Master of Architecture

M.Arch.(Digital Technologies for Buildings)

Short Syllabus

Professional core courses

Architectural Design Studio – 1(BIM Integrated) (0-0-12-12)

Design of a small building project, application of BIM tools; Identification of a mid-scale project, integration of architectural details; Source could be undergraduate thesis submission of the student or external source such as real estate promotional materials on the internet Preparation of a BIM drawing; Integration of conceptual plumbing and sanitary services; Integration of electro-mechanical services.

Architectural Design Studio – 2(Building Performance Analysis) (0-0-12-12)

Energy consumption-lighting, thermal performance, Water sustainability, air movement, Post construction and occupancy evaluation, facility management optimization; Conceptual analysis of building performance; Impact of open window percentage, external envelope material characteristics, orientation etc on building performance; Analysis of heritage structure using BIM techniques.

Architectural Design Studio – 3(Value Design) (0-0-12-12)

Small to medium scale studio design; demonstration of architectural design principles while accommodating integration of technical inputs into the timeline; Creation of a BIM format for the project; Integration of MEP and fire protection services services into the project, resolution of architectural details; Integration of material specifications and extraction of sample BOQs; Preparation of presentation drawings for the project including digitally enabled physical models.

Parametric Architecture (0-0-4-2)

Introduction - shape forms, Data-Driven Design, tools like Rhino and Grasshopper; Elements - parametric design processes and approaches; Geometric modelling - Boolean operations, formal transformations, freeform surface creation, geometry reconstruction; Modelling techniques and tools; Parametric Design and Scripting - sequential, conditional, loop statements, simple form generators; Advanced parametric modelling - Design & Computation, form-finding, digital fabrication

Digital Design Process (2-0-0-2)

Introduction - parameters of design process, systems thinking, design philosophies, optimization; Design Practice in Digital era - User experience tools, emerging trends (Metaverse, VR/AR). Introduction to gamification, Discussion on aesthetics, Culture in digital age; Analytical Thinking - Creative thinking, reasoning and logical deduction; Conceptualization / Ideation - MindMeister, ClickUp or similar mind mapping tools. Interpretation of data; Evaluation Methods - importance of prototyping, feedback on design's effectiveness, reliability, user experience; Ethical Concerns - design decisions on individuals, society and the environment at large; Research Seminars; Workshop on Emerging Trends

Research methodology for Architects (2-0-0-2)

Introduction - Areas of research and types of research in the built environment; Research Paradigms and Strategies - Research Question, Investigation, Measurement Issues, Hypothesis; Research Methods - Research Design, Types; Merging the two approaches; Experimental and Simulation Research Methods; Tools and Techniques - observational studies, surveys, interviews, Sampling design; Technical Report Writing - Need and process of literature review, Research writing in general and its components.

Employability enhancement core courses

Architectural Criticism (3-0-0-3)

Introduction - Origins of Art and Architectural Criticism, Ideas of History , theory and Criticism; World view and Indian concepts- Theorizing the Critical ideas, Types and characteristics; New paradigms - The idea of isms, Critical regionalism; Architecture as an interdisciplinary discourse - Urban sociology, Cultural sociology, Anthropology, Cultural ecology, Economics; Architectural appreciation - Metaphysics, Architectural Language and Notation, formalism, anti-formalism; Architectural Ethics and expressions - Architecture and the Political, Architectural Ethics, Power of images, Media and Photography, Journalism, Creative writing, Architectural expressions

Integrated approach to building services (3-0-0-3)

Electrical and HVAC Services - components and design strategies, present technologies; Lighting services- Basic lighting layout design, Present technologies, DALI Systems; Fire Safety and acoustics – Fire services, acoustic design and vibration control, Latest technologies; Plumbing and water supply - Basics of plumbing design strategies; Integration through BIM Soft wares - Simulation software to understand the integration of building services; Automation of Building services - Automation for access control, lighting control, HVAC, AV integration, HNS systems for plumbing

Project Management (3-0-0-3)

Introduction to Legal process of project management: Details on Contracts, agreements and tender; Project Planning Process: Plan development process, time planning process, work scheduling process, resource planning process, Importance of planning, scheduling and controlling projects; Project formulation, Build operate transfer, Design build operate transfer, Public Private Partnership project; Process of execution; Planning & scheduling Tools Bar charts, mile stone charts, Network Techniques, Brief Historical development, Non critical activity; Safety Managements, accident types and safety trainings; Management Information Systems, Information Technology in Construction, construction project management for scheduling (such as BIM, MS Project)

Digital Fabrication (0-0-6-3)

Introduction - Link between design and fabrication, Detailing and Pre-fabrication process; Bi-dimensional cutting - laser cutter and CNC routers, Assembling Methods; Additive techniques - Modelling printable objects for additive fabrication; Subtractive techniques -

CNC milling technologies, CNC Foam cutting machines; Robotic fabrication – An overview of fibrous material fabrication, parametric pick and place.

Architectural Entrepreneurship (3-0-0-3)

Introduction - Definition, ideation, innovation, capital, ownership, growth and management; Risks and uncertainties - Legal liabilities and risk perception; Principles of management - Project and financial management, marketing; Soft skills; Changing context and futuristic technologies - BIM, Augmented reality, virtual reality and Metaverse etc.; Guest Expert lecture

Skill Enhancement courses

Computational design (0-0-4-2)

Generative and Algorithmic explorations - NURBS, MESH and SuBD Modelling, computational components such as random, gene pool, Series etc; Mapping Organic structures - Usage of algorithms such as Voronai, Fractal, Delaunay etc to develop and simulate nature inspired designs; Kinetic Façade and Structural Frames - Interactive façade designs, point and curve attractors according to the sun-path; Environmental and Structural Analysis - Using Algorithmic components to analyze and simulate; Topology Optimization.

Zero Energy Mass custom homes (3-0-0-3)

Home: Indian and global context - Idea of home, home in India's varied bio-geographic zones and socio-cultural zones, socio-cultural dimensions; Mass customization: Architecture - Introduction to mass customization in architecture, History and latest trends; Net Zero energy buildings - , knowledge from the traditional Indian systems, latest trends, passive and active buildings energy systems; Building performance simulations; Urban and Rural - rural and urban planning: Indian housing, smart cities: AI tools; Contemporary paradigm - Legislative and organizational frameworks of operations, social impact assessment

Environmental Experience design (2-0-0-2)

Fundamentals of human Factors; Introduction to Ergonomics - History & applications, Anthropometrics, safety, foreseeable use, vulnerable populations, safety standards; Cognitive Dimensions, Information Processing and heuristics in human decision-making; Cognitive-Ergonomics - , User Experience (UX) design – Introduction, Factors Involved, Interactive Design, Conceptual Models of Interaction; Measurement and Evaluation – Physical environment, Visual Environment, Thermal Environment, Vibratory Environment, Auditory Environment; Application to Design - Workspace design, Environmental considerations, Design Evaluation Methods

Impact Assessment in Built Environment (2-0-0-2)

Introduction - Impact Assessment in the built environment- Environment Management- Legal policy and regulatory requirements of EIA studies in India, Global Perspective; EIA Procedure, Establishing Baseline Conditions, screening, scoping, setting, analysis, mitigation, Types and limitations; EIA Methods- Tools and Techniques, Prediction and Assessment of Impacts- Phases of impact assessment, Various methods & techniques used in impact identification, Techniques used in impact prediction, Weighting, Scaling techniques, ecological rating systems; Impact on Socio-Economic Systems - social impact

assessment, Relationship between social impacts and change in community and institutional arrangements; Environmental Management - preparation, implementation, and review, Mitigation and Rehabilitation Plans – Policy and guidelines for planning and monitoring programs – Post-project audit, Energy management; EIA Case Examples

Sustainable Built Environment (3-0-0-3)

Built Environment and Sustainability – physical and social impacts, History of sustainability; Sustainable development; Global warming and climate change; Thermal behaviour of built environment – Thermal response, climate responsive building design, New developments in the field of Thermal Comfort, thermal comfort modelling; Energy audit - Energy Performance Assessment, Life Cycle Assessment; Environmental Codes and Energy Ratings - Introduction and guidelines of ECBC, GRIHA, policy guidelines of sustainable architecture; Strategies and Technologies - Elements and principles of sustainability in vernacular architecture and smart built environment; HVAC and IAQ, Design - Basics of HVAC, NBC ,ASHRAE guidelines for ventilation. Accepted IAQ for different functional spaces and uses.

Future Architectural explorations (2-0-0-2)

History, Theory and Introduction :Futurist Architecture - Rise of Futurism, Manifesto of Futurism, Future concepts envisioned by earlier theorists; Futurism after World War II - Googie Architecture – History, Origin and Influences, Concepts of Temporal Structure ,Retro futurism, Influences on Animation series and movies; Predictive Architecture; Planning Trends and the Environment; Futuristic spatial design and visual aesthetics - Predictive exploration of probable futuristic spatial configurations; Design Research.

Environment and Behavior (2-0-0-2)

Man- Environment relationship; History of EBS – Nature, scope and functions of environmental psychology; Fundamental theories and basic concepts - Proxemics theory, Gestalt theory; Theories of Environmental Psychology - Environmental possibilism vs Environmental probabilism, Behavior constraint theory, Perception or cognition theory; Participatory approach - Methods and case studies to apply environment-behavior studies in design; Applications of EBS - Behavioral concepts in Neighborhood and Urban Design, Contemporary Socio-physical issues in environmental design; Guest Lectures.

Mind Mapping (2-0-0-2)

Introduction to Mind Mapping; Mind Mapping Process - Central Topics, branch out of maps, mapping types; Design Thinking and Problem Solving - Lenses for Design Thinking, Creativity, Motivation and Observation; Mind Mapping Tools; Mind Mapping for Architects - Case studies of architects using Mind Mapping for generating their design process; Expert talks and project

Facilities Management (2-0-0-2)

Introduction To Facilities Management - Role of Architects in facility management; Space Design And Management - Importance of managing space in a facility, Space planning , Design & construction for operability, design development, Using technology for space management; Strategic Facility Management; Operations And Maintenance Management - Facility Operations, Building performance, Maintenance and Repair, building management &

sustainability; Ict In Facility Management - IT infrastructure management, BIM technology for facility management, future of facility management; Workshop/Group Work/Discussions.

Construction Economics (2-0-0-2)

Understanding the nature and scope of construction industry; Principles of Economics - Introduction to Micro and macro-economics, general equilibrium, price elasticity, market failure, Factors of production; Value Engineering and concepts in Economics - Risks and uncertainties and management decision in capital budgeting, Depreciation, Taxation and inflation, Work pricing – Equipment and ownership cost, operation costs; Economics in Contracts; Performance analysis - benefits of economic analysis, type of estimates (parametric and approximate), practical problems; Globalization - International and local economics and policy instruments , Current economic issues and future directions