1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):
   i. To train students to negotiate design challenges of an advanced digital society with sensitivity and context.
   ii. To provide knowledge on the interaction of emerging technology with society and notions of space production.
   iii. To empower architects to be effective stakeholders and leaders in the domain of contemporary architecture, in the era of big data.
   iv. To add value multiplier skill sets to graduates through exploration of advanced digital design in detail and quantitative and qualitative research methods.
   v. To be a part of organisations that influence policy and decision making through contributing in-depth knowledge in relevant fields of study.
   vi. To prepare students to be effective participants in policy and decision making institutional frameworks.

2. PROGRAMME OUTCOMES (POs):

   PO#      Programme Outcomes
   1        Postgraduates will use their design and research skills to ensure liveable and inclusive design for our increasingly digitized and automated society.
   2        Postgraduates will be able to define and enhance interactions of the society with built environment at various levels through technology to bridge the digital divide.
   3        Postgraduates will be equipped with critical thinking & logical reasoning skills to address emerging issues of digital architecture and frame holistic solutions in institutions and organizations.
   4        Postgraduates will be well versed with industry 4.0 skills, including Digital Design Processes and parametric tools, prototypes and 3D printing, cognitive computing and design automation, IoT, Building performance and research methodologies.
   5        Postgraduates will be able to employ with various design theories, methodologies and processes to decode and comprehend contingencies as data, to resolve emerging global urban & environmental concerns in this era of digital data.
   6        Postgraduates will be able to communicate their ideas effectively through various forms of digital media.
3. PEO/PO Mapping:

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# ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS AFFILIATED COLLEGES
M. ARCH. (DIGITAL ARCHITECTURE) FULL-TIME PROGRAMME
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND SYLLABUS

## SEMESTER I

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### SEMESTER IV
(Prerequisite- Pass in Digital Studio III : Urban Computational Design)

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**Total No. Of Credits: 103**

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AUDIT COURSES (AC)

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SUMMARY

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5 Non-Credit Audit Course I Audit Course II
OBJECTIVES
• To provide understanding of the role of technology and digital media in contemporary architecture.
• To give knowledge about parametric design and generative / algorithmic design and the differences between them through case studies.

UNIT I INTRODUCTION

UNIT II PARAMETRIC DESIGN

UNIT III GENERATIVE AND ALGORITHMIC DESIGN

UNIT IV DIGITAL MEDIA
Interactivity and connectivity to virtual data and digital information, Augmented reality - virtual to production. Digital fabrication, virtual collaboration.

UNIT V CASE STUDIES
Case studies- Study, understanding and analysis of known examples at the national and international levels which demonstrates the contemporary theories of media and their influence on the perception of space & architecture, contemporary design processes and its relation to computation.

TOTAL: 45 PERIODS

OUTCOMES
• An understanding of the effects of contemporary theories of media on contemporary architectural design.
• An understanding of various contemporary design processes and their relation to computation.

REFERENCES
2. Contemporary Techniques in Architecture, Halsted Press, 2002
4. A. Menges, S. Ahlquist (Eds.), AD Reader: Computational Design Thinking, John Wiley & Sons Ltd, (2011)

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DG4102 DIGITAL FABRICATION L T P/S C 3 0 0 3

OBJECTIVES
- To give exposure to various digital production tools to build artefacts as part of creative design process.
- To give knowledge about utilizing prototyping and modelling as a design medium that supports the full spectrum of digital design as a paperless process.
- To give knowledge about fabrication process in Digital Architecture as a way to bring software models into reality.

UNIT I MATERIALS AND PROPERTIES 9
Plastics & Composites- Polymers, Thermoplastics, Honeycomb materials.
Wood and Fibrous Materials - Case Studies and Application, Laminated wood products, Veneers, Steam bent members.
Metals and Ceramics - Case Studies and Applications - Steel, Aluminium, Alloys - Ceramic Hybrids - Production and Fabrication Standards.

UNIT II ADDITIVE FABRICATION PROCESSES 9
Additive Fabrication Processes Case Studies - Fused Deposition Processes - Injection Molding, Roto-Molding- Casting Technologies - 3D Printing (SLA, SLS, FDM)

UNIT III SUBTRACTIVE FABRICATION PROCESSES 9
UNIT IV TRANSFORMATIVE FABRICATION & MASS PRODUCTION MANUFACTURING PROCESSES
Transformative Fabrication Processes Case Studies- Methods of Factory-Based production

UNIT V EXPERIMENTAL FABRICATION PROCESSES
Experimental Fabrication Processes Case Studies - Biological Growth Formation - Crystal Structure Formation - Explosion Forming - Muscle Wire and Self-Assembling Structures

OUTCOMES
- Awareness to the machines, different methods of fabrication and the workability with materials.
- Ability to correlate between the design processes and Digital Prototype or Model attributes.

REFERENCES
2. Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton & Co, 2010
7. Emergent Design Group, Morphogenetic Design Strategies AD, 2004
8. Farshid Moussavi, Daniel Lopez, Garrick Ambrose, Ben Fortunato, Ryan R. Ludwig and Ahmadreza Schricker, The Function of Form

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MH4151 SOCIETY, CULTURE, MEDIA AND TECHNOLOGY

OBJECTIVES
- To introduce the interdisciplinary field of research, science, technology and society studies.
- To create awareness of the interface between science, technology and society from a theoretical perspective.
UNIT I      SOCIOLOGY OF SCIENTIFIC KNOWLEDGE

UNIT II      TECHNOLOGY – SOCIETY INTERFACE I
Techno science and the Interpenetration of Science & Technology
Questioning of the traditional boundary between science (knowing) and technology (doing). How science and technology together shape the ways in which knowledge is constructed. Technological Determinism, Power and the Politics of Knowledge Production.

UNIT III      TECHNOLOGY – SOCIETY INTERFACE II

UNIT IV      NEW MEDIA
The new communication paradigm brought about by digital technologies. Digitality (Digital versus Analogue Media) – Interactivity, Extractive versus immersive navigation, Registrational Interactivity and Interactive communication – Hypertextuality - Networked Media - Virtuality

UNIT V      VISUAL CULTURE

OUTCOMES
- Understanding of trends that problematised production of scientific knowledge and the sociology of scientific knowledge
- Familiarity with the technology-society interface from a wide range of theoretical standpoints such as social shaping of technology, social constructionist and actor network theoretical perspectives.
- Understanding of science and technology as socially and culturally embedded activities.

REFERENCES
7. Mirzoeff, Nicholas, An Introduction to Visual Culture, Routledge

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DG4103 MODULAR ARCHITECTURE L T P/S C 3 0 0 3

OBJECTIVES
- To introduce the idea of mass production and advance building technologies in architecture
- To introduce advanced materials and pre-fabricated modules.

UNIT I INTRODUCTION
Introduction to prefabrication, manufacturing, modular, flat pack modular, volumetric modular - Modular co-ordination, standardization and tolerances - Moulds —construction design, maintenance techniques. Utopian concepts, principles and ideology on modular construction like pug in cities etc., - Philosophies of fuller, Corbusier, Eames, Scott Brown, Timberlake etc.,

UNIT II TECHNIQUES AND INDUSTRIAL STRUCTURES
Modular casting techniques - Planning, analysis and design considerations - Handling techniques - Transportation Storage and erection of structures. Tectonic strategies- structural core systems – Delivery strategies - Joints - Curing techniques - skeletal and large panel constructions.

UNIT III DESIGN PRINCIPLES AND APPLICATION
Disuniting of structures - design of cross section-based efficiency of material – problems in design because of joint flexibility – allowance for joint deformation – joints for different structural connections – modular technology for low cost and mass housing schemes. Small products like door frames, shutters in housing - Water tank service core unit. Quality control - Repairs and economical aspects on prefabrication.

UNIT IV DIGITAL FABRICATION
Study of various industrial mass production systems - CNC cutting and milling (for mass customization)- Laser Cutting - 3D Printing (SLS & FDM) & 3D Scanning - 3Axis CNC cutting & milling on non-planar surfaces. Digital & analogue experiment on various materials and their challenges.

UNIT V BEST PRACTICES
Understanding and exploring the various successful project at national and international level on the aspects of Material, Mass Production, Finance / project costing, climate response and energy efficiency.

TOTAL: 45 PERIODS
OUTCOMES

- Knowledge about modular construction techniques in architecture.
- Knowledge of various structural and design principle thorough various case studies.

REFERENCES


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DG4121 ADVANCED MANUFACTURING AND 3D PRINTING

OBJECTIVES

- To impart design thinking, knowledge and skills related to advanced manufacturing (additive manufacturing and 3D printing technologies).
- To provide familiarity with tools, material and equipment related to additive manufacturing and 3D printing.

UNIT I INTRODUCTION


UNIT II ADDITIVE MANUFACTURING AND 3D PRINTING ENABLED DESIGN PROCESS


UNIT III ADDITIVE MANUFACTURING TECHNIQUES, MATERIALS AND EQUIPMENT

UNIT IV  ADDITIVE MANUFACTURING CODING, TOOLS AND PARAMETRIC DESIGN

CAD Data formats, Data translation, Data loss, STL format. C and tools for additive manufacturing. Coding, visual scripting and software tools for parametric design and additive manufacturing.

UNIT V  ADDITIVE MANUFACTURING PROJECT

Design methodologies, parametric processes and tools of additive manufacturing will be deployed in a parametric design and additive manufacturing project.

TOTAL: 60 PERIODS

OUTCOMES

- An understanding of additive manufacturing design process and wide scope of application.
- Knowledge on appropriate tools, materials and equipment for additive manufacturing and 3D printing process.
- Knowledge of design process and skill sets for parametric design and additive manufacturing.
- Ability to process 3D models using tools and coding to the required formats in order to transfer them for production.

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DG4111  DIGITAL STUDIO I: PROCESS BASED DESIGN

OBJECTIVES

- To give understanding of importance of diagramming and translating the ideas into geometry.
- To give exposure to the various processes of user centric designs and computer exploration of form finding for smaller scale spaces or products.
- To give understanding of principles behind product design, explore tools and techniques for prototyping.
- To give exposure to the various methods of manual or 3D printed prototyping.
CONTENT
This course will emphasize on designing and prototyping a product or small scale space. The design process involves identifying the user needs, analyzing the product attributes such as function, emotions, Diachronic, Synchronic, parallel situations, future situations etc.

Analyze selective products to understand its geometry, mathematical principles, materials and technique behind manufacturing the product, ergonomics user analysis, techniques behind its prototyping and also analyze its packing and display designs. After the user centric analysis the concept of translating ideas into geometry and form generation or form finding can be made with the help of Computer Explorations of Fractals, Chaos, Complex Systems, Shape grammar, generative iterations and exploring the 3D lattice and structures.

The design detailing can be based on modularity and modular systems for mass production, study on various materials for prototyping and algorithm of packing design and display system of the designed product. The design output can be any product not limited to furniture/kiosk/bus-stop or bus shelter/ street furniture/ packaging design/ book shelf/ workstations/speaker design/mouse/other small products. The final design output should be explored with different types of prototype fabrications. The prototype fabrications can be either of manual or 3d printing.

OUTCOMES
- Understanding of the concepts and basics of mathematics (Geometry) behind computational design.
- Basic knowledge of 3D Modelling and prototyping techniques.

TOTAL: 150 PERIODS

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OBJECTIVES
• To give introduction to the importance of critical inquiry as away of gaining knowledge and adding to it through research.
• To give exposure to the various forms of research and research methodologies/ processes.
• To understand research in the specific domain of built environment research.

UNIT I  INTRODUCTION
Basic research issues and concepts. Orientation to research process. Types of research: historical, qualitative, co-relational, experimental, simulation and modelling, logical argumentation, case study and mixed methods. Illustration using research samples including research in the domain of built environment.

UNIT II  RESEARCH PROCESS
Elements of Research process: finding a topic, writing an introduction, stating a purpose of study, identifying key research questions and hypotheses, reviewing literature, using theory, defining, delimiting and stating the significance of the study, advanced methods and procedures for data collection and analysis. Illustration using research samples including research in the domain of built environment.

UNIT III  RESEARCHING AND DATA COLLECTION
Methods of data collection-Primary sources: observation and recording, interviews structured and unstructured, questionnaire, open ended and close ended questions and the advantages, sampling. Collecting data from secondary sources.

UNIT IV  REPORT WRITING
Research writing in general and its components. Developing the outline, referencing, writing the bibliography, presentation, etc.

UNIT V  CASE STUDIES
Case studies of competent research, from project inception to completion with a focus on research in the domain of built environment. Review of research publications.

OUTCOME
• Skill to identify, decipher and interpret issues relating to architecture based on research enquiry methods.
• Knowledge of different methods of conducting research and research writing.
• Familiarity with specific research related to built environment.

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DG4201 COMPUTATIONAL DESIGN AND ARCHITECTURE II L T P/S C 3 0 0 3

OBJECTIVE
- To learn how to use generative design & generative system architecture and their relation to computation.
- To highlight the importance of using computer as a generative tool in the design process depending on scripting and algorithmic architecture approach of designing.

UNIT I GENERATIVE DESIGN AND GENERATIVE SYSTEM 7

UNIT II INTRODUCTION TO COMPUTATION AND PROGRAMMING 8

UNIT III ALGORITHMIC DESIGN 6

UNIT IV INTRODUCTION TO CODING 12

UNIT V MORPHOGENETIC DESIGN 12

TOTAL: 45 PERIODS
OUTCOME
- Understanding of the effect of advanced computational methods on contemporary architectural design.
- Understanding of various contemporary design techniques and their relation to computation

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DG4202 METATEXTS IN ARCHITECTURE L T P/S C 3 0 0 3

OBJECTIVE
- To give knowledge about the role of texts in understanding various contradictions and formulation of thought in architecture.
- To give knowledge about the trajectory of architectural profession in India and abroad, in reference to the field of digital architecture.

UNIT I ARCHITECTURAL PARADIGM I: ROUTE TO MODERNISM 8
The ten books on architecture – Marcus Vitruvius; Scientific classification in history of architecture by sir Banister Fletcher; Fermentation in Architecture – Hans Poelzig; Ornament and crime - Adolf loos; Organic Architecture - F.L.Wright; The tall office building artistically considered- Louis Sullivan; Futurist Architecture - Antonio Sant’Elia; The new ideas on architecture – Walter Gropius and Bruno Tout; Towards an architecture by Le Corbusier; Analytical and Utopian Architecture – AurtherKrun; Towards a plastic Architecture – Van Doesburg; Industrialised Buildings, Technology and Architecture – Meis van der Rohe; Universal Architecture – Buckminster Fuller; Team 10 Primer – Aldo Van Eyck, Alison and Peter Smithson.

UNIT II ARCHITECTURAL PARADIGM II: RESPONSES TO MODERNIST CRISIS 7
Territory of architecture - Vittorio Gregotti; Complexity and contradiction in architecture – Robert Venturi; Post Functionalism- Peter Eisenman; The case of figurative Architecture – Michael graves;Aesthetics of architecture -Roger Scruton;Post-modern Architecture – ChalesA.Jencks;introduction to five architects – Colin Rowe; Towards a Critical Regionalism - Kenneth Frampton; Towards new horizons in architecture – Tada Ando; Towards a critique of architectural Ideology-ManfredoTafuri.

UNIT III THEORETICAL PARADIGMS OF POSTMODERNISM 9

UNIT IV THEORIES OF THE POSTMODERN CITY
The life and Death of Great American Cities- Jane Jacobs; Defensible cities - Oscar Newman; The collage city – Colin Rowe; The Architecture of the city – Aldo Rossi; The structure of the ordinary - N. John Habraken; The Meaning of the Built Environment by Amos Rapoport;Pattern language by Christopher Alexander; Learnings from Las vegas - Denise Scott Brown and Robert Venturi; Image of the city – Kevin Lynch;what would now sexist city would look like? - Dolores Hayden; whatever happened to urbanism?- Rem Koolhaas. Understanding architecture and urbanism of the Indian Cities - After the masters (Contemporary Indian Architecture) - Peter Scriver and Vikram Bhatt.

UNIT V ARCHITECTURE OF THE CONTEMPORARY CITY
Architecture Depends – Jermy Till; Visions Unfolding – Architecture in the age of electronic media-Peter Eisenman; architecture and the disjunction – Bernard Tschumi; Cradle to Cradle: Remaking the Way We Make Things - Michael Braungart and William McDonough; Notes around the Doppler Effect and Other Moods of Modernism - Robert Somol and Sarah Whiting; The case for the Tectonic – Kenneth Frampton; Material tendencies - Jeanne Gang; Ebodies, E cities, E buildings - William Mitchell; Digital culture in architecture - Antoine Picon; Towards performance driven computational geometry – Neri Oxman; The Geometry of Feeling – Juhani Pallasma; System thinking Revisited – Francis Duffy; Performative architecture – Branko Kolarevic; Adaptive strategies- Simosyannas.

TOTAL: 45 PERIODS

OUTCOME
- An understanding of various design theories, methodologies and perspectives to comprehend the contradictions in the field of Architectural design.
- An ability to understand the digital design and its impact on production practices which will guide them to future research and development.

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OBJECTIVES

- To introduce role of GIS in built environment.
- To give basic familiarity with the concepts, tools and techniques of GIS
- To give training in the application of GIS for built environment.

UNIT I INTRODUCTION TO G.I.S

Introduction to Geographical Information System (GIS). Defining the objectives of GIS in problems related to the macro environment. Outline of commercial and open source GIS software and introduction to basic components of GIS software. Outline of Spatial and non spatial data. Understanding of Projection and Coordinate systems. Preparation of map with appropriate format for specific purposes.

UNIT II SPATIAL AND ATTRIBUTE DATA INPUT


UNIT III SPATIAL ANALYSIS USING GIS


UNIT IV MODELLING THE MACRO ENVIRONMENT

Need for modelling the macro environment for different scales and purposes. Modelling for suitability/projects situations/problems in the realm of landscape design, urban design, urban and environmental planning.

OUTCOMES

- Awareness of GIS and the context of its use for different purposes.
- Knowledge of concepts, techniques, methods of GIS.
- Ability to apply GIS for specific situations/realms involving the built environment.

REFERENCES

OBJECTIVE

- To introduce explorative and creative thinking expressed through the application of digital software to design propositions.
- To develop the ability to use digital software for the development and execution of a designed building typology, parametrically.

COURSE CONTENT

The course will focus on the design and development of built spaces using parametric design softwares and digital design tools. This architectural design process will be collaborative, iterative and with an evolutionary vector framework.

There will be emphasis on diagramming in analysis and data mapping, followed by their translation into parametric platforms. These platforms are powerful design tools that augments the design and execution process.

From the project brief, individual visual communication concepts can be developed and documented. Campus studies and sketch walks are done to help prepare cognitive diagramming, figure-ground analysis with satellite images and ground corroboration.

Based on the design objectives, appropriate vector oriented software are chosen as a designing tools. Creative design outcomes are to be developed in a digital environment with reference to appropriate parametric software used for designing a building typology.

The studio will focus on parametric design process and will demonstrate link between the employment of advanced digital design tools and the realm of digital fabrication through a built form within an architectural domain that will augment the character of a specific built environment. Probable projects may include hospitality projects, housing and high rise buildings etc.

Students will work on above mentioned in detail and will submit the work in the form of drawings and/ models and supplementary documentation as found suitable to explain the design process and product judiciously.

TOTAL: 150 PERIODS

OUTCOME

- Understanding the application of Parametric Design principles in Digital architecture.
- Knowledge on advanced digital design tools.

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OBJECTIVE

- To enable students to understand IoT and IoT application in Building Management System.
- To familiarize students with IoT architecture, interface and key design considerations.

UNIT I INTRODUCTION

IoT basics. IoT architecture. Building management systems (BMS) and Automation. Interface of IoT networks and BMS. IoT based analytical platforms. IoT ecosystems. IoT and Big Data interface.

UNIT II SENSORS, DEVICES AND CONNECTIVITY

Hardware capabilities. Scaling and operations. Manufacturing and getaways. Introduction to connectivity. LPWAN, Cellulat, Satellite, WiFi and Bluetooth. Interface with BMS.

UNIT III DATA PROCESSING

Introduction to cloud. Introduction to IoT platforms. Choosing an IoT platform. APIs. Data Analytics vs Machine learning

UNIT IV USER INTERFACE AND USER EXPERIENCE

Basics of UX and UI. Native apps and web apps, hybrid apps, beyond mobile apps. UX and UI protocols for IoT. BMS UX and UI. Key considerations for UI design for IoT: user profile, alerts and notifications, responsiveness.

UNIT V THE FUTURE OF IOT

Intelligent, efficient and user friendly IoTs, IoTs for large building complexes and master plans. IoT and the city. Simple IoT apps for BMS, Occupancy monitoring and estimation model, leveraging of IoT data, tenant experience, service innovation, innovations for smart cities, etc.

TOTAL: 45 PERIODS

OUTCOME

- Understanding the key role of IoT in BMS.
- An understanding of IoT architecture and key design parameters for responsive UI and UX.
- Knowledge of necessary software, hardware, platform, protocols across the modules wherever it is required.

REFERENCES

2. Olivier Hersent, David Boswarthick, Omar Elloumi, —The Internet of Things – Key applications and Protocols, Wiley, 2012
DG4302  SUSTAINABLE ARCHITECTURE AND ENVIRONMENTAL MODELLING  L T P/S C 3 0 0 3

OBJECTIVE
- To train students in Incorporating digital tools in creating more sustainable and adaptive structures.
- To give knowledge about responsive forms of architecture, through the precision guided by digital tools.

UNIT I  INTRODUCTION TO SUSTAINABLE ARCHITECTURE  9
Role of traditional practices and development of those practices, Definitions, Opportunities in Contemporary architecture, minimization of energy usage in all building processes. Passive systems, life cycle assessment. Effects of work cycle and energy consumption of an individual. Innovative materials and products to formation of regenerative building materials, Green facades and building envelops. Assessments of building materials: ecological impacts, integrated systems inclusive of recycle, reuse, reduce and recovery, Eco-design and Eco-labelling.

UNIT II  BUILT ENVIRONMENT AND ENVIRONMENTAL ASSESSMENT METHODS  7
Design with nature and Passive systems, Building information modelling and transformative design, role of circular economy, smart houses and flexible designs, tall building and digitally induced sustainable techniques, brown field projects, Cognitive empirical and simulation assessment methods.

UNIT III  MATHEMATICAL MODELS TO ASSESS BUILDING PERFORMANCE  11
Mathematics behind building performance simulation (BPS), basic relationships of BPS systems such as climate analysis (ambient air temperature, RH, Radiation, wind velocity and direction), thermal comfort (PPD &PMV concepts, Radiant asymmetry, C02 concentration, Indoor air quality), energy calculations (cooling and heating energy demands, Load profiles-lighting and auxiliary systems, system sizing), daylight simulation (BIS method, Daylight factor method, overshadowing etc.). Case studies based on manual calculations of existing building examples.

UNIT IV  ADVANCE BUILDING SIMULATION AND ENERGY MODELLING  11

UNIT V  CROWDSOURCING AND COMMUNITY PARTICIPATION  7
Education and training for Community participation and consumer engagement. Ecological and cultural sensitivity: Study of occupants’ behavior, post-occupancy evaluation and end use energy efficiency, influence of the micro climate through urban landscaping, agriculture and green spaces.

TOTAL: 45 PERIODS

OUTCOME
- An understanding about how unique and individually a unit has to function for it to be sustainable.
- An ability to work with Energy optimization methods to be devised in assessments for audits.
• Knowledge on environmental assessment methods, audit and simulation techniques.
• Ability to add value to architectural design processes and equip students with energy modelling skills.

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DG4311  DISSESSATION  L T P/S C  0 0 4 4

Each student is required to prepare a dissertation on a subject concerning Digital Architecture and design media, under the guidance of an advisor, approved by the department.

OBJECTIVE
• To expose the students to the various thrust areas in Digital architecture.
• To inculcate the spirit in the students to research in the field of Digital architecture by providing opportunities to read on various issues.
• To help students enhance their technical writing and interdisciplinary research skills.

PROCESS
The primary objective of the dissertation is to provide an opportunity to each student to undertake in-depth and original study research in the field of their interest. It also provides an opportunity to synthesize knowledge and skill-sets, acquired through theory courses and digital architecture studios.

Dissertation is a self-directed exploration of any topic of the students' choice – a written document of the student's findings in a chosen specific area of interest within the realm of digital architecture through a rigorous process of original research. The subject of the dissertation may be theoretical, analytical, computational, comparative or interdisciplinary research concerning digital processes in the architectural domain (topic to be approved by departmental jury). The process would consist of choosing of an area of interest/challenge, phasing out primary studies, clarifying intent, identifying methodologies to approach and achieve the intent, exploring ways of primary data collection (reading, first hand studies, experimentation, documentation, computation, programming, digital analysis tools, interviews and so on), structuring the information, analyzing and interpreting it, and finally concluding with well-argued inferences. The dissertation should serve to concretize notions...
and ideas relating to digital architecture and/or the concerns and challenges of architecture and design in today's digital world.

The study must comprise of an aim, the objectives, the scope and limitations of their dissertation, hypothesis (if any), methodology followed by extensive review of literature and case studies through references and documentation. The analysis of the work must be substantiated either parametrically, empirically or through extensive arguments. A dissertation could serve as a prelude to the Thesis preparation and gives the student scope for independent study and opportunity to explore specific area of interest which will form the basis of his/her design thesis project in the next semester. The topic will have to be approved at the start of the semester and the progress of work will be reviewed periodically, culminating in a viva-voce to a jury at the end of the semester.

TOTAL: 90 PERIODS

OUTCOME

- A Dissertation book which is based on accepted norms of technical writing.
- An understanding leading to formation of thesis ideas.
- Ability to carry out independent research and develop an understanding leading to formation of thesis ideas.

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DG4312 DIGITAL STUDIO III : URBAN COMPUTATIONAL DESIGN

OBJECTIVE
- To facilitate students towards exploring new limits and possibilities of urban interventions and place making in the digital age.
- To analyze technology-society transect and corresponding shifts in place-realm and identity, resource based and infrastructural urbanism, new typologies etc.
- To employ data analysis, visualization and flexible-scalable frameworks of generative design to augment multi-layered and collaborative urban design process
COURSE CONTENT
Students will explore the transect of technology, society and cities, in flux and the multifold prospects that arise from contemporary urban condition and aspirations. They will study global and local urban design parameters and their effect on a selected area of study.

Students will employ cartography data mapping, analysis and visualization as basis for a layered collaborative design and analysis framework. They will combine ground mapping with stakeholder’s analysis, demographic study, climate studies, socio-economic analysis and wide range of urban design parameters. They will develop a system based approach for generating, evaluating and evolving multiple design solutions and development scenarios. They will employ generative and algorithmic models that might include (but not limited to) voronoi, cellular automata, fractals and L systems, neural networks, genetic algorithm etc.,

Probable projects might include place making in the digital era, urban networks and resources, eco urbanism, big data, IoT and urban form, digital and virtual urban experience, social media and the city, virtual public participation platforms and ‘up-stream’ public engagement with technology.

TOTAL: 150 PERIODS

OUTCOME
- An understanding of technology and society interaction, global urban shifts and concurrent local transformation of places
- Develop theoretical framework and technical skill sets to facilitate and propose responsive urban environments.
- Ability to acquire requisite skill-sets to be effective stake holders in the digital age and the means to use generative and algorithmic design for collaborative design process.

REFERENCES
3. Long, To introduce the challenges of Digital architectural practice.

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DG4313

INTERNSHIP TRAINING

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OBJECTIVE
overall understanding of different stages in real life Digital architectural projects inpractice.

- To create involvement in these stages as much as possible within the scope of contemporary architectural practice - initiation of project, development of concepts into schematic drawings, approval process, presentations and working drawings, involvement in office discussions and client meetings, integrating structural and service concerns, estimation and tendering processes, site supervision and coordination in the construction process.
COURSE CONTENT
The Practical Training would be done in offices / firms practising Digital techniques/processes in India empanelled by the Institution in which the principal architect is registered with the Council of Architecture if the firm is in India or in an internationally reputed firm established abroad. The progress of practical training shall be assessed periodically internally through submission of log books along with work done by the students in terms of drawings, reports, etc., along with the regular progress report from the employers.

The students would be evaluated based on the criteria related to their contribution in the office some of which are given below.

- Understanding and involvement in the Contemporary process of architectural practice as mentioned in the objectives within the scope of the specific office in which training is undertaken.
- Adherence to time schedule, overall responsibility and professional conduct.
- Ability to carry out the instructions on preparation of schematic drawings, presentation drawings, working drawings and skill in this regard.
- Ability to work as part of a team in an office and contribute to related activities.
- Ability to participate in client meetings and discussions.
- Involvement in supervision at project site.
- Involvement/ initiative/ participation in any other aspects during the course of the training.

At the end of the Practical Training, a portfolio of work done during the period of internship along with certification from the office has to be submitted for evaluation through a viva voce examination.

OUTCOME
- Ability to understand the overall idea of the nuances of architectural practice.
- An understanding about the total process including contemporary design methodologies that goes into the making of a building.
- Maturity in using the experience gained from internship in future academic projects, being able to effectively translate ideas into reality.

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SEMESTER IV
DG4411 THESIS PROJECT  L T P/S C 0 0 20 20

OBJECTIVE
- To integrate knowledge gained in previous semesters with respect to issues/ tools of Digital Architecture.
- To understand and identify issues appropriate to a particular project or area of concern, through independent thinking and digital tools.
- To enable students project design solutions through computational, parametric, generative and/or algorithmic methodology.
COURSE CONTENT
The students will synthesize the areas of knowledge, skills and techniques acquired in the various courses of the previous semesters through a thesis project of their choice. This thesis project would be concerned in the realm of digital explorations of architectural design with a strong research component. The project would desirably extend the critical position and computational theories and tools developed within the theory and studio projects as well as dissertation. Thesis projects can include but are not limited to research and application of computational models, prototyping, audit tools for building performance, generative systems for design automation, parametric design application in the realm of architecture, BIM, workflows, embedding computational design in practice, advanced algorithmic frameworks, additive manufacturing, IOT building systems and management. The process would culminate in design interventions at scales appropriate to the topic. The project shall desirably have the potential to serve as a starting point for practice and/ or further research.

Students will submit a detailed proposal on their topic of interest(s). The Proposal shall be approved by the thesis review committee. The thesis project will be reviewed periodically by the review committee. At the end of the semester, the final thesis will be submitted and presented through a viva voce examination before a jury.

TOTAL: 300 PERIODS

OUTCOME
- Ability to integrate various contemporary/ advanced issues and techniques into the Digital Architectural process.
- Knowledge to identify and go in depth into specific and appropriate aspects relating to the realm of Digital Architecture.

REFERENCES
4. 4D space Interactive Architecture, Architectural Design, Lucy Bullivant, John Wiley & Sons, Inc.

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PROFESSIONAL ELECTIVE I

UR4071          CULTURE OF PUBLIC SPACES         L  T  P/S C
                3 0 0 3

OBJECTIVES

- To understand the role of art in articulating city culture.
- To understand Cultural memory and art form associations in cities
- To understand the way public spaces in Indian cities have been used, appropriated and conceived.
- To understand the role of art in altering meanings and perceptions of public spaces

UNIT I   PRODUCTION OF SPACES – PUBLIC SPACE

Space: relative and absolute space, production of space in books, movies and literature. Definitions of public spaces, history of public spaces, typologies and characteristics of public spaces: parks, streets, plazas, Indian bazaars, etc.

UNIT II   CITY, MEANINGS AND MEMORY


UNIT III  PERFORMITIVITY AND TEMPORALITY IN SPACES

Everyday activities in the city: space, body, signs, rituals. Art and the city: role of art festivals in cultural shifts. Religion, ritual space, festival and spectacle in the city. Case studies of Kala ghoda festival, Pongal fairs and festivals, arupathumoovar, santhanakoodu and velankanni chariot festival.

UNIT IV   ACTIVISM AND PUBLIC SPACES

Theory of democratic public spaces: democratic theory, democratic performances. Theorizing and evaluating public spaces: place and politics, democratic assemblies, protests and the public sphere, city and its representative space. Global case studies of urban space, protests and activism

UNIT V    CONSUMPTION OF URBAN SPACES


TOTAL: 45 PERIODS

OUTCOMES

At the end of the semester, students will be able to:

- Understand the role of art in city culture, its perceptions and the collective memory.
- critically evaluate contemporary public space from theoretical, social, experiential and everyday perspectives and conceptualize alternate narratives
- Communicate their ideas about public space effectively using a variety of means such as writing, speaking and multimedia presentations.

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DG4001 ADVANCED GRAPHICS AND INTERFACE ARCHITECTURE

OBJECTIVE
- To provide students with the knowledge on user interface and graphics design.
- To enable understanding of human interface, digital imagining and production.

UNIT II INTRODUCTION TO ADVANCED GRAPHICS AND INTERFACE ARCHITECTURE
The fundamentals of user experience and user interface design, with an emphasis on: the design of interactive user experiences and interface systems for effective and meaningful computer-human interaction: and the use of digital tools for asset creation. Projects focus on the structural, informational, and psychological aspects of interactive design, as well as asset design and creation.

UNIT II GRAPHICS DESIGN AND ILLUSTRATION
Advanced work with images, headlines, text and graphs in single and multi-page publications as well as three dimensional layouts. a. Advanced problem solving methods b. Corporate and commercial graphics c. Advanced use of layout design software. Advanced layout methods. Illustrations in design work and criteria for selecting the most effective style. Students plan and work up rough concept drawings before executing the final work. a. Advanced use of vector based illustration program b. Package design c. Digital illustration

UNIT III MEASURING SYSTEMS

UNIT IV TYPOGRAPHY
Typography as an essential component of any design project. Exploring creative ways to use typography in design work. a. Typographical poster design b. Signage c. Font design.

UNIT V DIGITAL IMAGING AND PRODUCTION
Exploring creative ways to use the digital imaging software. a. Work in grey scale or sepia tone modes b. Product and portrait photography techniques c. Create special effects images d. Set up a digital portfolio e. Advanced use of digital imaging software. Production process involved in reproduction of a graphics file into a publication. a. Troubleshooting prepress files b. Printer’s instructions c. interpreting printer’s marks d. Evaluating proofs and print work e. Troubleshooting press operations

TOTAL: 45 PERIODS
OUTCOME

- Ability to understand Graphic Design and Interface Architecture.
- Knowledge of and perform tasks representative of technology-based careers, including art director, graphic designer, illustrator and digital artist.

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DG4002 DIGITAL MEDIA

OBJECTIVE

- To enable students to understand the integration of Art with Technology
- To give students a perspective on the history of interactive and digital art.

UNIT I HISTORY OF ART AND TECHNOLOGY

The use of tools, new materials, processes of production, mass communication, new products, inventions, and applications that were originally envisioned to be utilized in an industrial society and how they are now applied in the creation of artwork. Impact that artists have made on the technical world, particularly through the disciplines of printmaking, photography, film, and digital visualization.

UNIT II CONTEMPORARY ART IN CONTEXT

Digital art culture, present and happening. Case Studies of Artists and designers who are actively working with the latest technologies.

UNIT III INTERACTIVE ART AND INSTALLATION

Interactive art and its meaning. Theoretical and practical perspective of interactive art. Purpose and language of art, creative practices, the appropriation of new technologies, social relevance, common artistic themes, and the response and involvement of audiences.

UNIT IV COMPONENTS OF AN INTERACTIVE INSTALLATION

Introduction to hardware and software components of an installation. Sensors and mobile devices as Input. Microcontrollers for processing. Digital Media as Output.

UNIT V BEYOND INSTALLATIONS


TOTAL: 45 PERIODS
OUTCOME
- Ability to understand the creative and technical process in projects involving art and technology.

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MH4073 SOFT SKILLS L T P/S C 2 0 1 3

OBJECTIVES:
- To give introduction to the soft skills and personality
- To give understanding of and enable better interpersonal communication.
- To apprise of aspects of organizational communication and develop skill in it.
- To enable skill in reading and writing.

UNIT I INTRODUCTION TO SOFT SKILLS AND PERSONALITY

UNIT II INTERPERSONAL COMMUNICATION

UNIT III ORGANISATIONAL COMMUNICATION

UNIT I ADVANCED READING AND WRITING SKILLS

OUTCOME
- Awareness of importance of soft skills.
- Knowledge and skill in interpersonal communication.
- Knowledge and skill in organisational communication.
- Competency in reading and writing.

REFERENCES
1. Soft Skills, K.Alex, S.Chand, 2010

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PROFESSIONAL ELECTIVE II & III

UR4191 SOCIAL THEORY AND THE CITY

OBJECTIVES
- To give critical understanding of the city and its underlying forces though various social theories
- To give awareness of urban processes through political, economic, social and cultural lenses.
- To give knowledge about the role of people and culture in city identity.
UNIT I  CITY, CULTURE AND ITS IDENTITY  9

UNIT II  HISTORIOGRAPHY AND THE CITY  9
Understanding authorized and subaltern histories of cities - society and cities in vernacular literature, folk tradition and popular art - post-colonial theories and histories of Indian Cities.

UNIT III  POWER AND RESISTANCE IN THE CITY SPACES  9
Understanding the concept of power and its space manifestation in cities. Historic Indian Treatises: Chanakya Neeti, Harshcharitra, Ulta, Uthhirurur inscriptions, Baburnama, Ain-i-Akbari. Theories of Giddens, Aldo Rossi, Corbusier, Oscar Niemeyer, Foucault. Case studies from New Delhi, Istanbul, Los Angeles, Jerusalem, Shenzen

UNIT IV  URBAN POLITICS  9

UNIT V  GAZE IN THE CITY  9
Space and body: The Flâneur, gaze and urban public spaces. Tourist gaze, gender gaze, colonial gaze. Sexuality in urban space: feminista, queer, transgender, etc.

TOTAL: 45 PERIODS

OUTCOMES
• An understanding of the city and its underlying forces through various social theories.
• Ability to process city through political, economic, social and cultural lenses.
• Ability to understand the city in terms of people, community & identity.

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OBJECTIVES
- To acquire knowledge in statistical and numerical techniques and to take up quantitative analysis and research
- To provide in-depth understanding of various research methods in the field of planning and urban design

UNIT I  STATISTICAL METHODS  8
Data: Statistical and Numerical data. Types of data measurement scale – Nominal, ordinal, interval, ratio, Variables. Discrete, continuous- Data collection, coding and decoding, methods, tabulation and graphic presentation of data. Frequency distribution. Measures of central tendency: mean, median, mode. Measures of dispersion, Correlation and Regression. Introduction to spread sheets and statistical software – SPSS, Data Fit etc.

UNIT II  HYPOTHESIS TESTING  10
Sampling Distribution. Test based on Normal, t, Chi-square and F-Distributions. Discrete random variables, Completely Randomized Design. Randomized Block Design. Latin Square Design. ANOVA.

UNIT III  QUANTITATIVE TECHNIQUES IN PLANNING & DEMOGRAPHIC ANALYSIS  6
Elementary association models and decision making. Index numbers, weighted and un-weighted index numbers. Application of index number in spatial planning. Calculation techniques of vital events. Methods of demography and population studies, population projections, introduction to Census data and sampling Techniques.

UNIT IV  FORECASTING AND TIME SERIES ANALYSIS  9
Time series forecasting- line chart, curve fitting. Function approximation – approximation theory and numerical analysis, interpolation, extrapolation, pattern recognition, econometrics, segmentation, Uni-variate linear and nonlinear measures and bi-variate measures. Visualization Charts, Braided graphs, Line charts, Slope graphs, Gap Chart, Horizon graphs, reduced line chart (small multiples), Silhouette graph, Circular silhouette graph etc.

UNIT V  DATA REPRESENTATION  12
Data Ideograms and the Language of Symbols- Braille, Morse Code, Sign, and Gesture Data Abstraction, Task Abstraction, Common Visualization Idioms such as Bar Chart, Pie Chart and Coxcomb Plot, Line Chart, Area Chart etc., - Spatial data, networks, trees - Making Maps-encoding, Stacked & Grouped data, Manipulate View, Facet into Multiple Views, Case Studies in Visualization and Information tools

TOTAL: 45 PERIODS

OUTCOMES
- The students will be exposed to data analysis techniques and will be equipped with necessary analytical skills to pursue quantitative research.
- The student will develop necessary skills to identify and interpret issues based on research inquiry methods.
- The student will learn how to write and publish research work in journals

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DG4003 USER INTERFACE AND USER EXPERIENCE DESIGN (UI / UX)  

OBJECTIVES

- To acquire knowledge in User interface and user experience design and techniques and able to develop wire frames and prototypes.
- To provide in-depth understanding of role of human computer interactions.
- To gain basic design thinking knowledge into UX design and its research methods.

UNIT I INTRODUCTION TO UXD  
What is UX design, History and evolution of UX, connection between cognitive psychology and UX design, concept of human centered design process, components of UX design, difference between UX, UI and interaction design, introduction to basic laws in UX design, difference between web-based UI and phone-based UI.

UNIT II UNDERSTANDING AND DEFINING A PROBLEM  
Example of global UX projects worked and problems addressed, Practical exercise on Establishing design thinking into UX design, UX research methods (Contextual enquiries, ethnographic study, cultural probe, behavioral study, benchmarking etc.). Active immersion exercises reading a brief, problem identification and deriving of a problem statement basic overview of processes in UX design processes, conducting heuristic analysis

UNIT III ANALYSING AND ESTABLISHING USER EMPATHY  
Understanding human systems and Practical exercises on collaborative thinking (brainstorming, role-play etc.) Deriving practical user centric scenarios of existing problem and possible solutions to the problem through story boarding. Understanding user mind-set and establishing empathy (empathy mapping, user journey mapping etc). Deriving a strategic direction and plan of intervention areas, scope of interventions etc.

UNIT IV INTRODUCTION TO IDEATION PROCESSES IN CONTEXT WITH USABILITY  
Practical exercises on deriving of insights and conversion into user flows, Information architecture, wireframes and paper prototypes Introduction of Ui software (Figma / Adobe XD etc) Usability in interaction design, Introductions to Laws of UX design (Fitt’s law, Law of proximity, Gestalt laws etc), Golden rules of usability in UI design, schneiderman’s Eight golden rules, psychology and UX.

UNIT V VISUAL DESIGN AND PROTOTYPING  
Practical exercises in basics of Ui colour themes, Psychology behind colour themes, establishing aesthetic identity and theme relevant to context of the product, mood board generation and analysis. Incorporation of branding/ strategy theme into visual design. Generation of completed high-fidelity prototypes.

TOTAL: 45 PERIODS
OUTCOMES

- Knowledge about user analysis techniques and the necessary analytical skills to pursue design thinking research.
- Ability to develop necessary skills to identify and interpret issues relating to, based on user research inquiry methods.
- Ability to develop wire frames and prototypes.

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DG4004 ADVANCED BIM AND BUILDING SERVICES

OBJECTIVE

- To enable students to understand HVAC strategies, building services, building management and building automation & networking.
- To provide knowledge on the BIM Software in design development, project and building management.

UNIT I HVAC


UNIT II ELECTRICAL SERVICES

UNIT III BUILDING AUTOMATION AND NETWORKING

Introduction to building automation systems: components of BAS, HVAC, Lighting, electrical systems, water supply and sanitary systems, fire safety, security, communication and office automation system. Concept of Intelligent buildings. Integration of services, water pump monitoring & control. Control of Computerized HVAC Systems: Direct Digital Control, chillers, pumps, BTU monitoring & control. Data networking: IBMS system and its components, centralized control equipment’s, substation and field controllers, field sensors.

UNIT IV WORK FLOWS AND PROJECT MANAGEMENT

Introduction to softwares like spreadsheets, excel, etc. to determine workflow, materials inventory, human resource management, finance management, Primavera-P6/MS Project/Sure track-For schedule development and tracking of it; Prolog-Data Management-RFI’s “Request for Information], Submittals-Product Data, Punch list etc.; JDE [JD Edwards]. Financial Management: For use of tracking and developing the cost reports and issuing the change orders, etc.; Navis works-In this software 3D Auto CAD/Revit model can be imported with a project schedule to review the progress of the Project.

Introduction to BIM Software application to simulate and analyze anticipation and ease of project delivery, the overall safety, etc. and to enhance efficiency during and post construction phases, and facility management. Applications like determination of quantities of items and material inventory, to build a building virtually prior to building it physically, work out problems, and simulate and analyze potential impacts, anticipation & ease of project delivery, overall safety of the project, etc.

UNIT V BUILDING INFORMATION MODELLING (BIM)

Use of computers, Building information management of energy with environment aspects. Building information modelling (BIM): Facilitates documentation, design exploration, model-based quantity take off and estimating, interference checking, construction coordination and sequencing, digital fabrication and 3- D building information capture and visualization. Examine geometry, spatial relationships, building information, quantities and properties of building components. Integrating people, systems, business structures and practices for maximizes efficiency through all phases of design, fabrication, construction and life cycle of the structure.

TOTAL: 45 PERIODS

OUTCOMES
- Knowledge on BIM software to develop complex design solutions,
- Ability to enhance non-conventional creativity, for working on the technical aspects of architecture such as Structural Systems, Construction Technologies, Building Services, Detailing and Materials.
- Knowledge about exploring 2D, 3D and moving images for development and implementation of Design Ideas.

REFERENCES
2. BIS, National Building Code 2005, New Delhi, 2005

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OBJECTIVE

- To introduce students to emerging innovative building materials.
- To enable understanding of production of SMART materials, their uses and its application.

UNIT I  INTRODUCTION  9

UNIT II  SMART MATERIALS AND TECHNOLOGIES I  9
Introduce students to smart materials for use in architectural design: materials and products that have changeable properties and that are able to reversibly change their shape or color in response to physical elements like light, temperature etc. Property Changing Smart Materials Photochromic, Thermochromics, Electro chromics – Photo adhesives, Electro active Polymers, Shape Memory Alloys

UNIT III  SMART MATERIALS AND TECHNOLOGIES II  9
Examine in depth, materials and technologies such as Energy-exchanging smart materials - Phase change Materials (PCM) – Photo-luminescent, Photovoltaics, LED’s, and Photoelectric, thermoelectric, Piezoelectric, smart glazing, displays and interactive surfaces; and their contemporary application in architecture.

UNIT IV  SMART MATERIALS AND TECHNOLOGIES III  9

UNIT V  CASE STUDIES  9
Case Studies by Students on the innovative applications of Smart Materials in Design, to discuss the methods of fabrication, production and construction for innovation in design.

TOTAL: 45 PERIODS

OUTCOME

- Knowledge on the fundamentals and potentials of smart material and comprehensively analyze their current applications in architecture.
- Ability to focus on the smart material characteristics and explore different methods of material technology transfer to design, thereby inventing innovative approaches to design.

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OBJECTIVES

- To train students in using simulation and coding, to understand and re-imagine urban scenarios
- To familiarize students with complex automation algorithms in big data crunching and urban projections

UNIT I URBAN DESIGN PRACTICES

Introduction to various issues and aspects that impinge on contemporary urban condition: globalization, digital revolution, contemporary processes, sustainability, splintering urbanism through changes in information and communication networks and transportation. Contemporary Processes in Urban Design. Place making in the Digital Age. Reconfiguring Public realm. Urbanization and Excursions on density. Case study / appraisal of an urban center / central business district / Town center in view of the above issues related to urban design.

UNIT II ANALYTICAL TECHNIQUES, COMPUTER PROGRAMMING AND INFORMATION SYSTEMS

Introduction to computers, concept of data management, flow-chart, introduction of programming languages. Delphi, Trade off-game, simulation models, gravity analysis, Lowry model, Threshold analysis, Multivariate analysis. Techniques of delineation of planning areas and planning regions. LanD use models. Optimization and economic analysis methods in project formulation and implementation- Project management software- Goal achievement matrix, Introduction to Cost-Benefit analysis - Application of computer in planning.

UNIT III PARAMETRIC MODELLING

Parametric modelling for adaptive topographies, modularity, visualization of development codes, urban environmental modelling. Scripts for parametric algorithms. Interactive web applications. Additional functions for land use, FSI and density, plot coverage, optimization of building footprint.GIS applications

UNIT IV BIM DATASETS

BIM datasets manipulation. Automate processes. Create links between multiple applications.

TOTAL: 45 PERIODS

OUTCOMES

- To learn to automate urban development scenarios
- To deploy algorithms and coding to propose innovative solutions in urban design

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**MH4074  PSYCHOLOGY OF LEARNING AND DEVELOPMENT**

**OBJECTIVES**
- To introduce general concepts of learning theory.
- To help understand research related to theories of learning.
- To enable opportunity to engage in critical analysis of theories through discussions.

**UNIT I  INTRODUCTION**
7

**UNIT II  EDUCATIONAL PSYCHOLOGY**
9

**UNIT III  UNDERSTANDING LEARNER STAGES OF HUMAN DEVELOPMENT**
9

**UNIT IV  LEARNING AND MOTIVATION**
11

**UNIT V  APPRECIATION AND CRITICISM**
9
Ability of Understanding– appreciation, advocacy, descriptive, evaluative, interpretative and other evaluation criteria and methodology. Development of Design Thoughts- understanding, developing and expressing a design thought in its right perspective purpose, manner and mode. Theories and models for experiencing architecture.

**OUTCOME**
- Knowledge about major social and psychological processes involved in learning and development in an educational setting.
- Ability to engage in knowledgeable and productive dialogue with colleagues about human learning, development, and educational practice.

**TOTAL: 45 PERIODS**
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PROFESSIONAL ELECTIVE IV

DG4007 ECOLOGY AND DIGITAL ARCHITECTURE L T P/S C 3 0 0 3

OBJECTIVES
- To enable students to understand nature inspired designs.
- To give students knowledge on bio mimicry architecture.
- To introduce students about the use of digital platforms for design development.

UNIT I INTRODUCTION

UNIT II DYNAMICS IN ECOLOGY

UNIT III BIOMIMICRY
UNIT IV    BIOMORPHISM
Emerging technologies and designs- towards a biological paradigm. Dynamics in biological systems. Environmental dynamics and computation. Understanding Fibers, Textiles, Nets, Lattices, Branches, Cells, Mass components and implications in design.

UNIT V    VISUAL SCRIPTING
Evolve concepts of Biomimicry and Biomorphism in architecture, simple scripting, visual coding and parametric design using BIM and other computational software.

OUTCOMES
- Knowledge about the Dynamics in nature and ecosystem
- Ability to Design inspired through nature
- Ability to use parametric software to generate nature inspired design.

REFERENCES

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DG4008    BIO-MIMETIC ARCHITECTURE

OBJECTIVE
- To enable students to understand nature inspired designs.
- To give students knowledge on bio mimicry architecture.
- To introduce students about the use of digital platforms for design development.

UNIT I    INTRODUCTION

UNIT II    DYNAMICS IN ECOLOGY

UNIT III    BIOMIMICRY
UNIT IV  BIOMORPHISM  
Emerging technologies and designs- towards a biological paradigm. Dynamics in biological systems. Environmental dynamics and computation. Understanding Fibers, Textiles, Nets, Lattices, Branches, Cells, Mass components and implications in design.

UNIT V  VISUAL SCRIPTING  
Evolve concepts of Biomimicry and Biomorphism in architecture, simple scripting, visual coding and parametric design using BIM and other computational software.

OUTCOMES

- Knowledge about the Dynamics in nature and ecosystem
- Ability to Design inspired through nature
- Ability to use parametric software to generate nature inspired design.

REFERENCES


DG4009  ADVANCED STRUCTURES AND MODULAR SYSTEMS  
OBJECTIVE

- To enable students in understanding the advanced structural systems.
- To introduce students to the modular construction technique.

UNIT I  INTRODUCTION  
Understanding various structural systems and structural mechanism of complex systems-Wind and earthquake resistant building design, Advanced structural systems and construction systems. Overview of design philosophy and selection of the structural systems for tall buildings; criteria and loadings; Gravity load resisting systems, Lateral load resisting systems.

UNIT II  DESIGN PRINCIPLES  

UNIT III  ADVANCED STRUCTURAL SYSTEMS  
Properties, Application, specifications and standards (Indian and International). Shell Structure, Domes, Space frames, shell barrel vault, folded plates, tensile structure and pneumatic structure – working details. Sequence of erection and facilitating maintenance of such structures. Understanding specialized equipment’s.
UNIT IV MODULAR COORDINATION 9

UNIT V DIGITAL FABRICATION 12
Study of various industrial mass production systems - CNC cutting and milling (for mass customization) - Laser Cutting - 3D printing (SLS & FDM) & 3D Scanning - 3Axis CNC cutting & milling on non-planar surfaces. Digital & analogue experiment on various materials and their challenges. Best practices on the same.

OUTCOME
- Knowledge about modular construction techniques.
- Ability to understand various structural and design principles
- Knowledge to analyse through various case examples.

REFERENCES

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MH4075 THEORY OF ARCHITECTURAL EDUCATION L T P/S C 3 0 0 3

OBJECTIVE
- To give familiarity about theories of architectural education.
- To introduce the idea of cognition development.
- To give familiarity about ways of thinking and learning with respect to architecture.

UNIT I INTRODUCTION 7
Overview of the important aspects of the discipline of architecture. Nature of Architectural Education based on the nature of the discipline of architecture.

UNIT II TOOLS/TECHNIQUES TO TEACH ARCHITECTURE 9
Models and methods of Teaching. Teaching Aids In Architecture Education. Types of Teaching Aids-Visual, Audio, etc., Learning by Doing, reflection, exploring, arguing, incidentally. Case-Based Teaching. Advanced Organizer, Concept attainment model, Simulations.
UNIT III  SYNLECTICS AS A MODEL OF TEACHING.  9
The essence of creativity in synectics. Use of synectics in the design studio. Techniques of teaching-learning: Maxims of teaching and its application to subjects of architecture. Concept mapping, creating concept maps. Basic aspects of classroom management.

UNIT IV  STUDENT DEVELOPMENT  11

UNIT V  LEARNING IN ARCHITECTURE DESIGN STUDIO  9
Development of Critical, Creative and Pragmatic Thinking in Architectural Design Studio. Bloom Taxonomy in Design Studio. Qualities which can be attained at various stages in Architectural Design Studio.

TOTAL: 45 PERIODS

OUTCOME

- Awareness of the importance of contextual excellence in architectural design and methods for the same.
- Knowledge about and ability to integrate interdisciplinary and cognitive aspects of learning, teaching and development.

REFERENCES

AUDIT COURSES

AX4091 ENGLISH FOR RESEARCH PAPER WRITING  L T P C  2 0 0 0

OBJECTIVES
- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I  INTRODUCTION TO RESEARCH PAPER WRITING  6
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II  PRESENTATION SKILLS  6

UNIT III  TITLE WRITING SKILLS  6
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV  RESULT WRITING SKILLS  6
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V  VERIFICATION SKILLS  6
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first-time submission

TOTAL: 30 PERIODS

OUTCOMES
CO1 – Understand that how to improve your writing skills and level of readability
CO2 – Learn about what to write in each section
CO3 – Understand the skills needed when writing a Title
CO4 – Understand the skills needed when writing the Conclusion
CO5 – Ensure the good quality of paper at very first-time submission

REFERENCES
OBJECTIVES

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION
Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II REPERCUSSIONS OF DISASTERS AND HAZARDS

UNIT III DISASTER PRONE AREAS IN INDIA
Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT
Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People’s Participation in Risk Assessment. Strategies for Survival

TOTAL : 30 PERIODS

OUTCOMES

CO1: Ability to summarize basics of disaster
CO2: Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
CO3: Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
CO4: Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
CO5: Ability to develop the strengths and weaknesses of disaster management approaches

REFERENCES

OBJECTIVES
Students will be able to:
- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals’ constitutional role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

UNIT I HISTORY OF MAKING OF THE INDIAN CONSTITUTION
History, Drafting Committee, (Composition & Working)

UNIT II PHILOSOPHY OF THE INDIAN CONSTITUTION
Preamble, Salient Features

UNIT III CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

UNIT IV ORGANS OF GOVERNANCE
Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V LOCAL ADMINISTRATION

UNIT VI ELECTION COMMISSION
Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

OUTCOMES
Students will be able to:
- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party (CSP) under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

SUGGESTED READING
1. The Constitution of India, 1950 (Bare Act), Government Publication.
UNIT I

சங்கிலிக்கம் 6
1. தமிழின் துவக்கநூல்தொல்கொப்பியம் – எழுத்து, தொல், தபொருள்
2. அகநொனூறு (82)
   - ஓர்சன்கிளீலரிகைத் தொகை
3. குறிஞ்சிப்பொட்டின்மலர்க் கொட்சி
4. புறநொனூறு (95,195)
   - பொருந்தியினுற்றகவல்பார்க்

UNIT II

அறநநறித்தமிழ் 6
1. அறநநறித்தகவாகத்தொன்றான்
   - அம்மோண்டுக்காதை, அம்மோண்டலை, தோமோண்டுக்காதை, இவை, பொருள்
2. புறநநறித்தகவாகத்தொன்றான் - தொன்றலை
   - தொன்றலை, தொன்றலைக்காதை, தொன்றலை, அம்மோண்டலை
   (காமோண்டலைத்தொன்றான்)

UNIT III

இரட்டடக்காப்பியங்கள் 6
1.கணநநறின்புரட்சி
   - கணநநறித்தச் செல்லார்
2.துவக்கநூல்தொல்கொப்பியங்கள்
   - கணநநறித்தச் செல்லார்

UNIT IV

அருள்நநறித்தமிழ் 6
1. சிறுபொணொற்றுப்பகட
   - பொரிமுல்கலக்குத்தகொடுத்தது
2. சிறுபொணொற்றுப்பகட
   - அருள்பணொன்றிக்குத்தகொடுத்தது
3. நற்றிகண அன்கனக்குரியபுன்கனசிறப்பு
4. நற்றிகண அன்கனக்குரியபுன்கனசிறப்பு
5. நற்றிகண அன்கனக்குரியபுன்கனசிறப்பு
6. நற்றிகண அன்கனக்குரியபுன்கனசிறப்பு
UNIT V

நவீனதமிழ்இலக்கியம்

1. உகரநகடத் தமிழ்
   - நுழைவயத்திலக்கியம்
   - நுழைவயத்திலக்கியமத்தினம்
   - துணைத்திலக்கியம்
   - பயணத்திலக்கியம்
   - நொடகம்

2. நொட்டுவிடுதகலபபொரொட்டமும்தமிழ்இலக்கியமும்

3. முதொயவிடுதுயயும்தமிழ்இலக்கியமும்

4. பொழுதுவிடுதுயயும்தமிழ்இலக்கியமும்பயணநிக்கொள்லினரின்பமம்பொட்டில்தமிழ்இலக்கியமும்

5. அறிவியல்

6. இகணயத்தில்

7. சுற்றுசூழல்

TOTAL : 30 PERIODS

தமிழ்இலக்கியநெளியீடுகள்/புத்தகங்கள்

1. தமிழ்விக்கிப்பீடியொ (Tamil Wikipedia)- https://ta.wikipedia.org
2. தமிழ்விக்கிப்பீடியொ (Tamil Wikipedia)- https://ta.wikipedia.org
3. தமிழ்விக்கிப்பீடியொ (Tamil Wikipedia)- https://ta.wikipedia.org
4. பயணவிடுதகலபபொரொட்டமும்தமிழ்இலக்கியமும் (Tamil Virtual University)- www.tamilvu.org
5. பயணவிடுதகலபபொரொட்டமும்தமிழ்இலக்கியமும் (Tamil Virtual University)- www.tamilvu.org
6. பயணவிடுதகலபபொரொட்டமும்தமிழ்இலக்கியமும் (Tamil Virtual University)- www.tamilvu.org

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