it in situations that demand such an intervention. It can be a research thesis, enquiring into a specific research question or testing a hypothesis.

The course converges the learning outcomes of preceding courses, enables the students to formulate, customize and demonstrate their own forte in Urban Design and Development paradigm and suggests to discuss through their acquired skills of representation and techniques. The process of comprehending the urban challenges and demonstration of required skill sets would lead to design or prescribe a proposal under constant guidance of the respective tutor and periodic juries for feedbacks

Objective

The objective to the course is to primarily acquire and assimilate the data-form and design a prospective solution so as to cater to the identified urban issues. Considering the specialisation as pre-defined set of modules and skill set, the thesis project would enable the students to define their own project accordingly and would be assessed on the basis of it. Adding up the clause of “Customisation”, students would define their own thrust areas while identifying the urban issues and would cater to it through that and the assessment would acknowledge the implementation of the identified thrust area. The thesis project would work as culmination of acquired knowledge and wisdom to choose the design strategy or process accordingly.

Outcome

CO1: Demonstrate fundamentals and conceptual framework of focused study

CO2: Interpret the site context and collect required data for the focused study

CO3: Analyze the data collected on parameters.

CO4: Propose urban design intervention for sustainable and people centric design in an urban context.

Outline

Unit 1: Identification of issues and project formulation with supporting literature for argument/discourse

Unit 2: Issue study/ Site Study and identification of relevant supporting cases, data and case studies

Unit 3: Analysis methodologies and derivations; Defining “thrust area”

Unit 4: Strategy/Proposal Design and demonstration

References

1. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring. Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.

ARC 7204 OPEN ELECTIVE (MLC)**ARC 7206 ONLINE COURSES: SWAYAM AND NPTEL (MLC)****ANNEXURE -1****ELECTIVE MODULES WITH (With B.Arch.)****Note: Adapted From B. Arch 2019 (Revised 2020) Syllabus****ARC 5105.2 - ADVANCE ELECTIVE – I (SMART CITIES) (3 0 0 3)****Objective:**

To understand the Concepts, Methods and models of e-Governance, Citizenship, ICT acts and Initiatives.

Outcome:

To get acquainted with Smart Governance, including the role of ICT, public policy and administration

Course Content:

Module 1: Introduction & background, Overview of Smart Systems and ICT (Information and Communication Technology) at sectoral level (neighbourhood, ward etc.) covering attributes of physical and social infrastructure; Real Time Sensing Technologies (SCADA).

Module 2: Real time Security, Surveillance and Response Systems for emergency services and Disaster Management Systems.

Module 3: Intelligent Transport Systems – Parking, Non-Motorized Transport system (Bicycle etc.) Last mile connectivity systems, Real Time Transport Information Systems (Dashboard etc.)

Module 4: Tools and Systems for Real Time Environment Information Capture and Display- Weather, Ambient Air Quality etc. Example: Cline line modelling, Box Modelling, PLC (Programmable Logic Controllers) and Actuators etc.

Module 5: Undertaking a Holistic Project Design based upon learning from previous units

References:

1. Stimmel, C. L. (2015). Building smart cities: analytics, ICT, and design thinking. Auerbach Publications.
2. Idris, M. Y. I., Leng, Y. Y., Tamil, E. M., Noor, N. M., & Razak, Z. (2009). Car park system: a review of smart parking system and its technology. Information Technology Journal, 8(2), 101-113.
3. Khedo, K. K., Perseedoss, R., & Mungur, A. (2010). A wireless sensor network air pollution monitoring system. arXiv preprint arXiv:1005.1737.

4. Geertman, S., Ferreira, J., Goodspeed, R., & Stillwell, J. C. H. (Eds.). (2015). Planning support systems and smart cities. Switzerland: Springer.
5. Shepard, M. (2011). Sentient city: Ubiquitous computing, architecture, and the future of urban space. The MIT press.

ARC 5105.3 – URBANISM (3-0-0-3)

Objective:

- To Study the Basics of Land Use Planning
- To understand the attributes of Land Use Planning
- To Study the Basics of Transportation Planning
- To understand the attributes of Transportation Planning
- To Study the Basics of Environmental Planning
- To understand the attributes of Environmental Planning
- To Study the Basics of Planning Economics
- To understand the feasibility of a Planning Project
- To Study the Socio - Economic Impact Assessment

Outcome:

- Outline the Relation between the Natural Landscape and the Physical Planning, Land Suitability Principles, Land Capacity Indexing, Carrying Capacity.
- To develop an understanding of the Modal Structure about urban transportation systems and its relationship with the built environment.
- Classifying the different Environmental Policies that are incorporated in the Planning Domain and analyze its necessities and intent
- To categorize the various tools required to assess the Socio - Economic Impact, the relation between the Population and the services delivered in the city and the outcomes of the different layouts

Course Content:

Module 1 - Basic of Land use planning; Introduction to the Terminologies related to Land Use Planning, Geography, Physical Boundaries, Population Density, FAR Index, City Profiling, Demography, Zoning Classification, Types of Zoning, etc.

Module 2 - Basics of transportation Planning; Concepts of accessibility versus mobility; Traffic Surveys, Travel demand analysis; Parking demand estimation; Pedestrianization; Mass Transit Systems – road and rail-based systems; Debates about transit choices; Debates on private versus public transport systems.

Module 3 - Basics of Environmental Planning; Introduction to Environment & Built Environment, Sustainable Planning Approach (SDG Goals in the Global as well as the Indian Context), Green and Clean Approach for planning Future Cities, Compact City Concept, Global Warming Measures (Public Transport over Private Ones), Vulnerability Quotient.

Module 4 - Basics of Planning Economics; Definitions and Terminologies related to Land Economics, Different types of Industries (Primary, Secondary, etc.), Types of

Market, Globalization and its effect on the economics of the country, Land Value Capture, Policies related to Land Economics (Urban Land Ceiling Act, etc.).

Module 5 - Socio - Economic Assessment; Health and well-being, Sustainable land access and use, Protecting heritage and cultural resources, Equitable business and employment opportunities, Population sustainability, Adequate services and infrastructure, Adequate sustainable income and lifestyle.

References:

1. Allen G. Noble, et.al, (eds). (1998). *Regional Development and Planning for the 21st Century: New priorities New Philosophies*. Aldershot, USA.
2. Mosse, D. (1998). Process-oriented approaches to development practice and social research. *Development as process: Concepts and methods for working with complexity*, Routledge, London.
3. Walter I. (1960). *Methods of Regional Analysis – An Introduction to Regional Science*.
4. Chand, M., & Puri, V. K. (1983). *Regional planning in India* (Vol. 1). Allied Publishers, New Delhi.
5. Hamilton, F. I. (1983). *Industrialization in developing and peripheral regions*. Routledge.
6. Haughton, G., & Hunter, C. (2004). *Sustainable cities*. Routledge.
7. Jenks, M., & Dempsey, N. (2005). *Future forms and design for sustainable cities*. Routledge.
8. Tiwari, G. (2002). Urban transport priorities: meeting the challenge of socio-economic diversity in cities, a case study of Delhi, India. *Cities*, 19(2), 95-103.

ARC 5105.4 - SUSTAINABILITY (3-0-0-3)

Objective:

This course will help the students to get acquainted and outline the Life Cycle Assessment and Environment Management Systems.

Outcome:

After the completion of the course, the student will be able to:

- Define Life cycle assessment and outline the process of it. (C1, C2)
- Demonstrate the software's associated with heat transfer and Hygrothermal Analysis, Thermal Comfort Evaluations and energy generating facades in LCA. (C2)
- Relate the importance of Life cycle assessment in Environment Management Systems. (C2)
- Explain the implementation of Environment management system and the areas where it can be applied to. (C2)

Course Content:

Module 1- Life Cycle Assessment – Evolution, Stages in Product of LCA, Code of Good Conduct for LCA

Module 2 - Procedure for LCA - Defining the Goal and Scope, Analysing the Inventory, Assessing Environmental Impact, Evaluating Environmental Profiles

Module 3 - Applications of LCA, Use of software / Computational Skills for LCA, Case Studies for LCA

Module 4 - Environment Management System Standards – Core elements of EMS, Benefits of EMS, Certification Body Assessments of EMS, Documentation for EMS; EMS Standards: ISO 14000 series – Evolution, Principles and Structures, Supporting Systems, EMS Specification Standards: ISO:14001

Module 5 - Implementation of EMS Conforming to ISO 14001; Benefits of Implementing ISO 14001: An Indian Scenario

References:

1. ISO.(1997). Environmental Management – Life Cycle Assessment – Life Cycle assessment – Life Cycle Impact Assessment. ISO/ CD 14 042.1, 1997.01.15
2. Linfors L-G, Christiansen, K., Hoffman, L., Virtanen, Y., Juntilla, V., Hannsen O-J, Ronning, A., Ekvall, T., Finnveden, G., (1995). Nordic Guidelines on Life Cycle Assessment, Copenhagen: Nordic Council of Ministers.
3. ISO.(1996).Global Green Standards: ISO 14000 and Sustainable Development, International Institute for Sustainable Development, Manitoba
4. Ghosh, S. (2010). Examining carbon emissions economic growth nexus for India: a multivariate cointegration approach. Energy Policy, 38(6), 3008-3014.
5. Pacheco-Torgal, F., Cabeza, L. F., Labrincha, J., & De Magalhaes, A. G. (2014). Eco-efficient construction and building materials: life cycle assessment (LCA), eco-labelling and case studies. woodhead Publishing.
6. Kalbar, P. P., Karmakar, S., & Asolekar, S. R. (2014). Life cycle-based environmental assessment of municipal wastewater treatment plant in India. International Journal of Environment and Waste Management, 14(1), 84-98.
7. Wernet, G., Stucki, M., Shenoy, M., & Muthusezhiyan, N. (2011). Establishing a data framework for life cycle management in India. In LCM 2011 Conference. Available at: www.lcm2011.org/papers.html. (Accessed 7 July 2016).

ARC 5104 ADVANCED ELECTIVE – II, (WITH B. ARCH)

ARC 5104.2- (SMART CITIES) (3 0 0 3)

Objective:

The students will be able to understand the Concept of Smart Cities, outline Systematic and strategic planning approaches for developing, managing and implementation of Smart City design.

Outcome:

1. The students will be able to outline application of Smart Technologies in Infrastructure design and management.
2. The students will be able to apply smart strategies in solving various public policy and governance issues
3. The students will be able to apply smart strategies to address infrastructure challenges confronting urban living.
4. The students will be able to appraise the smart city strategies for social and environmental sustainability

Course Content:

Module 1 - Introduction & background, Overview of Smart City Concept. Smart Growth, Smart Urbanism, Smart Networks, Real Time Sensing Technologies etc.

Module 2 - The role of technology, data and urban analytics in managing urban transformation, addressing public delivery services, businesses, institutions and other stakeholders of the city

Module 3 - Public systems (ULB, state, federal government, NGO's etc.) in developing smart cities, Standards and Data policy climate

Module 4 - The connections between Urban Innovation, Social Planning, Enterprise and Future Smart Cities, Finance and Global Circuits of Capital Flow (World Bank, ADB etc.) in Smart approaches

Module 5 - Challenges to Smart Cities- Social Acceptability and Sustainability, Monitoring and tooling of Smart Infrastructure.

References:

1. Goldsmith, S., & Crawford, S. (2014). The Responsive City: Engaging Communities Through Data-Smart Governance. John Wiley & Sons.
2. Mele, N. (2013). The end of big: How the Internet Makes David the New Goliath. Macmillan
3. Stimmel, C. L. (2015). Building smart cities: analytics, ICT, and design thinking. Auerbach Publications.
4. Townsend, A. M. (2013). Smart cities: Big data, civic hackers, and the quest for a new utopia. WW Norton & Company

ARC 5104.3 -URBANISM (3-0-0-3)

Objective:

During the last several years, there has been substantial and important growth in the application of quantitative analysis, i.e., operations research/management science, statistics, and related arenas, to interdisciplinary problems arising in the area of socio-economic planning and development. The module aims to highlight the importance of socio-economic aspects and methodologies.

- To study the process of quantification and assessment in planning processes.
- To understand the importance of Vulnerability indexing as a beginning to attain resilience as objective.

- To understand various Neo- modernist urban strategies as call of need and time.
- To examine and understand the current strategies on account of efficiency and productivity to humans.
- To understand environmental sensitivity in terms of socio-economic betterment.
- To read and examine various participant elements contributing to environmental design.
- To understand the word self-sufficient as sustainable concept.
- To identify various resources and elements of planning for self-sufficiency.

Outcome:

- To understand Socio-Economics and its relevance in Habitat design and management
- To understand and experiment with Indexing principles and methodologies
- To make use of Neo modernist strategies and issues
- To develop Sensitivity towards environmental design with socio economic growth as discourse
- To apply Prescription of self-sufficiency as frugal and sustainable practice in planning discourse

Course Content:

Module 1 - Introduction to Socio-Economic aspect of Planning; Importance of social economic perspective and outcomes. Holistic development and socio-economic inclusions. Existing cases as examples and frameworks.

Module 2 - Indexing principles and methodologies; Introduction to Social and economic resilience indexing; introduction to social and economic vulnerability indexing; inter-relation of resilience and vulnerability. Identification through cases.

Module 3 - Neo Modernist strategies and issues; Introduction to Neo modernist urban strategies with respect to current issues; Human Centric Development through perspective of Socio-Economic paradigm. Role of Communication and technology in planning evolution and habitat management; Impact assessment

Module 4 - Environmental Sustainability & Socio-Economic Planning; Environmental sustainability with regards to socio-economic discourse. Form & ecology, footprints assessments; waste management; assessment of services; environmental ecology.

Module 5 - Self Sufficiency and attributes; Concept of Self Sufficiency in planning. Core area identification- Information, Matter, Water, Mobility, Energy, Buildings, nature; Identification of consumers in terms of Housing, facilities, public space and tertiary consumptions; Waste as resource.

References:

1. Bramley, G., & Power, S. (2009). *Urban form and social sustainability: the role of density and housing type*. Environment and Planning B: Planning and Design, 36(1), 30-48.

2. Frey, H. (2003). *Designing the city: Towards a more sustainable urban form*. Taylor & Francis.
3. Dizdaroglu, D., Yigitcanlar, T., & Dawes, L. (2012). *A micro-level indexing model for assessing urban ecosystem sustainability*. *Smart and sustainable built environment*, 1(3), 291-315.
4. Oktay, D. (2012). *Human sustainable urbanism: In pursuit of ecological and social-cultural sustainability*. *Procedia-Social and Behavioral Sciences*, 36, 16-27.
5. Knox, P., & Pinch, S. (2014). *Urban social geography: an introduction*. Routledge.
6. Manzi, T., Lucas, K., Jones, T. L., & Allen, J. (Eds.). (2010). *Social sustainability in urban areas: Communities, connectivity and the urban fabric*. Routledge.
7. Shaftoe, H. (2012). *Convivial urban spaces: Creating effective public places*. Routledge.
8. Aurigi, A. (2016). *Making the digital city: the early shaping of urban internet space*. Routledge.

ARC 5104.4 – SUSTAINABILITY (3-0-0-3)

Objective:

Understanding the Concept of Environmental Management Techniques and Environmental Design

Outcome:

After the completion of the course, the student will be able to:

- Understanding of environment Management techniques and technology. (C2)
- Developing database to develop environment profile. (C3)
- Experiment with various tools and its use in forecasting, assessing status and monitoring environmental parameters. (C3)
- Principles of risk assessment and mapping techniques. (C2)
- Development of environment design for product, process, built environment and planning scales. (C3)

Course Content:

Module 1 - Environment Management Techniques – Environment Monitoring, Modelling – (Forecasting and Growth Modelling), Sensitivity Analysis

Module 2 - Application of Remote Sensing and GIS in Environment Management, Environmental Profile, Environmental Technology Assessment

Module 3 - Environmental Risk Assessment – ERA in Industry, Ecosystem Approach to Risk Assessment; Rapid Urban Environmental Assessment; Eco-Mapping

Module 4 - Environmental Design – Principles, Benefits, Motivation, ED and Other Environmental Practices; ED for Manufactured Products – ED consideration in Product Life Stages. ED Tools for Products, Concept of Eco Labelling

Module 5 - ED for Buildings – Green Buildings, Principles of Green Buildings, ED strategies for Building Construction; ED for Development Planning – Framework and examples in Indian Context.

References:

1. Meadows, D. H., Meadows, D. L., Randers, J., (1992). Beyond the Limits, Global Collapse or a Sustainable Future. Earthscan Publication Limited, London.
2. Richardson, C. J., (1994), Ecological Functions and human values in wetlands: a framework for assessing forestry impacts. Wetlands 14: 1-9.
3. UNESCO, (1978). Tibilisi Declaration: Final Report of the Intergovernmental Conference on Environmental Education,
4. Belmane, I., (1999). An Eco-innovation: cathode ray tube recycling at IBM Sweden, Journal of Sustainable Product Design, Issue 9, April 1999, Centre for Sustainable Product Design, Surrey, UK
5. Brown, L. R., and Shaw, P., (1982). Six steps to a Sustainable Society, World Watch Paper No. 48. World Watch Institute, Washington.
6. Rowledge, L. R., Barton, R. S., and Brady, K. S., (1999). Mapping the Journey: Case Studies in Strategy and Action towards Sustainable Development. Greenleaf Publishers, UK

ARC 5106 ADVANCED ELECTIVE – III (With B.Arch.)

ARC 5106.2 - SMART CITIES (3 0 0 3)

Objective:

The students will be able to develop project design, management, and implementation; evaluate risk analysis of Smart Infrastructure; develop strategies for efficient resource management and deployment.

Outcome:

- The students will be able to outline frameworks to anticipate smart futures
- The students will be able to apply analytical skills in developing strategies for resource management in smart city development.
- The students will be able to develop project management strategies for smart city development and functioning
- The students will be able to design smart infrastructures (any one)

Course Content:

Module 1 - Smart Cities and Sustainability Transitions; STI's-Socio technical Imaginaries, Beckert's Fictional Expectation Model, Visioning Transition Management through Smart Cities.

Module 2 - Resource Management, Project Design, Costing, Financial Feasibility (Cost Benefit Analysis, IRR) Economic Feasibility and Tariff Management Structures; tariff designs for demand response.

Module 3 - Smart Infrastructure design (Business plan of one to two infrastructures) on various payback periods; Cash flow analysis; Risk Identification, Risk Analysis - Qualitative (risk metrics) and Quantitative, and Risk Evaluation; Sensitivity Analysis.

Module 4 - Project Management and Project Analysis for Smart Infrastructure; Operation & Management (O&M) Models, Financial Modelling -Public Private Partnerships, use of VGF, Life Cycle Analysis for implementation etc.

Module 5 - Undertaking a Holistic Project Design of a Smart Infrastructure using inputs from previous units.

References:

1. Al-Hader, M., & Rodzi, A. (2009). The smart city infrastructure development & monitoring, Theoretical and Empirical Researches in Urban Management, 4(2 (11), 87-94.
2. Ansell, J., & Wharton, F. (1992). Risk: analysis, assessment, management, John Wiley & Sons Inc.
3. Hajer, M. A., & Pelzer, P. (2018). 2050—An Energetic Odyssey: Understanding 'Techniques of Futuring' in the transition towards renewable energy. Energy Research & Social Science, 44, 222-231.
4. Kneifel, J. (2010). Life-cycle carbon and cost analysis of energy efficiency measures in new commercial buildings, Energy and Buildings, 42(3), 333-340.
5. Picon, A. (2015). Smart Cities: A Spatialized Intelligence, John Wiley & Sons.
6. Varian, H. R. (1917), Intermediate microeconomics: Modern approach.

ARC 5106.3 - URBANISM (3-0-0-3)

Objective:

Sustainable Urbanism is a recent term prevalent in urban design and planning. Within the contemporary metropolitan environment, it is rooted in study of sustainability and urban design in a rapidly urbanizing world. Though the terminology benefits from the debates around the definition(s) and meaning(s) of "sustainability," it lacks a comprehensive understanding of "urban design." The intent is to equip prospective participants with modern practices in terms of efficiency

Outcome:

- To explain the scope of sustainability as concept
- To classify the different terminologies, indicators, concepts, principles and elements of Sustainable Urbanism
- To assess the understanding of different parameters and concepts with context variation.
- To demonstrate the participatory process as a concept of Sustainable Urbanism.

- To identify combinations and prospects of new concepts through cases and processes by studying various modern practices of sustainability.

Course Content:

Module 1 - Introduction to Sustainable Urbanism: Introduction to urbanism and environment as a combination; sustainability as term and concept, introduction to sustainable Urban Development through practices; resource efficiency management- Community, economy & environment; Ecological services

Module 2 - Elements and principles of sustainable Urbanism: Introduction of newly evolved words in conscious- sustainable urbanism- Green City, Regional city, Dispersed city, Compact city, Virtual city, informational city; attributes and identification through cases; contextual sustainable practices; Paradigm shift- Understanding sustainability as a process

Module 3 - Sustainable Urbanism Concepts: Sustainable urbanism concept- Co design-Co relations; Interventions; Metabolism; Layers Approach; Proximity. Guiding principles and derivations of Sustainable urbanism concept- Spatial; Content and Process, Environmental Education, Eco - Mapping, Environmental Profile, lighting principles related to Urbanism – Light imprint Urbanism, Circadian lighting strategies, U.C. Davis protocol on lighting

Module 4 - Participatory process in Sustainable development: Participatory process in sustainable development; Utility of Participatory process in Sustainable Development; Participatory development models and practices

Module 5 - Sustainable practices & Environmental Management Techniques: Keys and modern practices to resource respect, management and allocation- Conservation & urban development; Mixed use development as concept to efficiency; Digital parametrises as a tool to volumetric efficiency; Environmental - Monitoring, Modelling (Forecasting & Growth), Sensitivity Analysis, Application of Remote Sensing & GIS in EM, Environment Technology Assessment, Environment Risk Management.

References:

1. Farr, D. (2011). *Sustainable urbanism: Urban design with nature*. John Wiley & Sons.
2. Wheeler, S. M., & Beatley, T. (Eds.). (2014). *Sustainable urban development reader*. Routledge.
3. Kim, H. (2013). Urbanism in the Age of Climate Change, by Peter Calthorpe. *Berkeley Planning Journal*, 26(1).
4. Low, N., & Gleeson, B. J. (2005). The green city. *Sustainable Homes, Sustainable Suburbs*. Sydney.
5. Burton, E., Jenks, M., & Williams, K. (2003). *The compact city: a sustainable urban form?*. Routledge.
6. Ferrão, P., & Fernández, J. E. (2013). *Sustainable urban metabolism*. MIT press.
7. Isenstadt, S., Petty, M. M., & Neumann, D. (2014). *Cities of light: Two centuries of urban illumination*. Routledge.

8. Barrionuevo, J. M., Berrone, P., & Ricart, J. E. (2012). Smart cities, sustainable progress. *IESE Insight* 14: 50–57.
9. Ghai, D., & Vivian, J. M. (2014). *Grassroots environmental action: people's participation in sustainable development*. Routledge.

ARC 5106.4 - SUSTAINABILITY (3 0 0 3)

Objective:

To understand the economic aspects associated to the Environmental Management

Outcome:

After the completion of the course, the student will be able to:

- Demonstration of Life Cycle Analysis of project. (C2)
- Understanding of the concept of Total cost (Fixed + Variable). (C2)
- Make use of Payback Time. (C3)
- Make use of Internal Rate of Return. (C3)

Course Content:

Module 1 - Economics and the Environment - Introduction, Environmental Costs and Benefits, Environmental Taxes, Environmental Accounting.

Module 2 - Environmental Valuation - Categorizing Environmental Values, Valuation Techniques, Valuing Environmental Amenities

Module 3 - Economics of Natural Resources - Fisheries, Forestry, Water Use and Agriculture

Module 4 - Environment and Regional Economics

Module 5 - Ecological Economics

References:

1. Kahn, M. E. (2007). *Green cities: urban growth and the environment*. Brookings Institution Press.
2. Kulkarni, V., & Ramachandra, T. V. (2009). *Environmental management, Commonwealth of learning, Canada and Indian Institute of Science, Bangalore*
3. Goodstein, E. S., & Polasky, S. (2005). *Economics and the Environment* (p. 32). Hoboken, NJ: Wiley.
4. Pearce, D. W., & Turner, R. K. (1990). *Economics of natural resources and the environment*. JHU Press.
5. Pearce, D. W., & Warford, J. J. (1993). *World without end: economics, environment, and sustainable development*. Oxford University Press.
6. Pearce, D., Barbier, E., & Markandya, A. (2013). *Sustainable development: economics and environment in the Third World*. Routledge.
7. Siebert, H., & Siebert, H. (1981). *Economics of the Environment* (pp. 16-17). Massachusetts: Lexington Books.

ELECTIVE MODULES WITH (WITH M.DES)

Note: Adapted from M.Des. Sustainable Design 2020 Syllabus

ARC 7002: RENEWABLE ENERGY SYSTEMS: (2 0 2 3)**Objectives**

To understand the supply side management of energy on site through different renewable sources.

Outcomes

After completion of this course the student will be able to:

1. Estimate the appropriateness of different types of Renewable energy systems in different projects.
2. Design the Renewable energy system for different projects.

Outline

Assessment of current and potential future energy systems, covering resources, extraction, conversion, and end-use technologies, with emphasis on meeting regional and global energy needs in the 21st century in a sustainable manner. Various renewable and conventional energy production technologies, energy end-use practices and alternatives, and consumption practices in different countries. Stand-alone systems, Grid Interactive Systems, Hybrid Systems. Quantitative framework to aid in evaluation and analysis of energy technology system proposals in the context of engineering, political, economic, and environmental goal, using different tools like PV Watts, etc.

References

- Quaschnig, V., (2016), Understanding Renewable Energy Systems, 2nd edition, Routledge
- Luo, F.L., Hong, y., (2017), Renewable Energy Systems: Advanced Conversion Technologies and Applications, 1st Edition, Routledge

ARC 7004: ENVIRONMENT AND BEHAVIOR: (2 0 2 3)**Objectives**

To understand Environmental Attitude & behaviour.

To understand relation between behaviour & immediate environment.

Outcomes

After completion of this course the student will be able to:

3. Know various environmental factors affecting the behaviour of users of the built environment.
4. Consider the relation of environment Behaviour & Elements of climate while designing.

Outline

Prediction of environmental attitudes and behaviour. Environmental assessment. Environmental Perception and cognition. Perspectives on perception, learning, habituation, and perception of change. Models and acquisition of spatial cognition and cognitive maps. Wayfinding, characteristics, settings.

Introduction to the theories of Environment-Behaviour relationships. The nature and function of theories. Arousal approach, stimulation approach, Adaptation level, Behaviour constraint, and Environmental stress approach. Barker's ecological psychology approach.

Environment and Behaviour studies related to Noise, Weather, Climate, Territoriality, Disasters, Crowding. Issues related to the built environment such as the design of residential, institutional, work, learning and leisure environments.

References

Morgan, T., & Clifford, "Introduction to Psychology", Tata McGraw - Hill Publications New York, 1983.

Kayem, S.M., "Psychology in relation to design" Dowden, Hutchinson and Ross, 1973.

Hall, E.T., "The Hidden Dimension" New York, Doubleday, 1966.

Bell, A. Paul, Greene, C. Thomas, Fisher, D. Jeffrey, Baum Andrew, "Environmental Psychology" Harcourt Brace College Publishers, New York, 1996.

ARC 7001: DATA SCIENCE: (1 2 0 3)

Objective:

To equip participants with an understanding of tools and techniques used for handling, managing, analyzing and interpreting data.

Outcomes

An in-depth understanding and skills of data structure and data analysis

The managerial understanding of the tools & techniques used in Data-Science and Machine Learning

The skills to make data-driven, real-time, day-to-day organizational decisions

Outline

This course is an introduction to statistical data analysis. Topics are chosen from applied probability, sampling, estimation, hypothesis testing, linear regression, analysis of variance, categorical data analysis, and nonparametric statistics.

This is an introductory statistics class, assuming probability as a prerequisite. We will review probability, discuss sampling techniques, data summarization, common sampling distributions, statistical inference and hypothesis testing, regression, and nonparametric inference. T test, Q test, Multiple Correlation, Partial Correlation, Introduction to Probability, Different Approaches to Probability Theory, Laws of Probability, Linear Regression, Multiple Regression, Introduction to Sample Surveys, Simple Random Sampling, Stratified Random Sampling, Other Sampling Schemes, Analysis of Variance, Data sanitisation, Data analysis using s/w packages like MS Excel, SPSS etc

Machine Learning:- The Statistical Theory of Machine Learning. Classification, Regression, Aggregation, Empirical Risk Minimization, Regularization, Suprema of Empirical Processes, Algorithms and Convexity. Excel, R, and STATA, MATLAB® in the class.

References

Christopher M. Bishop, *Pattern Recognition and Machine Learning (PRML)*.

Springer, 2006.

David J. C. MacKay, *Information Theory, Inference, and Learning Algorithms*.

Cambridge University Press, 2003. [Free online, and apparently better than Harry Potter, unless one speaks Welsh or Latin.]

Ian Goodfellow, Yoshua Bengio, and Aaron Courville, *Deep Learning*. MIT Press, in preparation. [Free online]

Michael Nielsen, *Neural Networks and Deep Learning*. Determination Press, 2015.

[Free online]

ARC 7003: MATERIAL SCIENCE (1 1 2 3)**Objectives**

To understand fundamentals of structure, energetics, and bonding of Materials.

Outcomes

After completion of this course the student will be able to:

1. Understand many fascinating materials phenomena.
2. Apply materials by understanding structure, bonding, and thermodynamic behavior.

Outline

An introduction to thermodynamic functions and laws governing equilibrium properties, relating macroscopic behavior to atomistic and molecular models of materials;

The role of electronic bonding in determining the energy, structure, and stability of materials; quantum mechanical descriptions of interacting electrons and atoms; materials phenomena, such as heat capacities, phase transformations, and multiphase equilibria to chemical reactions and magnetism; symmetry properties of molecules and solids; structure of complex, disordered, and amorphous materials; tensors and constraints on physical properties imposed by symmetry; and determination of structure through diffraction.

Real-world applications include engineered alloys, electronic and magnetic materials, ionic and network solids, polymers, and biomaterials

References:

E&R: Engel, T., and P. Reid. *Physical Chemistry*. San Francisco, CA: Benjamin Cummings, 2005. ISBN: 9780805338423.

A&T: Allen, S. M., and E. L. Thomas. *The Structure of Materials*. New York, NY: J. Wiley & Sons, 1999. ISBN: 9780471000822.

ARC 7005: NET ZERO ENERGY BUILDINGS: (2 0 2 3)**Objectives:-**

To analyze the energy use of a building

To analyze the local climate and select appropriate measures

To develop an integrated net-zero-energy concept for the building

To apply a stepped approach to find energy reducing measure

Outcomes:-

After completion of this course the student will be able to:

1. Analyze the energy use of a building
2. Use stepped approach to design a zero energy climate concept for existing buildings: homes, schools, offices, shops etc.
3. Demonstrate an integrated approach taking in account both passive measures (such as thermal insulation and sun shading) and active measures (such as heat pumps and photovoltaic panels), can deliver the best results.

Outline:-

Energy in the built environment, Introduction to Zero Energy Design, Analyse the energy consumption of a selected building, REDUCE: Passive measures, Analyse the local climate and choose passive measures to reduce the energy demand, like thermal insulation and sun shading. REDUCE: Active measures, Overview of active measures to reduce the energy demand, like demand-controlled heating and ventilation. REUSE, Overview of the opportunities to reuse energy flows in buildings, like heat recovery from ventilation air and warm waste water, PRODUCE, Overview of the opportunities to produce heat and electricity in the building, like PV-systems, ground source heat pumps. Net Zero Energy Buildings (NZEB): Concepts. To bring the most relevant

topics like climate sensitivity, comfort requirements, carbon footprints, construction quality, and evidence-based design. The context of high-performance buildings, present overviews of NZEB, discusses the performance thresholds for efficient buildings and cover materials, micro-grid and smart grids, construction quality, performance monitoring, post occupancy evaluation, and more. Relationships between luminous and thermal design and to consider a fresh perspective on the roles of “passive design” and “solar architecture” in reaching net-zero energy in cold-climate architecture. Net-zero design protocols integrate essential solar principles and precepts state-of-the art technologies, and innovative approaches to building programming and use. Design approaches to net-zero energy and carbon-neutral architecture.

References:

Architecture 2030, January 2006, The Architecture 2030 Challenge and 2010 Imperative, Santa Fe, New Mexico: Architecture 2030, <http://www.architecture2030.org/>.

https://arch.design.umn.edu/directory/guzowskim/documents/Guzowski_TowardsNet-ZeroEnergy_1.20.14_FINAL_ARCC.pdf

Dorn, Whitney. “The Net-Zero Energy Challenge: Who Will be Next,” US Green Building Council (USGBC), <http://www.usgbc.org/articles/net-zero-energy-building-challenge-who-will-be-next>.

International Living Futures Institute, 2014, Living Building Challenge, Seattle, WA, <http://living-future.org/lbc>.

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Objectives

- To understand concepts of various thermal and electrical utilities.
- To apply to evaluate performance of any electrical and thermal equipment.
- To upgrade the quality of your energy auditing skills.
- To identify implementable energy savings.

Outcomes

After completion of this course the student will be able to:

1. Gather relevant data and information quickly, analyse and discuss on potential energy efficiency measures with client
2. Conduct effective energy audit in shorter duration.
3. Prepare for of energy managers/energy auditor exams.

Outline

Energy Auditing: Scope, Types, Methodology, Implementing measures, DPR, Measurement & verification

General aspects of energy management and energy audit: Energy Scenario, Energy Conservation Act 2001 and related policies, Basics of Energy and its various forms, Energy Management & Audit, Material and Energy balance, Energy Action Planning, Financial Management, Project Management, Energy Monitoring and Targeting, Energy, Environment and Climate change, New & Renewable Energy Sources

Energy efficiency in thermal utilities: Fuels and Combustion, Boilers, Steam System, Furnaces, Insulation and Refractories, FBC Boilers, Cogeneration, Waste Heat Recovery, Heat Exchangers

Energy efficiency in electrical utilities: Electrical System, Electric Motors, Compressed Air System, HVAC and Refrigeration System, Fans and Blowers, Pumps and Pumping System, Cooling Tower, Lighting System, Diesel/Natural Gas Power Generating System, Energy Conservation in Buildings and ECBC

References

Guide books for national certification examination for energy manager and energy auditors, Bureau of Energy Efficiency.