PROPOSED MG UNIVERSITY DETAILED SCHEME, PROGRAM STRUCTURE (CURRICULUM), SYLLABUS, MANUAL & REGULATIONS

MASTER OF ARCHITECTURE (ADVANCED ARCHITECTURE)

2 YEAR FULL TIME

M.ARCH COURSE

2023

Concept Note for the M. Arch: Masters in Advanced Architecture Design Course

The evolution of architecture in the 21st century has been marked by a profound integration of technology, sustainability, and innovation. The demand for architects who can harness cutting-edge tools and methodologies such as Building Information Modeling (BIM), Artificial Intelligence (AI), and Parametric Modeling has never been higher. The Master of Advanced Architecture Design program is conceived to address this need and prepare architects to lead in a rapidly changing and technologically-driven built environment.

The program aims to equip students with the skills, knowledge, and mindset required to excel in the dynamic field of advanced architecture design. The program focuses on three key pillars:

Technological Proficiency:

- In-depth training in BIM, AI, and Parametric Modeling.
- Hands-on experience with industry-standard software and tools.
- Integration of technology into the entire architectural design process.

Advanced Sustainability:

- Comprehensive understanding of sustainable design principles.
- Exploration of innovative materials and construction technologies.
- Application of sustainable practices in real-world architectural projects.

Theoretical and Practical Exposure:

- Balanced coursework covering theoretical concepts and practical applications.
- Collaborative projects with industry partners to provide real-world challenges.
- Internships and site visits to gain firsthand experience in the field.

Benefits of the Program:

Holistic Skill Development: Graduates will possess a well-rounded skill set, integrating design, technology, and sustainability in their architectural practice.

Industry-Relevant Training: The curriculum is designed in consultation with industry experts to ensure alignment with current and future industry needs.

Global Perspective: Exposure to international best practices through collaborations with renowned architectural firms and exposure to global case studies.

Career Advancement: Graduates will be prepared for leadership roles in architectural firms, sustainable design consultancies, and other related fields.

PROGRAM STRUCTURE (SEMESTER WISE)

FIRST SEMESTER

(**Focus Area:** Sustainability, Energy Efficiency & Green Building Design)

Course Code	Subject	Hours/Week			Credits	Marks			
		Theory (T)	Studio (S)	Workshop/Lab (W/L)	Total Credits: 25	CA	University Exam		Total
							Jury	Written	
CORE COURSES									
23MAR1001	**Advanced Sustainable and Green Building Design**	2			2	50	-	100	**150**
23MAR1002	**Advanced Sustainable, Energy Efficient Building Materials & Technologies**	2		1	3	50	-	100	**150**
23MAR1003	**Building Physics & Performance Evaluation of Buildings**	1		2	3	50	-	100	**150**
23MAR1004	**Advanced Research in Architecture & Seminar**	1		2	3	50	100	-	**150**
ELECTIVE THEORY – I									
23MAR1005	**ELECTIVE - I**	**Students to choose any one from Elective - I**							
Option 1	**Environmental Law & Legislations**	2			2	50	50	-	**100**
Option 2	**Adaptive Reuse & Retrofit of Buildings**	2			2	50	50	-	**100**
ELECTIVE THEORY - II									
23MAR1006	**ELECTIVE - II**	**Students to choose any one from Elective - II**							
Option 1	**Low Cost Housing**	2			2	50	50	-	**100**
Option 2	**Disaster Management**	2			2	50	50	-	**100**
STUDIO									
23MAR1007	**Advanced Design Studio – I (Focus on Sustainability)**	2	8		10	150	150	-	**300**
								Total Marks:	**1100**

SECOND SEMESTER

Focus Area: Contemporary Processes & Technology in Architectural Design

Course Code	Subject	Hours/Week			Credits	Marks			
		Theory (T)	Studio (S)	Workshop/Lab (W/L)	Total Credits: 25	CA	University Exam		Total
							Jury	Written	
CORE COURSES									
23MAR2001	**Contemporary Processes In Architectural Design: BIM, AI, ML, VR, AR**	2	-	-	2	50	-	100	**150**
23MAR2002	**Theory & Application of Digital Architecture**	1	-	2	3	50	-	100	**150**
23MAR2003	**Advanced Design Visualization Studio**	1	-	2	3	50	100	-	**150**
23MAR2004	**Advanced Design Optimization Through Algorithms**	1	-	2	3	50	-	100	**150**
ELECTIVE THEORY - III									
23MAR2005	**Elective Theory - III**	**Students to choose any one from Elective - III**							
Option 1	**High End 3d Modelling**	-	-	2	2	50	50	-	**100**
Option 2	**Smart Materials**	1	-	1	2	50	50	-	**100**
ELECTIVE THEORY- IV									
23MAR2006	**Elective Theory - IV**	**Students to choose any one from Elective - IV**							
Option 1	**Advanced Biomimetic Architecture**	2	-	-	2	50	50	-	**100**
Option 2	**Digital Fabrication**	-	-	2	2	50	50	-	**100**
STUDIO									
23MAR2007	**Advanced Design Studio – II (Focus on Digital Architecture)**	2	8	-	10	150	150	-	**300**
								Total Marks:	**1100**

THIRD SEMESTER

FOCUS AREA: ADVANCED BUILDING SYSTEMS, CONSTRUCTION & TECHNOLOGY

Course Code	Subject	Hours/Week			Credits	Marks			
		T	S	W/L	Total Credits:	CA	University Exam		Total
							Jury	Written	
CORE COURSES									
23MAR3001	ADVANCED BUILDING SYSTEMS INTEGRATION	2	-	-	2	**50**	**-**	**100**	**150**
23MAR3002	ADVANCED CONSTRUCTION MANAGEMENT AND TECHNOLOGY	2	-	-	3	**50**	**-**	**100**	**150**
23MAR3003	HIGH-PERFORMANCE BUILDING ENVELOPES	2	-	-	3	**50**	**-**	**100**	**150**
23MAR3004	ADVANCED BUILDING INFORMATION MODELING (BIM) AND DIGITAL DESIGN	-	-	2	3	**50**	**-**	**100**	**150**
ELECTIVE - V									
23MAR3005	**Elective Theory - V**	**Students to choose any one from Elective - V**							
Option 1	ADVANCED ARTIFICIAL INTELLIGENCE & MACHINE LEARNING IN ARCHITECTURE	2	-	-	2	**50**	**50**	**-**	**100**
Option 2	Virtual Reality (VR) and Augmented Reality (AR) in Architecture	2	-	-	2	**50**	**50**	**-**	**100**
ELECTIVE - VI									
23MAR3006	**Elective Theory - VI**	**Students to choose any one from Elective - VI**							

Option 1	Technology & Human-Centered Design in Architecture	**2**	**-**	**-**	**2**	**50**	**50**	**-**	**100**
Option 2	Design Thinking and Innovation in Architecture	**2**	**-**	**-**	**2**	**50**	**50**	**-**	**100**
STUDIO									
23MAR3007	ADVANCED DESIGN STUDIO - III	2	8	-	10	150	150	-	300

FOURTH SEMESTER: ADVANCED ARCHITECTURE DESIGN THESIS

Course Code	**Subject**	**Hours/Week**			**Credits**	**Marks**			
		T	**S**	**W/L**		**CA**	**University Exam**		**Total**
							Jury	**Written**	
CORE COURSES									
23MAR4001	Advanced THESIS PROGRAMMING	2	-	-	2	50	100	-	150
23MAR4002	RESEARCH PAPER PUBLICATION & SEMINAR	**-**	**-**	**3**	**3**	**50**	**100**	**-**	**150**
STUDIO									
23MAR4003	ADVANCED ARCHITECTURE DESIGN THESIS	-	15	-	15	250	250	-	500
								Total marks:	**800**

DETAILED SYLLABUS: FIRST SEMESTER

23MAR1001: Advanced Sustainable and Green Building Design

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1001	Advanced Sustainable and Green Building Design	2	-	-	2	50	-	100	150

Course Objectives:

- To sensitize about the various aspects of sustainable and green building design in the context of global warming and climate change.
- To study the building materials for its impact on environment.

Module 1: Introduction

A historical perspective, General premises and strategies for sustainable and green design, objectives and basis, Bio-mimicry as a design tool based on ecosystem analogy.

Module 2: Green Construction & Environmental Quality

Sustainable architecture and Green Building: Definition, Green building evaluation systems. LEED Certification, Green Globe Certification, Case studies which look at the environmental approach, Renewable Energy, Controlling the water cycle, Impact of materials on environment, Optimizing construction, Site management, Environmental management of buildings.

Module 3: Passive Design in Materials

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

Module 4: Eco House

The form of the house. The building as an analogy. Building concepts of energy gain/loss. Insulation. Passive and active solar gain. Health benefits. Sustainable materials. Small scale wind and hydro power systems. Case study of an eco-house.

Module 5: Sustainable and Green Building Applications

This module will explore collaborative learning to explore, investigate and apply various parameters of sustainability for design development of projected building/ urban scenarios.

Outcomes:

- An understanding on sustainability.
- Knowledge on renewable energy conservation through material usage.
- A thorough understanding on designing green buildings.

References:

1. Ken Yeang: Eco Design- A manual for Ecological design; Wiley Academy, 2006.
2. Sue Roaf et all: Ecohouse, A design guide; Elsevier Architectural Press, 2007.
3. Thomas E Glavinich: Green Building Construction; Wiley, 2008.
4. Brenda and Robert Vale: Green Architecture, Design for a Sustainable Future; Thames and Hudson, 1996.
5. Daniel Vallero and Chris Brasier: Sustainable Design - The science of sustainability and Green Engineering; Wiley, 2008.

23MAR1002: Advanced Sustainable, Energy Efficient Building Materials and Technologies

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1002	Advanced Sustainable, Energy Efficient Building Materials and Technologies	2	-	1	3	50	-	100	150

Course Objectives:

- To understand the concept of energy.
- To study the building materials and its impact on environment.
- To provide an insight into various energy-efficient materials and sustainable construction technology.

Module 1: Energy and the Built Environment

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

Module 2: Environmental Impact of Building Materials

Measuring the impact of building materials. Calculating embodied energy, recycling and embodied energy, processing and embodied energy, time and embodied energy, embodied energy of different building materials. Low energy building and masonry materials, life cycle and analysis (life cycle analysis can be after embodied energy). Case studies and analysis.

Module 3: Recyclable and Renewable Materials

Concept of Recyclable materials. Sustainable Building Materials. Life Cycle Design of Materials. Biodegradable & Non-Biodegradable Materials. Green rating and Building Materials. Concept of Resource reuse. Recycled content. Regional materials. Rapidly renewable materials – fly ash bricks, cement, recycled steel, bamboo-based products.

Module 4: Sustainable Construction

Design issues relating to sustainable development including site and ecology, community and culture, health, materials, energy, and water. Domestic and community buildings using self-help techniques of construction. Adaptation, repair and management. Portable architecture.

Module 5: Energy Efficient Construction Technologies

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

Outcomes:

- Insight on environmental impact of building materials.
- Understanding of building materials and construction techniques that are sustainable and energy efficient.

References:

1. Koenigsberger O.H, T.G. Inger Soll, “Manual of tropical Housing and Building” Longman Group United Kingdom, 2012.
2. Bansal Naveendra K., Hauser Gerd and Minke Gernot, “Passive Buildings Designs: Handbook of Natural Climatic Control”, Elsevier Science, Amsterdam, 1997.
3. Givonji B., “Man, Climate and Architecture”, Elsevier, Amsterdam, 1986.
4. Watson Donald, ‘Climatic Design: Energy Efficient Building Principles & Practices”, Mc Graw Hill Book company, New York, 1993.

23MAR1003: Building Physics & Performance Evaluation of Buildings

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
1	23MAR1003	Building Physics & Performance Evaluation of Buildings	1	-	2	3	50	-	100	150

Course Objective:

To investigate the simulation and audit techniques for assessing the energy performance, environmental response and impact of built form.

Module 1: Introduction to Building Performance Evaluation

Emerging role of performance evaluation in building design and Master Planning. Integrated approach to environmental design. Case studies. Cognitive, analytical and simulated modeling and design of buildings. Net Zero Energy Building.

Module 2: Environmental Assessment Methods and Modelling for Passive Systems (Lab Based)

Modelling and experimental techniques for building assessment/evaluation and design. Basics of thermal comfort, solar shading/access/control, day lighting, acoustics and air movement etc. Issues and opportunities with current assessment modes/evaluation tools. Evaluation assessment based on building type/function and program.

Module 3: Energy Modelling (Lab Based)

Computer based simulation. Building performance with respect to function, program, microclimate, urban planning, envelope design and material. Energy modelling and performance simulation of existing buildings (residential, institutional). Design of a new residential building.

Module 4: Post Occupancy Evaluation of Buildings

Building performance benchmarks. Rating and comparison of buildings. Techniques, methods and procedures of post occupancy evaluation. Students are required to carry out post-occupancy evaluation of a building and document the relationship between building design, energy use, occupant satisfaction, and environmental impact and report their observations. Assessing existing buildings on their energy use, environmental impact and occupant satisfaction.

Module 5: Seminar and Case Study Presentation

Case study presentation of students on performance evaluation of a building identified by the student and approved by the course faculty. Seminar on topics approved by the course faculty.

Outcomes:

- Knowledge on environmental assessment methods, audit and simulation techniques.
- Addition of value to the architectural design processes and equipping students with energy modeling skills.

References:

1. Energy Audit of Building Systems – Moneef Kranti (Ph. D) – CRC Press 2000
2. Clarke, J.A., Energy Simulation in building design, Adam Hilger Ltd, Bristol, 1985
3. ESRU., "ESP – A Building Energy Simulation Environment; User Guide Version 9 Series. "ESRU Manual U 96/1, University of Starthclyde, Energy Systems Research Unit, Glasgow, 1996.
4. Kabele, K., Modeling and analyses of Passive solar systems with computer simulation, in Proc. Renewable energy sources, PP. 39 – 44, Czech Society for Energetics Kromeriz 1998.
5. James Douglas "Building Adaptation", Elsevier, Oxford 2002.

23MAR1004: Advanced Research in Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1004	Advanced Research in Architecture	1	-	2	3	50	100	-	150

Course Objectives:

- To learn the importance of research methodology
- To understand research application in architectural design.
- To understand the different methods and techniques as relevant to the design profession.
- To apply the research concepts in evaluation and appraisal of architectural design projects.
- To analyze the various methodologies of field survey
- To develop the skill of preparation of report and documentation

Module 1: Introduction to Research

Importance, Purpose and Scope of Research and Field Studies. Application in architecture in terms of design, technology, environment, economic and behavioral areas.

Module 2: Research Objectives and Methodology

Sequence and Methods of Research. Identification of Problem, Hypothesis Formulation, Objectives and Methodology.

Module 3: Application of Research

Understanding and Applying Qualitative, Analytical, Interpretative, Correlational, Quasi- Experimental, Experimental, Simulation and Modelling techniques in Architectural Design.

Module 4: Field Studies

Pilot Studies. Field Surveys and Collection of Samples - Physical, Architectural, Environmental, Organizational. Preparation and Analysis of Data Sheets and Questionnaires.

Module 5: Analysis, Preparation and Documentation

Preparation and Analysis of Data Sheets and Questionnaires. Arriving at conclusions from the Research at Field Studies. Report Writing and Publications.

Outcomes:

- An understanding of the methods of research
- Development of field study and experimentation skills
- An understanding of the research application in the field of Architectural Design
- An understanding of the process and methods collection of data and analysis of data
- Development of documentation skills of various surveys and research
- Preparation of documents, report writing and publishing in journals

References:

1. Knight, A. and Ruddock., "Advanced Research Methods in Built Environment", John Wiley & Sons.2008.
2. Groat, L. and Wang D., "Architectural Research Methods", John Wiley & Sons. 2002.
3. Gibbs, J.P., "Urban Research Methods", (rev.ed.) Von Nostrand. 1988.
4. Kothari, C.R., "Research Methodology- Methods and Techniques", New Age International. 2004.

23MAR1005 - ELECTIVE I (Option 1): Environmental Law & Legislations

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1005	Elective I (Option 1): Environmental Law & Legislations	2	-	-	2	50	50	-	100

Course Objective:
To introduce students to various international developments, environmental laws and legislations in India and its current applicability to the society at large.

Module 1: Public Health and Safety
Remedies under law of torts, law of crimes & other common law remedies.
Module 2: The Constitution of India
Salient features, Fundamental Rights and Directive Principles of State Policy, writ petitions, Public Interest Litigations.
Module 3: Environmental Laws and Legislations
Water Act, 1974, Air Act, 1981, Environment Protection Act, 1986, Energy Conservation Act, 2001, Public Liability Insurance Act, 1991 and Biodiversity Act 2002
Module 4: Environmental Notifications and Rules
Coastal Regulation Zones, Eco-Fragile Areas & Zones, Environment Impact Assessment of Development Projects, Eco-Sensitive Zones, Bio-Medical Waste Rules, Hazardous Waste Rules, Municipal Solid Waste and other applicable rules and regulations.
Module 5: End of term assessment
The continuous assessment will be in the form of notes/ assignments, as stipulated above and will be assessed internally.

Outcomes:
• An understanding of the current laws related to environment in the Indian context • An understanding of the application of the current laws in the context of design and planning
References:
1. Leela Krishnan; *Environmental Law in India* 2. Mehta M; *Commentary on water and air pollution with environmental protection law* 3. Sarkar S; *Legal aspects of regulations in South Asia* 4. Chalifour N; *Land use law for sustainable development* 5. Birnie PW and Boyle; *International law and the Environment* *6.* Saksena K.D; *Environmental policies and programs in India*

23MAR1005 - ELECTIVE I (Option 2): Adaptive Reuse & Retrofit of Buildings

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1005	Elective I (Option 2): Adaptive Reuse & Retrofit of Buildings	2	-	-	2	50	50	-	100

Course Objective:
To give a comprehensive overview on how existing buildings can be adapted and retrofitted to function sustainably.

Module 1: Sustainable Retrofit for Existing Buildings
Retrofitting options for existing buildings. Structural retrofit. Services. Interior retrofit. Performance analysis of existing buildings. Physical audits. Building simulation. Metering and tracking options. Analysis of the building's current performance. Decision influencers for retrofit. Economic, Social and Environmental issues.
Module 2: Adaptive Reuse of Old Buildings
Need for adaptive reuse. Issues to be explored in building adaption. Economic, Social, Environmental and assessment models for adaptive reuse. Case studies of buildings with adaptive reuse.
Module 3: Technologies for Energy Efficiency in Existing Buildings
Improving energy efficiency in existing buildings. Facade improvements. HVAC improvements. Indoor environment improvements. Monitoring the performance of retrofits. Case studies on energy efficiency improvements in existing buildings.
Module 4: Sustainable Conservation of Heritage Structures
Conservation of heritage structures. Sustainability in heritage structures. Adaptive reuse of heritage structures. Issues in adapting a heritage structure. Use of sustainable conservation techniques. Improving the energy performance of heritage structures. Case studies of sustainable conservation in heritage structures.
Module 5: Retrofitting Tall Buildings for Energy Efficiency
Energy consumption by existing tall buildings. Retrofitting existing tall buildings to make them energy efficient. Case studies of tall buildings such as Empire State Building, Sears Towers etc. which have been retrofitted for energy efficiency.

Outcome:
An understanding of how existing residential buildings, tall structures and buildings with heritage value can be retrofitted for energy efficiency.
References:
1. Sara J. Wilkinson, Hilde Remoy, Craig Langston: Sustainable Building Adaption: Innovations in design making; John Wiley and sons, 2014. 2. John Krigger: Residential Energy: Cost savings and Comfort for Existing buildings; Prentice Hall, 2009. 3. William H. Clark: Retrofitting for Energy Conservation; McGraw Hill Professional, 1997. 4. Paul Apple: Sustainable Retrofit and Facilities Management; Routledge, 2013. 5. Zynep Aygen: International Heritage and Historic Building Conservation: Saving the World's Past; Routledge, 2013.

23MAR1006 ELECTIVE II (Option 1): Low Cost Housing

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1006	ELECTIVE II (Option 1): Low Cost Housing	2	-	-	2	50	50	-	100

Course Objective:

To provide the students with in-depth knowledge of various building materials, construction and execution techniques in low cost housing.

Module 1: Introduction to Low Cost Housing

Introduction to low cost housing, building components influencing cost of buildings. Adobe, Cob, Rammed earth, Straw bale, Bamboo, earthen finishes, etc., their sustainability, adaptability to local climate and engineering considerations necessary for durability.

Module 2: Modular Coordination

Modular coordination in building design, total and partial prefabrication, impact of prefabrication on employment. Various methods of mass production of building components.

Module 3: Low Cost Construction Technologies

Building construction technology solutions for cost reduction. Available knowledge in low cost construction technologies, Institutions developing low cost construction technologies like BMTPC, CBRI, Auroville Building Center, etc.

Module 4: Time Cost Management

Use of CPM and PERT methods in building construction management. Effect of time-cost relationship in low cost housing delivery mechanism.

Module 5: Building Cost Reduction

Application of low-cost building materials and various construction techniques, building cost control techniques, research and development by various organizations in the country and foreign countries to reduce the cost.

Outcomes:

The course will make the student conversant with various design systems used in Low Cost Housing.

References:

1. Davis, S. “Architecture of Affordable Housing”, University of California Press, 1995.
2. Ruiz, F. P. “Building an Affordable House, Taunton Press, 1995.
3. Laul, A. K. “A Handbook of Low-Cost Housing”, New Age International, 1995.
4. Mathur, G. C. “Low Cost Housing in Developing Countries”, South Asia Book, 1999.

23MAR1006 : ELECTIVE II (Option 2): Disaster Management

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1006	ELECTIVE II (Option 2): Disaster Management	2	-	-	2	50	50	-	100

Course Objectives:

• To understand the nature and importance of disaster management.
• To gain an understanding hazard and vulnerability assessment, structural and nonstructural mitigation measures for different types of disasters.

Module 1: Introduction to Disaster Management

Paradigm shift in Disaster Management thought. The Disaster Management Cycle. Disaster Impact, Response, Recovery, Development, Prevention, Mitigation and Preparedness. Factoring in Disaster Mitigation with Development Projects.

Module 2: Prevention of Hazard

Types of Natural disasters. Nature, causes, Impact. Hazard and vulnerability assessment, concepts, tools and techniques, Pre-disaster mitigation and protection of lifeline and critical facilities against natural hazards. Manmade hazards in urban areas and their mitigation.

Module 3: Structural and Non-Structural Mitigation Measures

Structural and non-structural methods of mitigation: making buildings resilient to earthquakes, cyclones, tsunami and landslides. Building codes and regulations for earthquake prone areas and coastal zone regulations. Capacity building for architects and masons. Retrofitting existing buildings for disaster resistance. Recent advances in housing technologies: base isolation and shape memory alloys and smart materials for disaster resistance.

Module 4: Institutional Framework for Disaster Management

Environmental policies and programmes, Institutions and National Centers for Natural Disaster Impact Reduction. Environmental legislations in India, awareness, education and training programmes.

Module 5: Methods of Community Based Disaster Management

Principles and methods of community-based approaches for urban disaster management. Community based disaster management practice. Role of self-help communities and case studies of public participation in rehabilitation projects.

Outcomes:

- Understanding of the concept of disaster management in urban areas from early warning to assessment and recovery and reconstruction.
- Awareness of various strategies for disaster mitigation, vulnerability reduction, hazard analysis and latest technologies in disaster risk reduction.

References:

1. Arnold, C and Reitherman, R. Building Configuration and Seismic Design. John Wiley and Sons, New York, 1982.
2. Carter, WN. Disaster Management: A Disaster Manager's Handbook, Asian Development Bank, Manila, 1990.
3. Farrington, K. Natural Disasters – The Terrifying forces of nature, Grammery Books, London, 1999.
4. Sharma, VK. Disaster Management, Rawat Publications, Jaipur, 1995.
5. United Nations. Disaster Prevention and Mitigation, United Nations Disaster Relief Organization, 1986.

23MAR1007 Advanced Design Studio – I (Focus Area: Sustainability)

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
1	23MAR1007	Advanced Design Studio - I	2	8	-	10	150	150	-	300

Course Objectives:

- To enable the student to understand the underlying concepts of Sustainable Architecture, to experiment and utilize them in various aspects of building design.
- To train the student to derive sustainable solutions at an individual building level.

Design Studio Focus:

The design studio should focus on the role of site planning, spatial design, building materials, construction technology, landscape and other components in achieving sustainability. The studio work includes both, the quantitative and qualitative analysis of buildings and the role of each of the above components in achieving sustainability. Passive design strategies are to be explored in contemporary architecture.

The studio will experiment on designing an individual building, like a residence, primary school, health center, small office, etc. situated in one of the climatic zones in India. In-depth analysis of the local climate, site conditions, usage characteristics of the premises, user-groups' functional and physiological needs, and aspirations should guide the student in deriving appropriate building geometry, orientation, blending of built, semi-open and open spaces, and usage of suitable building elements to achieve a sustainable building design solution.

Presentations & Viva Voce:

Stage-wise progress of student's approach to design is continually evaluated by the studio faculty at various internal juries, followed by a final presentation at the semester-end design jury.

Viva-voce on the project would be conducted by an external jury to examine the prudence of the student in deriving the design solution, reviewing the complete work done during the design studio.

DETAILED SYLLABUS: SECOND SEMESTER

23MAR2001: Contemporary Processes in Architectural Design

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2001	Contemporary Processes in Architectural Design	2	-	-	2	50	-	100	150

Objectives:

- To provide an overview of various contemporary design processes and its relation to computation.
- To investigate the contemporary theories of media and their influence on the perception of space and architecture.

Module 1: Introduction to Contemporary Processes in Architectural Design

Investigation of contemporary theories of media and their influence on the perception of space and architecture. Technology and Art. Technology and Architecture. Technology as Rhetoric. Digital Technology and Architecture

Module 2: Aspect of Digital Architecture

Design and Computation. Difference between Digital Process and Non-Digital Process. Architecture and Cyber Space. Qualities of the new space. Issues of Aesthetics and Authorship of Design. Increased Automatism and its influence on Architectural Form and Space.

Module 3: Contemporary Process

Overview of various Contemporary design process and its relation to computation. Diagrams, Diagrammatic Reasoning, Diagrams and Design Process. Animation and Design. Digital Hybrid Design Protocols. Concept of Emergence. Introduction to Cellular Automata and Architectural applications. Genetic algorithms and Design Computation.

Module 4: Geometries and Surfaces

Fractal Geometry and their properties. Architectural applications - works of Zvi Hecker etc. Shape Grammar - Shapes, rules and Label. Shape Grammar as analytical and synthetic tools. Combining Shape grammar and Genetic algorithm to optimize architectural solutions. Introduction to Hyper surface and concepts of Liquid architecture.

Module 5: Case Studies

Case studies- study, understanding and analysis of known examples at the national and international level which demonstrates the contemporary theories of media and their influence on the perception of space and architecture, contemporary design processes and its relation to computation.

Outcomes:

- Understanding of the effect of contemporary theories of media on contemporary architectural design.
- Understanding of various contemporary design process and their relation to computation

References:

1. Peter Eisenmann, Diagram: An Original Scene of Writing, Diagram Diaries
2. Grey Lynn, The Folded, The Pliant and The Supple, Animate form
3. Contemporary Techniques in Architecture, Halsted Press, 2002
4. Ali Rahim, Contemporary Process in Architecture, John Wiley & Sons, 2000
5. Walter Benjamin, Practices of Art in the Age of Mechanical Reproduction Colin press, 1977
6. Work of Architecture in the Age of Mechanical Reproduction, Differences MIT press,1997.
7. William J Mitchell, the Logic of Architecture: Design, Computation and Cognition. MIT Press, Cambridge, 1995

23MAR2002: Theory & Application of Digital Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2002	Theory & Application of Digital Architecture	1	-	2	3	50	-	100	150

Course Objectives:
To create a discussion on issues of Architectural Interpretations in the contexts of culture and socio-economics with a backdrop of emerging Computer Technology.

Module 1: Introduction to Architectural Interpretations
Architectural Interpretations in the contexts of culture and socio-economics.
Module 2: Emerging Computer Technologies
Influenced of emerging computer technologies on architecture and all building industry. Digital design processes and digital manufacture possibilities.
Module 3: Changing Cultures of The World Due to Technological Innovations
Forces which contribute to the cultural change described include colonization, globalization, and advances in communication, transport and infrastructure improvements.
Module 4: Architectural Interpretations
Rethinking Architecture Architectural Interpretations in the contexts of globalization. Super Modernism. Complexity Science and its influence on Architecture and Culture.
Module 5: Other Theoretical Issues
Theories of globalization local contexts

References:

1. Rethinking Architecture: A Reader in Cultural Theory by Neil Leach
2. Architecture Culture: 1943-1968 (Columbia Books of Architecture) by Joan Ockman
3. Architecture Theory since 1968 by K. Michael Hays (Editor)
4. Theorizing a New Agenda for Architecture: An Anthology of Architectural Theory 1965-1995 by Kate Nesbitt
5. The Poetics of Construction in Nineteenth and Twentieth Century Architecture by Kenneth Frampton
6. Complexity and Contradiction in Architecture by Robert Venturi
7. Architecture, Technique and Representation (Critical Voices in Art, Theory, and Culture) by Stan Allen
8. The Paradox of Contemporary Architecture by Peter Cook (Editor), et al
9. Ten Books on Architecture by Vitruvius, et al
10. The Architecture of the Jumping Universe: A Polemic: How Complexity Science Is Changing Architecture and Culture by Charles Jencks
11. Ontology of Construction: On Nihilism of Technology and Theories of Modern Architecture by Kenneth Frampton (Foreword), Gevork Hartoonian (Paperback - March 28, 1997)
12. Chora Four: Intervals in the Philosophy of Architecture by Alberto Perez-Gomez (Editor), Stephen Parcell (Editor)

23MAR2003 : Architectural Visualization Studio

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2003	Architectural Visualization Studio	1	-	2	3	50	100	-	150

Course Objectives:

Specific issues dealing with form generation using the generative potential of software's unique ability to deploy geometric entities. Introduction of Shape grammars, 3D sketch boards, parametric design tools, virtual environments etc. Discussion of Visualization techniques and their potential uses for the Architectural Design and analysis.

Module 1: Introduction to Architectural Visualization

Introduction to Virtual environments, Alpha worlds, Digital design in Architecture & Design. Introduction to Hardware components such as data-gloves, Head Mounted Displays, IMAX screens, AR & VR Goggles.

Module 2: Shape Grammar

Shape grammars for form generation: Visual and spatial reasoning in Design.

Introduction of features found in typical 2D & 3D shape grammars. References used in conjunction with tabular shape grammar summaries such as those for DXF, IGES, RIB, and VRML-Digital tectonics, Morphogenetic design strategies, Reflexive architecture, Hybrid Spaces-Other related issues: Contemporary Digital Experimentation and the Radical Avant-garde.

Module 3: Presentations & Viva Voce

Stage-wise progress of student's approach to design is continually evaluated by the studio faculty at various internal juries, followed by a final presentation at the semester-end design jury. Viva-voce on the project would be conducted by an external jury to examine the prudence of the student in deriving the design solution, reviewing the complete work done during the design studio.

References:

1. Hyper Architecture: Spaces in the Electronic Age (The Information Technology Revolution in Architecture) by Luigi Prestinenza Puglisi, L. Byatt (Translator)
2. Next Generation Architecture: Folds, Blobs, and Boxes by JOSEPH ROSA
3. Advanced Technologies: Building in the Computer Age (The Information Technology Revolution in Architecture) by Valerio Travi.
4. Hyperbodies by Kas Oosterhuis
5. Digital Tectonics by Neil Leach (Editor), David Turnbull (Editor), Chris Williams (Editor)
6. Hybrid Space: Generative Form and Digital Architecture by PETER ZELLNER
7. Developing Digital Architecture by Yu-Tung Liu (Editor), Yu Tung Liu
8. Architectural Representation Handbook: Traditional and Digital Techniques for Graphic Communication by Paul Laseau.

23MAR2004 : Design Optimization Through Algorithms

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2004	Design Optimization through Algorithms	1	-	2	3	50	-	100	150

Course Objectives:

- To introduce students to the concepts and techniques of modern optimization theory and practice.
- To learn and analyze how design optimization enhances the design outcome.

Module 1: Introduction

Optimization and evolutionary design. Optimization in the design process. Overview of principles, methods and tools for design optimization.

Module 2: Optimization Method

Evolutionary Design Optimization using Genetic Algorithms. Overview of traditional gradient-based methods.

Module 3: Fundamental Concepts of Optimality

Formulation of the objective function for architectural design. Aggregating multiple objectives and multi-objective optimization. Constraint handling.

Module 4: Design Optimization Practice

Case Studies by students on Design Optimization in practice.

Module 5: Modeling

Selection of design variables, objectives and constraints. Building optimization models. Post-Optimal Analysis.

Outcomes:

- Learning of the fundamentals of optimization and its support in the design process.
- Creation of an appropriate simulation model of the design problem to formulate the optimization problem and use algorithmic optimization techniques and computer support tools to solve the problem.

References:

1. John S.Gero (ed), *Design Optimization*, Academic press, Inc, 1985
2. Antony D.Radford and John S.Gero , *Design by Optimization in Architecture, Building, and Construction,* Van Nostrand Reinhold, 1988
3. Panos Y. Papalambros and Douglass J. Wilde, *Principles of Optimal Design – Modeling and Computation*, Cambridge University Press, 2000
4. Mitsuo Gen and Runwei Cheng, *Genetic Algorithms and Engineering Optimization*, Wiley, 2000

23MAR2005: Elective III (Option 1): High End 3d Modeling

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2005	Elective III (Option 1): High End 3d Modeling	-	-	2	2	50	50	-	100

Course Objectives:

- To comprehend and prepare digital design solution using advance high-end modeling and animation.
- To train students on the high end-3D modeling and animation.
- To introduce students to a suitable 3D modeling software such as MAYA
- To introduce students to Hypergraph Modeling: Nurb Modeling/ Polygon Modeling / Organic Modeling
- To introduce students to animation - working with Key frames and Breakdowns/ Deformers/ Character setup/Rendering:
- To introduce students to advanced effects of lighting/shading/texture advanced effects and MEL scripting language.

Module 1: Fundamentals of 3D Modeling in Architecture

Understanding the principles of 3D space. Overview of various 3D modeling software (e.g., Autodesk Revit, Rhino, SketchUp). Basic modeling techniques: extrusion, lofting, sweeping, and Boolean operations. Advanced techniques for precise modeling. Mastering parametric modeling.
Exploring advanced editing tools and modifiers. Introduction to rendering engines and materials. Lighting techniques for realistic visualizations. Post-processing and compositing for high-quality renders.

Module 2: Advanced Parametric Design in Architecture

Understanding parametric design principles. Exploring parametric tools in software (e.g., Grasshopper for Rhino). Building parametric relationships and algorithms. Using parametric modeling for generative design. Optimization techniques for performance-based design. Case studies of parametric design in real-world architectural projects. Applying parametric principles to detailing. Parametric patterns and ornamentation. Integrating parametric models with digital fabrication techniques.

Module 3: Advanced Texturing and Materiality

Understanding material properties and textures. Creating custom materials and textures. Mapping techniques for realistic material representation. Introduction to procedural texturing. Hands-on experience with Substance Designer. Applying procedural textures to architectural elements. Advanced material rendering techniques. Realistic representation of various materials (e.g., glass, metal, concrete). Texture mapping for architectural visualization.

Module 4: Animation and Simulation in Architectural 3D Modeling

Introduction to animation principles. Creating basic walkthroughs and flyovers. Keyframing and camera animation. Simulating environmental factors (e.g., sunlight, wind). Analyzing daylighting and shadow studies. Using simulation tools for performance analysis. Creating cinematic architectural animations. Introduction to VR for architectural walkthroughs. Integrating animation and simulation for immersive experiences.

Module 5: Project Integration and Capstone

Application of 3D modeling skills to a real-world architectural project. Project development from conceptualization to final visualization. Presentation and critique of capstone projects.

Outcomes:

Identification of the basic elements in the process of creating a 3D scene and construction of 3D models using well proven techniques.

References:

1. User's Manual for MAYA, Alias Wavefront.
2. Perry Hrovas, et.al, MAYA Complete 2, BPB Publications New Delhi, 2000.

23MAR2005: Elective III (Option 2): Smart Materials

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2005	Elective III (Option 2): Smart Materials	1	-	1	2	50	50	-	100

Course Objectives:

- To introduce students to smart materials for use in architectural design
- To examine, in depth, materials and technologies such as LED's, smart glazing, displays and interactive surfaces and their contemporary application in architecture.
- To discuss the methods of fabrication, production and construction for innovation in design.

Module 1: Introduction

Introduction to Innovative Materials. Smart materials in Nature. Current Trends and Developments.

Module 2: Property Changing Smart Materials

Photochromics. Thermochromics. Electrochromics. Photoadhesives. Electroactive Polymers. Shape Memory Alloys. Phase change Materials (PCM) - Photoluminescents – Photovoltaics, LED's, Photoelectric-thermoelectric, Piezoelectric.

Module 3: Matter-Exchanging Smart Materials

Gas/Water storing Smart Materials. Absorbent/Super absorbent Polymers - Bioplastics

Module 4: Case Studies

Case studies by students on the innovative applications of Smart Materials in Design.

Outcomes:

- Learning of the fundamentals of material and comprehensively analyze current applications in architecture.
- Exploration of the potential of smart materials in creative designing.
- Understanding of smart material characteristics and methods of material technology transfer to design, thereby inventing innovative approaches to design.

References:

1. Michelle Addington and Daniel L.Schodek, *Smart Materials and Technologies in Architecture*, Architectural Press, Elsevier, 2004
2. Axel Ritter,*Smart Materials: In Architecture, Interior Architecture and Design*,Birkhauser 2007
3. Marinella Ferrara and Murat Bengisu*, Materials that Change Color: Smart Materials Intelligent Design*, Springer, 2013
4. Elena Gorb, Yves.J.M.Brechet et al, *Materials Design Inspired by Nature: Function Through Inner Architecture (RSC Smart Materials)*, RSC Publishing, 2013

23MAR2006: ELECTIVE IV (Option 1): Advanced BIOMIMETIC DESIGN

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2006	Elective IV (Option 1): Advanced Biomimetic Design	2	-	-	2	50	50	-	100

Course Objectives:

- Understand the fundamental principles of biomimicry and its relevance to architecture.
- Explore historical and contemporary examples of biomimetic design in architecture.
- Develop an awareness of the ecological and sustainable benefits of biomimicry in the built environment.

Module 1: Introduction to Biomimicry and Architectural Relevance

Define biomimicry and its applications in architecture.
Understand the historical context of biomimetic design.
Explore the ecological and sustainable benefits of biomimicry in architecture.

Module 2: Biomimetic Design Principles and Methodologies

Explore biomimetic design methodologies and processes.
Introduce tools and techniques for analyzing biological systems and translating them into architectural solutions.
Foster interdisciplinary collaboration and communication in biomimetic design.

Module 3: Biomimicry in Architectural Design - Case Studies

Analyze and critique real-world examples of biomimetic design in architecture.
Understand the challenges and opportunities of implementing biomimicry in different architectural contexts.
Develop critical thinking skills in evaluating the success and limitations of biomimetic solutions.

Module 4: Advanced Biomimetic Design Techniques and Technologies

Explore cutting-edge developments in biomimetic design and emerging technologies.
Investigate the role of biomimicry in addressing complex challenges, such as climate change and urbanization.
Encourage students to propose and develop their biomimetic design projects.

Module 5: Future Trends and Applications of Biomimicry in Architecture

Explore emerging trends and future applications of biomimicry in architecture.
Discuss the ethical considerations and cultural implications of biomimetic design.
Encourage critical thinking about the role of biomimicry in shaping the future of architecture.

Course Outcomes:

- Students will be familiar with the latest advancements and potential future applications of biomimetic design.
- Students will critically analyze the ethical and cultural dimensions of biomimetic architecture.
- Students will formulate informed opinions on the role of biomimicry in the future of architectural practice.

References:

1. Benyus, J. M. (1997). "Biomimicry: Innovation Inspired by Nature."
2. Pawlyn, M. (2011). "Biomimicry in Architecture."
3. Speck, T., Speck, O., & Horn, R. (2013). "Biomimetic Research for Architecture and Building Construction."

23MAR2006 - ELECTIVE IV (Option 2): DIGITAL FABRICATION

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2006	Elective IV (Option 2): Digital Fabrication	-	-	2	2	50	50	-	100

Course Objectives:

- To gain an understanding of systems application of existing modes of production using digital fabrication.
- To develop a new thinking that results from invented systems in which design is constrained and informed by CAD/CAM manufacturing and real materials

Module 1: Manufacturing Processes

Different manufacturing processes like Additive, Subtractive & Consolidatory processes such as CNC cutting, CNC milling, Laser Cutting, 3D Printing (SLS & FDM), 3D Scanning, 3 Axis CNC cutting & milling on non-planar surfaces.

Module 2: Sessional Work

Data conversion for design production will be emphasized upon details for file Conversions, Meshing, etc. that is required for realizing the proto-types from digital files of the models will be emphasized upon. Students will be exposed to emerging theories pertaining to smart materials and alloys.

Students will demonstrate their proficiency through Model making Students will submit reports related to their process of fabrication and research in the related domain will be presented through documentation.

REFERENCES:

1. Lisa Iwamoto; Digital Fabrications: Architectural and Material Techniques
2. Luca Caneparo; Digital Fabrication in Architecture, Engineering and Construction
3. Christopher Breorkram ; Material Strategies in Digital Fabrication
4. Sophia Vyozviti; Soft Shells: Porous and Deployable Architectural Screens
5. Sophia Vyozviti; Folding Architecture
6. Mark Burry Jordi Boneti Armengol, Jos Tomlow, Antoni Gaudi; Gaudi: Unseen

23MAR2007 - ADVANCED DIGITAL DESIGN STUDIO – II (FOCUS ON DIGITAL ARCHITECTURE)

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
2	23MAR2007	Advanced Design Studio II (Focus on Digital & Technology Driven Processes)	2	8	-	10	150	150	-	300

Course Objectives:

- To gain an understanding of various contemporary processes and translating them into architecture.
- To compute the methods of quantifying architecture and developing design from codified data.

Design Studio Focus:

The project involves in developing design prototype to explore various contemporary processes and ideas using shape grammar, fractal, parametric models, and biometric etc. using major software used in design and video making.

Presentations & Viva Voce:

Stage-wise progress of student's approach to design is continually evaluated by the studio faculty at various internal juries, followed by a final presentation at the semester-end design jury.
Viva-voce on the project would be conducted by an external jury to examine the prudence of the student in deriving the design solution, reviewing the complete work done during the design studio.

Outcome:

Development of the aptitude to use Digital Media as a medium to generate complex forms.

References:

1. H. A Simon. Sciences of the Artificial, MIT Press, Cambridge, 1996
2. B. Colajanni and G. Pelliteri (ed.), Multimedia and Architectural Disciplines, Italy, 1996.
3. M.L. Maher, et. al, Understanding Virtual Design Studios, Verlag, London 1999
4. Robin Baker, Designing the future: The Computer Transformation of Reality, London), 1993.

SEMESTER 3

23MAR3001 - ADVANCED BUILDING SYSTEMS INTEGRATION

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3001	Advanced Building Systems Integration	2	-	-	2	50	-	100	150

Course Objectives:

- Introduce the principles of building systems integration in architecture.
- Explore the relationships and interactions between various building systems.
- Understand the impact of integrated building systems on energy efficiency and sustainability.

Module 1: Advanced HVAC Systems Integration

- Dive into advanced HVAC (Heating, Ventilation, and Air Conditioning) systems and their integration in architectural design.
- Explore energy-efficient HVAC technologies and their impact on indoor environmental quality.
- Introduce the concept of smart and responsive HVAC systems for sustainable building design.

Module 2: Integrated Building Automation Systems

- Explore the role of building automation systems in creating a cohesive and responsive building environment.
- Introduce the integration of lighting, security, and other systems through building automation.
- Understand the impact of smart technologies on user comfort and energy efficiency.

Module 3: Sustainable Energy Systems Integration

- Examine sustainable energy systems and their integration into architectural design.
- Explore renewable energy sources and their applications in buildings.
- Understand the principles of net-zero energy and energy-positive building design.

Module 4: Case Studies in Building Systems Integration

- Analyze and critique real-world examples of advanced building systems integration.
- Understand the challenges and opportunities of implementing integrated building systems in different architectural contexts.
- Develop critical thinking skills in evaluating the success and limitations of integrated building solutions.

Course Outcomes:

- Students will grasp the foundational concepts of building systems integration.
- Students will identify key building systems and their roles in integration.
- Students will evaluate the environmental implications of integrated building systems.
- Students will critically evaluate integrated building systems in existing architectural projects.
- Students will gain insights into the adaptation of integrated systems to various architectural typologies.
- Students will propose modifications and improvements to existing integrated building designs.

References:

- Allen, E., & Iano, J. (2014). "Fundamentals of Building Construction: Materials and Methods."
- Grondzik, W., Kwok, A. G., & Stein, B. (2014). "Mechanical and Electrical Equipment for Buildings."
- DeKay, M., & Brown, G. Z. (2017). "Sun, Wind & Light: Architectural Design Strategies."
- ASHRAE Handbook - HVAC Systems and Equipment.
- Coad, W. J. (2016). "Heating, Cooling, Lighting: Sustainable Design Methods for Architects."

- Mumovic, D., & Santamouris, M. (2009). "A Handbook of Sustainable Building Design and Engineering: An Integrated Approach to Energy, Health, and Operational Performance."
- Szokolay, S. V. (2004). "Introduction to Architectural Science: The Basis of Sustainable Design."
- Duffie, J. A., & Beckman, W. A. (2013). "Solar Engineering of Thermal Processes."
- Hestnes, A. G., & Gustavsen, A. (2011). "Sustainable School Architecture: Design for Elementary and Secondary Schools."
- Lechner, N. (2009). "Heating, Cooling, and Lighting: Sustainable Design Methods for Architects."
- Mahdavi, A., & Mathew, P. A. (2013). "The Greening of Architecture: A Critical History and Survey of Contemporary Sustainable Architecture and Urban Design."
- Poirazis, H. (2019). "BIM for Building Owners and Developers: Making a Business Case for Using BIM on Projects."

23MAR3002 - ADVANCED CONSTRUCTION MANAGEMENT AND TECHNOLOGY

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
3	23MAR3002	Advanced Construction Management & Technology	2	-	-	2	50	-	100	150

Course Objectives:

- Introduce the principles and processes of construction management.
- Explore project planning, scheduling, and budgeting techniques.
- Understand risk management and quality control in construction projects.

Module 1: Advanced Construction Technologies

Explore the latest advancements in construction technologies.
Introduce Building Information Modeling (BIM) and its applications in construction.
Understand the integration of robotics, automation, and 3D printing in the construction industry.

Module 2: Sustainable Construction Practices

Explore sustainable construction practices and green building certifications.
Introduce life cycle assessment and environmental impact analysis in construction.
Understand the integration of renewable energy systems in construction projects.

Module 3: Advanced Project Delivery Methods

Explore various project delivery methods in construction.
Introduce Integrated Project Delivery (IPD) and Design-Build approaches.
Understand the legal and contractual aspects of construction projects.

Module 4: Advanced Construction Technology and Built Environment

Explore the role of construction technology in shaping smart cities.
Introduce the concept of smart infrastructure and intelligent construction systems.
Understand the integration of data analytics and sensors in construction management.

Course Outcomes:

- Students will comprehend the foundational concepts of construction management.
- Students will apply project planning and scheduling techniques to hypothetical scenarios.
- Students will analyze case studies to understand risk management and quality control in construction.
- Students will be familiar with cutting-edge construction technologies.
- Students will apply BIM principles to model construction projects.
- Students will analyze the benefits and challenges of integrating robotics and automation in construction.

References:

- Oberlender, G. D. (2014). "Project Management for Engineering and Construction."
- AbouRizk, S. M., & Halpin, D. W. (2017). "Project Management for Construction."
- Schexnayder, C., Mayo, V., & Benamati, J. (2014). "Construction Project Scheduling and Control."
- Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2018). "BIM Handbook: A Guide to Building Information Modeling."
- Flemming, U., & Pishdad-Bozorgi, P. (2017). "Computational Design Thinking: Computation Design Thinking."
- Kamat, V. R., Martinez, J. C., & Issa, R. R. A. (Eds.). (2020). "Building Information Modeling: Applications and Practices."
- Kibert, C. J. (2016). "Sustainable Construction: Green Building Design and Delivery."
- Thumann, A., & Szokolay, S. V. (2013). "Sustainable HVAC Systems: An Overview."
- Pacheco-Torgal, F., Labrincha, J. A., Diamanti, M. V., de Brito, J., & Yu, C. P. (2018). "Eco-efficient Construction and Building Materials."

- Lee, J., Arditi, D., & Polat, G. (Eds.). (2018). "Smart and Sustainable Planning for Cities and Regions: Results of SSPCR 2017."
- Chen, Y., Zhang, W., Hong, J., & Wang, X. (2020). "Building Information Modeling: Technological Foundations and Industry Practices."
- El-Diraby, T., & Nayeri, P. (2015). "Smart Cities: Foundations, Principles, and Applications."

23MAR3003 - HIGH-PERFORMANCE BUILDING ENVELOPES

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3003	High Performance Building Envelopes	2	-	-	2	50	-	100	150

Course Objectives:

- Explore the key components of building envelopes, including walls, roofs, and fenestration.
- Understand the impact of building envelopes on energy efficiency, occupant comfort, and sustainability.

Module 1: Introduction to High Performance Building Envelopes

- Define high-performance building envelopes and their significance in the built environment. Explore advanced materials used in high-performance building envelopes.
- Introduce technologies for thermal insulation, moisture management, and air barrier systems.
- Understand the role of smart materials and innovative technologies in enhancing building envelope performance.

Module 2: Energy Efficiency and Thermal Performance of Building Envelopes

- Examine the principles of energy-efficient building envelope design.
- Introduce methods for evaluating and improving thermal performance.
- Understand the role of passive design strategies in enhancing energy efficiency.

Module 3: Daylighting and Ventilation Strategies in Building Envelopes

- Explore strategies for incorporating daylight into building design.
- Examine natural ventilation and passive cooling techniques.
- Understand the integration of daylighting and ventilation in high-performance building envelopes.

Module 4: Case Studies in High-Performance Building Envelopes

- Analyze and critique real-world examples of high-performance building envelopes.
- Understand the challenges and opportunities in implementing advanced building envelope designs.
- Develop critical thinking skills in evaluating the success and limitations of high-performance building solutions.

Module 5: Future Trends and Innovations in Building Envelopes

- Explore emerging trends and innovations in high-performance building envelopes.
- Discuss the role of technology and research in advancing building envelope design.
- Encourage students to propose and develop their ideas for future high-performance building envelope solutions.

Course Outcomes:

- Students will understand the principles of energy-efficient building envelope design.
- Students will assess and propose improvements to the thermal performance of building envelopes.
- Students will analyze the impact of passive design strategies on building energy consumption.
- Students will comprehend strategies for effective daylighting in building design.

- Students will analyze natural ventilation and passive cooling methods.
- Students will integrate daylighting and ventilation strategies into high-performance building envelope design.

References:

- Straube, J. (2015). "High Performance Enclosures: Design Guide for Institutional, Commercial and Industrial Buildings."
- Allen, E., & Iano, J. (2014). "Fundamentals of Building Construction: Materials and Methods."
- Reinhart, C. F., & Walkenhorst, O. (2018). "Building Performance Analysis."
- Memari, A. M., & Memari, M. (2013). "High Performance Structures and Materials III."
- Straube, J. (2014). "High Performance Enclosures: Strategies, Guidelines, and Best Practices."
- Kensek, K., & Noble, D. (2014). "Building Information Modeling: BIM in Current and Future Practice."
- Osser, R. (2018). "High Performance Enclosures."
- Bauman, F. S. (2012). "Energy-Efficient Building Systems."
- Chappell, M. (2018). "Energy Performance of Buildings: Efficiency and Renewable Energy Sources."
- Mardaljevic, J., & Nabil, A. (2015). "Daylighting: Natural Light in Architecture."
- Szokolay, S. V. (2013). "Introduction to Architectural Science: The Basis of Sustainable Design."
- Givoni, B. (1994). "Passive and Low Energy Cooling of Buildings."
- Kensek, K., & Nobel, D. (2017). "Building Information Modeling: Planning and Managing Construction Projects with 4D CAD and Simulations."
- Gu, L. (2019). "Green Building: Guidebook for Sustainable Architecture."
- Straube, J. (2017). "High Performance Enclosures: Designing for Energy Efficiency and Moisture Management."

23MAR3004 – ADVANCED BUILDING INFORMATION MODELING (BIM) AND DIGITAL DESIGN

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3004	Advanced Building Information Modeling (BIM) and Digital Design	2	-	-	2	50	-	100	150

Course Objectives:

- Advanced BIM concepts and their significance in architectural practice.
- Explore the evolution of BIM technologies and their impact on the design and construction process.
- Introduce the principles of parametric modeling and scripting in BIM.

Module 1: Parametric Design and Computational BIM

- Advanced parametric design techniques in BIM.
- Explore computational design tools and their integration with BIM platforms.
- Understand the relationship between parametric modeling and data-driven design.

Module 2: Advanced BIM Collaboration and Coordination

- Explore advanced BIM collaboration tools and platforms.
- Introduce clash detection and resolution techniques in BIM.
- Understand the role of BIM in interdisciplinary collaboration and coordination.

Module 3: Advanced BIM Visualization and Rendering

- Explore advanced visualization techniques in BIM.
- Introduce rendering and animation capabilities in BIM platforms.

- Understand the role of virtual reality (VR) and augmented reality (AR) in BIM.

Module 4: BIM and Sustainable Design

- Examine the integration of BIM in sustainable design processes.
- Explore energy analysis tools and environmental performance assessment in BIM.
- Understand how BIM contributes to life cycle assessment and green building certification.

Module 5: Emerging Trends in BIM and Digital Design

- Explore emerging trends and innovations in BIM and digital design.
- Discuss the role of artificial intelligence (AI) and machine learning in BIM.
- Encourage students to propose and develop their ideas for future BIM applications.

Course Outcomes:

- Students will understand the advanced concepts and benefits of BIM.
- Students will trace the historical development of BIM technologies.
- Students will gain exposure to parametric modeling and scripting for enhanced design capabilities.
- Students will apply parametric design techniques within BIM environments.
- Students will use computational design tools to enhance their BIM workflows.
- Students will create data-driven design solutions using advanced BIM methods.
- Students will apply BIM in sustainable design processes.
- Students will use BIM tools for energy analysis and environmental performance assessment.
- Students will understand the role of BIM in achieving green building certifications.

References:

- Eastman, C., Teicholz, P., Sacks, R., & Liston, K. (2018). "BIM Handbook: A Guide to Building Information Modeling."
- Krygiel, E., & Nies, B. (2014). "Green BIM: Successful Sustainable Design with Building Information Modeling."
- Woodbury, R. (2010). "Elements of Parametric Design."
- Terzidis, K. (2006). "Algorithmic Architecture."
- Aish, R. (2013). "DesignScript: Process, Grammar, and Notation in the Age of Parametric Design."
- Peters, B., & Peters, T. (2019). "Mastering Autodesk Revit 2020."
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- Aksamija, A. (2018). "Sustainable Facades: Design Methods for High-Performance Building Envelopes."
- Lee, S. H., & Lee, J. (2017). "The BIM Sustainable Design."
- Wigginton, M., & Harris, M. (2019). "Sustainable Construction: Green Building Design and Delivery."

23MAR3005 – Elective V (Option 1): Advanced Artificial Intelligence & Machine Learning In Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3005	Elective V (Option 1): Advanced Artificial Intelligence & Machine Learning in Architecture	2	-	-	2	50	50	-	100

Course Objectives:

- Define the fundamentals of artificial intelligence and machine learning.
- Explore the history and evolution of AI and ML in the architectural domain.
- Understand the potential impact of AI and ML on architectural design, analysis, and decision-making.

Module 1: AI and ML Applications in Design Exploration

Explore generative design and algorithmic approaches using AI and ML.
Introduce tools and platforms for AI-driven design exploration.
Understand how AI can enhance creativity, innovation, and iterative design processes.

Module 2: Machine Learning for Building Performance Analysis

Examine the role of ML in building performance simulation and analysis.
Introduce predictive modeling for energy efficiency, daylighting, and thermal comfort.
Explore data-driven approaches to optimize building systems and environmental performance.

Module 3: AI and ML in Macro Built Environment

Explore AI and ML applications in urban design and planning.
Introduce data-driven decision-making for urban development projects.
Understand how AI can contribute to smart city initiatives and sustainable urban design.

Module 4: Ethical Considerations in AI and ML for Architects

Examine ethical considerations in the use of AI and ML in architecture.
Explore issues related to bias, transparency, and accountability.
Discuss the responsibility of architects when integrating AI and ML into design processes.

Module 5: Future Trends and Innovations in AI and ML in Architecture

Explore emerging trends and innovations in AI and ML for architecture.
Discuss the integration of AI with other technologies such as VR, AR, and robotics.
Encourage students to propose and develop their ideas for future applications of AI and ML in architecture.

Course Outcomes:

- Students will grasp the basic concepts of AI and ML.
- Students will identify historical and contemporary applications of AI and ML in architecture.
- Students will recognize the potential benefits and challenges of integrating AI and ML into architectural processes.
- Students will apply generative design principles using AI and ML tools.
- Students will explore algorithmic design strategies for architectural projects.
- Students will recognize the role of AI in facilitating design exploration and ideation.

References:

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- Augenbroe, G. (2013). "Building Performance Simulation for Design and Operation."
- Nagy, Z., & Reinhart, C. F. (2014). "Developing a simple and efficient Radiance scalper for complex fenestration systems."
- Yoon, Y., & Augenbroe, G. (2010). "Predictive modeling of energy use: A case study of university buildings."

23MAR3005 – Elective V (Option 2): Virtual Reality (VR) and Augmented Reality (AR) in Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3005	Elective V (Option 2): Virtual Reality (VR) and Augmented Reality (AR) in Architecture	2	-	-	2	50	50	-	100

Course objectives:

Define the fundamental concepts of Virtual Reality (VR) and Augmented Reality (AR).
Explore the historical development and evolution of VR and AR in the architectural context.
Understand the potential impact of VR and AR on architectural design, visualization, and communication.

Module 1: VR and AR Tools for Architectural Design

Introduce various VR and AR tools and platforms used in architectural design.
Provide hands-on experience with popular software and hardware for VR and AR.
Explore how VR and AR can be integrated into the design process from conceptualization to presentation.

Module 2: Immersive Architectural Visualization in VR

Explore advanced techniques for architectural visualization in VR.
Introduce principles of creating immersive and interactive VR experiences.
Understand the use of VR for design review, client presentations, and public engagement.

Module 3: AR for Site Analysis and Urban Planning

Explore the application of Augmented Reality for site analysis and urban planning.
Introduce geospatial AR tools and their integration with architectural projects.
Understand how AR can aid in visualizing and analyzing data in the context of the built environment.

Module 4: AR for Building Maintenance and Facility Management

Explore the application of AR in building maintenance and facility management.
Introduce AR tools for visualizing building systems, maintenance procedures, and facility information.
Understand how AR can contribute to the efficient operation and maintenance of buildings.

Module 5: Future Trends and Innovations in VR and AR in Architecture

Explore emerging trends and innovations in VR and AR for architecture.
Discuss the integration of VR and AR with other technologies such as AI, robotics, and IoT.
Encourage students to propose and develop their ideas for future applications of VR and AR in architecture.

Course Outcomes:
• Students will comprehend the basic principles and terminology of VR and AR. • Students will identify historical and contemporary applications of VR and AR in architecture. • Students will recognize the potential benefits and challenges of integrating VR and AR into architectural processes. • Students will be familiar with a range of VR and AR tools and their capabilities. • Students will apply VR and AR tools in architectural design projects. • Students will understand the workflow of integrating VR and AR into the design process.
References:
• Cruz-Neira, C., Sandin, D. J., & DeFanti, T. A. (1993). "Surround-Screen Projection-Based Virtual Reality: The Design and Implementation of the CAVE." • Schnabel, M. A., & Kvan, T. (2003). "Spatial Understanding in Immersive Virtual Environments." • Wang, X. (2019). "Virtual Reality Technologies for BIM-Based Performance Visualization." • Bowman, D. A., Kruijff, E., LaViola, J. J., & Poupyrev, I. (2005). "3D User Interfaces: Theory and Practice." • Microsoft. (2020). "Introduction to Microsoft HoloLens." • Autodesk. (2021). "Virtual Reality in Autodesk Revit: A Step-by-Step Guide." • Billinghurst, M., Clark, A., & Lee, G. (2015). "A Survey of Augmented Reality." • Banissi, E., Burkhard, R., Grinstein, G., Stuart, L., & Wyeld, T. (2013). "Advanced Visual Interfaces for Digital Cultural Heritage." • Schmalstieg, D., & Hollerer, T. (2016). "Augmented Reality: Principles and Practice." • Kolarevic, B., & Malkawi, A. M. (2005). "Performative Architecture: Beyond Instrumentality." • Duarte, J. P., & Heitor, T. (2008). "Sustainable Housing Design: Learning from Vernacular Architecture." • Corser, R. (2016). "Augmented Reality for Site Planning and Analysis."

23MAR3006 – Elective VI (Option 1): Technology & Human Centered Design in Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3006	Elective VI (Option 1): Technology & Human Centered Design in Architecture	2	-	-	2	50	50	-	100

Course Objectives:
Define the fundamental concepts of human-centered design (HCD) in architecture. Explore the historical development and evolution of HCD principles. Understand the importance of user experience, inclusivity, and human well-being in architectural design.

Module 1: User Research and Empathy in Architectural Design
Introduce methods of user research and empathic design in architectural practice. Explore techniques for understanding the needs, behaviors, and preferences of diverse user groups. Apply empathic design principles to inform architectural decision-making.
Module 2: Inclusive Design and Universal Accessibility in Architecture
Explore the principles of inclusive design and universal accessibility in architecture. Examine guidelines and standards for creating spaces that cater to diverse abilities. Apply inclusive design principles to architectural projects.
Module 3: Human-Centered Design in Interior Architecture

Explore the application of human-centered design principles in interior architecture. Introduce the relationship between spatial design and user experience. Understand the role of interior architecture in supporting human well-being.
Module 4: Technology and Human-Centered Design Integration
Examine the integration of technology in human-centered design processes. Explore the use of digital tools, simulation, and virtual reality in enhancing user experiences. Understand the ethical considerations of technology use in human-centered design.
Module 5: Human-Centered Design in Sustainable Architecture
Explore the intersection of human-centered design and sustainable architecture. Examine how sustainable practices contribute to human well-being. Introduce biophilic design principles and their impact on user experiences.

Course Outcomes:
• Students will grasp the basic principles and terminology of human-centered design. • Students will identify historical and contemporary examples of human-centered design in architecture. • Students will recognize the significance of prioritizing user needs and experiences in architectural practice. • Students will conduct user research to gather insights for architectural projects. • Students will develop empathy maps and personas to understand user perspectives. • Students will integrate user research findings into the design process.
References:
• Norman, D. A. (2013). "The Design of Everyday Things." • Sanders, E. B. N., & Stappers, P. J. (2014). "Probes, Toolkits and Prototypes: Three Approaches to Making in Codesigning." • Moggridge, B. (2006). "Designing Interactions." • Brown, T. (2009). "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation." • Kelley, D., & Kelley, T. (2013). "Creative Confidence: Unleashing the Creative Potential Within Us All." • Zimmerman, J., Forlizzi, J., & Evenson, S. (2007). "Research Through Design as a Method for Interaction Design Research in HCI." • Preiser, W. F. E., & Ostroff, E. (2001). "Universal Design Handbook." • Steinfeld, E., & Maisel, J. L. (2012). "Universal Design: Creating Inclusive Environments." • Imrie, R. (2014). "Disability and the Built Environment in a Globalised World." • Pile, J. F. (2007). "Interior Design." • Stamper, L. (2011). "The Fundamentals of Interior Design." • Hutton, L. A. (2018). "Human Factors in the Built Environment."

23MAR3006 – Elective VI (Option 2): Design Thinking and Innovation in Architecture

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
3	23MAR3006	Elective VI (Option 2): Design Thinking & Innovation in Architecture	2	-	-	2	50	50	-	100

Course Objectives:
Define the fundamental principles of design thinking. Explore the historical development and evolution of design thinking in architectural practice. Understand the role of empathy, ideation, and prototyping in the design thinking process.

Module 1: Empathy and User-Centered Design in Architecture
Explore the importance of empathy in architectural design. Introduce methods for understanding user needs and perspectives. Apply user-centered design principles to architectural projects.
Module 2: Ideation and Creativity in Architectural Design
Explore techniques for generating creative ideas in architectural design. Introduce brainstorming, mind mapping, and other ideation methods. Apply ideation techniques to solve architectural challenges.
Module 3: Prototyping and Iterative Design in Architecture
Introduce the importance of prototyping in the design process. Explore various prototyping methods and materials in architectural contexts. Apply iterative design principles to refine architectural solutions.
Module 4: Design Thinking for Sustainable Architecture
Explore the integration of design thinking and sustainability in architecture. Examine how design thinking principles can contribute to eco-friendly and socially responsible design. Apply design thinking strategies to address sustainability challenges in architectural projects.
Module 5: Future Trends and Innovations in Design Thinking for Architecture
Explore emerging trends and innovations in design thinking for architecture. Discuss the integration of design thinking with other technologies such as AI, VR, and AR. Encourage students to propose and develop their ideas for the future of design thinking in architecture.

Course Outcomes:
• Students will grasp the basic principles and terminology of design thinking. • Students will identify historical and contemporary examples of design thinking in architecture. • Students will apply empathy, ideation, and prototyping techniques in architectural projects. • Students will develop empathic understanding of users in architectural contexts. • Students will apply user-centered design techniques to gather insights. • Students will integrate user needs into the design process.
References:
• Brown, T. (2008). "Design Thinking." • Plattner, H., Meinel, C., & Leifer, L. (Eds.). (2011). "Design Thinking: Understand – Improve – Apply." • Liedtka, J., & Ogilvie, T. (2011). "Designing for Growth: A Design Thinking Toolkit for Managers." • Sanders, E. B. N., & Stappers, P. J. (2008). "Co-creation and the new landscapes of design." • Norman, D. A. (2004). "Emotional Design: Why We Love (or Hate) Everyday Things." • Dunne, D., & Raby, F. (2013). "Speculative Everything: Design, Fiction, and Social Dreaming." • Kelley, T., & Kelley, D. (2013). "Creative Confidence: Unleashing the Creative Potential Within Us All." • Brown, T. (2009). "Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation." • Plsek, P. E., & Wilson, T. (2001). "Innovation as a Learning Process: Embedding Design Thinking." • Schrage, M. (2000). "Serious Play: How the World's Best Companies Simulate to Innovate." • Buxton, B. (2007). "Sketching User Experiences: Getting the Design Right and the Right Design." • Cross, N., Dorst, K., & Roozenburg, N. (1992). "Research in Design Thinking."

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
3	23MAR3007	Advanced Design Studio III (Focus on Advanced Processes in Architecture)	2	8	-	10	150	150	-	300

Course Objectives:

Familiarize students with the design studio objectives and expectations.
Develop an understanding of the site and contextual factors influencing design.

Design Studio Focus:

Conduct in-depth research on relevant precedents, cultural contexts, and environmental factors.
Develop a conceptual framework that informs the design approach.
Develop a comprehensive understanding of building systems and integration.
Address detailed design aspects and resolve technical challenges.

Presentations & Viva Voce:

Stage-wise progress of student's approach to design is continually evaluated by the studio faculty at various internal juries, followed by a final presentation at the semester-end design jury.
Viva-voce on the project would be conducted by an external jury to examine the prudence of the student in deriving the design solution, reviewing the complete work done during the design studio.

23MAR4001: Advanced Thesis Programming

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
4	23MAR4001	Advanced Thesis Programming	2	8	-	10	150	150	-	300

Course Content:

- Identifying the areas of interest in the contemporary or specific advanced architecture design theories by simultaneously identifying current issues of the built environment.
- Role of the architect and the kind of approach required to the various issues and application of theory and enquiry
- Conventional steps, stages and concept and framing a thesis/research proposal and making a literature review
- Framing the issue or research question, approach and way of inquiry into probable domains (Indian cities/specific precinct), literature review, relevant case studies, writing the proposal for design /research-based thesis.

Course Outcomes:

Thesis proposal containing:

- Thesis title
- Literature review
- Best practices/Case studies
- Identified methodology
- Identified sites/demonstration areas
- Work schedule

References:

- "Architectural Research Methods" by David Wang and Linda N. Groat
- "The Design of Design: Essays from a Computer Scientist" by Frederick P. Brooks Jr.
- "Research Design: Qualitative, Quantitative, and Mixed Methods Approaches" by John W. Creswell and J. David Creswell
- "The Dissertation: An Architecture Student's Handbook" by Iain Borden and Katerina Rüedi Ray
- "Thinking, Fast and Slow" by Daniel Kahneman
- "Atlas of Novel Tectonics" by Jesse Reiser and Nanako Umemoto

23MAR4002 - Research Paper Publication & Seminar

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/L		CA	University Exam		Total
								Jury	Written	
4	23MAR4002	Research paper Publication & Seminar	-	-	2	3	50	100	-	150

Course Objectives:

- To develop the investigative skills of graduate students, through researching one of the topic areas covered in the course.
- To facilitate exchange of ideas and findings in class between students and the course instructor, hence creating a motivating environment for learning.
- To enable the student to undertake a methodical research on a topic in architecture and to communicate it through technical writing

Course Content:
To develop the capacity of the students to work and undertake research in a given subject relating to architecture, presenting the observations verbally and graphically, to explore and understand the essence of a design. Acknowledge, appreciate and convey the meaning of quality designs. Identify and study the working of various systems of architecture in the society. Approach, investigate and highlight the various socially relevant issues of design through seminars.
Sessional/Term Work:
Research paper shall be prepared by each student based upon the topic approved by the institute in around 5000 words, in the format specified by the university. The paper has to adhere to the plagiarism norms as given by UGC and a plagiarism report will be attached as a part of the submission. A research seminar to be conducted internally at the end of the term which shall be mandatory for internal evaluation.

Course Outcomes:
Students at the end of the semester should be able to undertake independent research in the field of architecture and present it in the appropriate technical formats as required.

REFERENCES:
All books/ Journals/ Magazines/ unpublished thesis related to the topic selected by the individual student.

23MAR4003 ADVANCED ARCHITECTURE DESIGN THESIS

Semester	Course Code	Subject	Hours/Week			Credits	Marks			
			T	S	W/ L		CA	University Exam		Total
								Jury	Written	
4	23MAR4003	Advanced Architecture Design Thesis	-	15	-	15	250	250	-	500

Course Objectives:
• To develop independent critical thinking and design/ research abilities with reference to advancements in design. • To demonstrate an ability to comprehend the nature of architectural challenge and develop pertinent solutions with the help of knowledge grasped through the course.

Course Content & Overview:
The thesis project is to be undertaken independently by each student on a topic of his/her choice, selected and approved by the faculty during the previous semester as part of course requirements of the subject Dissertation. Thrust areas of work may include architectural design, non-conventional construction systems, large span structures, hi-tech architecture, public facilities, urban design, sustainable architecture, building system design, landscape design, detailing in design, etc. The Projects can be of any scale and size (in terms of built areas or detailing) as long as the required rigor and depth is demonstrated by the student to merit consideration as a final project. It is expected that all genre of projects (research study or design) would end with a design solution; all projects should be grounded in a research and critical enquiry. The Project development will involve the aspects of Structural Systems, Construction Technologies, Building Services, Detailing and Materials along with Design considerations, to develop a comprehensive Project proposal.

The key stages of the thesis process are:

1. Pre – Project: Dissertation
2. Abstract and Introduction
3. Scope and Focus of Project
4. User Activity Studies
5. Case Studies
6. Formulation of Design Brief
7. Site Studies and Guidelines
8. Conceptual Development
9. Final Design Solution

Learning Outcomes:

Research Competence:

Ability to formulate a comprehensive research question or hypothesis relevant to advanced architectural design.

Proficiency in conducting a thorough literature review and contextual analysis to inform the design process.

Critical Thinking and Analysis:

Demonstrate critical thinking skills in evaluating and synthesizing diverse sources of information.

Analyze precedents, theories, and relevant case studies to inform design decisions.

Design Innovation:

Develop innovative and creative design solutions that push the boundaries of traditional architectural thinking.

Integrate cutting-edge technologies, materials, or sustainable strategies into the design process.

Interdisciplinary Integration:

Ability to integrate knowledge from diverse disciplines, incorporating elements of technology, engineering, environmental science, or other relevant fields into architectural design.

Communication Skills:

Effectively communicate complex design ideas through various mediums, including drawings, models, and digital representations.

Clearly articulate the theoretical framework, design intent, and rationale behind design decisions.

Collaboration and Professionalism:

Collaborate with peers, advisors, and potential stakeholders to refine and strengthen the design proposal.

Demonstrate a high level of professionalism in project management, meeting deadlines, and responding to constructive feedback.

Ethical Considerations:

Consider ethical implications in architectural design, including social, cultural, and environmental responsibilities.

Incorporate principles of inclusivity, accessibility, and sustainability in the design process.

Project Deliverables:

Thesis Proposal:

- A well-defined and articulated thesis proposal outlining the research question, objectives, and anticipated contributions to the field of advanced architectural design.

Literature Review:

- A comprehensive literature review that establishes the theoretical framework, contextualizing the project within existing research and architectural discourse.

Contextual Analysis:

- Detailed analysis of the project site, considering historical, cultural, environmental, and social factors that influence the design.

Design Development:

- Progressive iterations of the design, including conceptual sketches, diagrams, and preliminary design explorations.

Final Design Presentation:

- A comprehensive presentation of the final design proposal, including digital and physical models, renderings, drawings, and any other relevant visualizations.

Design Documentation:

- A thorough documentation package, including construction drawings, specifications, and any necessary documentation for the implementation of the design.

Written Thesis:

- A well-structured and scholarly written thesis that discusses the research question, methodology, design process, and critical analysis of the final design outcome.

Public Presentation:

- A public presentation or exhibition of the thesis project, showcasing the design and research to peers, faculty, and potentially industry professionals.

Reflective Essay:

- A reflective essay discussing the challenges, successes, and lessons learned during the thesis process, offering insights into personal and academic growth.

Peer Review and Feedback:

- Active participation in peer reviews, critiques, and feedback sessions, demonstrating the ability to give and receive constructive criticism.

References:

All books/ Journals/ Magazines/ unpublished thesis related to the topic selected by the individual student.