ANNA UNIVERSITY : : CHENNAI- 600 025

UNIVERSITY DEPARTMENTS

CURRICULUM – R 2009

M. ARCH (DIGITAL ARCHITECTURE)

I TO IV SEMESTERS CURRICULUM AND SYLLABUS

No.	Code No	Course Name	L	T	P/S	C
SEMESTER I Common to M. Arch., M. Arch. (Digital Arch.) and M. Arch. (Landscape Arch.)						
1.	**AA 9111**	Contemporary Processes in Architectural Design I	3	0	0	3
2.	**AA 9112**	Architecture and Critical Theory	3	0	0	3
3.	**AA 9113**	Traditional and Contemporary Landscapes	3	0	0	3
4.	**AA 9114**	Sustainable and Green Building Design	2	0	6	5
5.	**AA 9115**	Urban Design Studio	2	0	6	5
		Sub Total	**13**	**0**	**12**	**19**
SEMESTER II						
6.	**DG 9121**	Contemporary Processes in Architectural Design II	3	0	0	3
7.	**DG 9122**	Performance Evaluation of Buildings	3	0	0	3
8.	**DG 9123**	Visual Design through Algorithms	3	0	0	3
9.	**DG 9124**	Visualization Studio	1	0	4	3
10.	*** * * * * ***	Elective I	*	*	*	3
11.	**DG 9125**	Digital Design Studio I	0	0	12	6
		Sub Total	**10**	**0**	**16**	**21**
SEMESTER III						
12.	**AA 9131**	Research Methodologies in Architecture	3	0	0	3
13.	**DG 9132**	Digital Production, Solid Modeling and RP	1	0	4	3
14.	*** * * * * ***	Elective II	*	*	*	3
15.	*** * * * * ***	Elective III	*	*	*	3
16.	**DG 9133**	Dissertation	0	0	6	3
17.	**DG 9134**	Advanced Digital Design Studio II	0	0	12	6
		Sub Total	**4**	**0**	**22**	**21**
		Sub Total				
SEMESTER IV						
18.	*** * * * * ***	Elective IV	*	*	*	3
19.	**DG 9141**	Portfolio Production and Web Publishing	0	0	6	3
20.	**DG 9142**	Thesis	0	0	16	8
		Sub Total	**0**	**0**	**22**	**14**
Total no of credits required for the award of the degree						**75**

List of Electives- M. Arch (Digital Architecture)						
21.	**AA 9123**	Services in High Rise Buildings	3	0	0	3
22.	**AA 9151**	Building Management and Control Systems	3	0	0	3
23.	**AA 9153**	GIS Modeling in Urban Planning	3	0	0	3
24.	**DG 9153**	Introduction to Scripting	3	0	0	3
25.	**DG 9154**	Introduction to Algorithms	3	0	0	3
26.	**DG 9155**	Virtual Society	3	0	0	3
27.	**DG 9156**	High End 3 D Modeling	1	0	4	3
28.	**DG 9157**	Web Design	1	0	4	3
L- Lecture T- Tutorial P- Practical / S-Studio C- Credits						

ANNA UNIVERSITY : : CHENNAI- 600 025

UNIVERSITY DEPARTMENTS

M. ARCH (Digital Architecture) – Part Time- Day Time

CURRICULUM (REGULATIONS 2009)

No.	Code No	Course Name	L	T	P/S	C
SEMESTER I Common to M. Arch., M. Arch. (Digital Arch.) and M. Arch. (Landscape Arch.)						
1.	**AA 9111**	Contemporary Processes in Architectural Design I	3	0	0	3
2.	**AA 9114**	Sustainable and Green Building Design	2	0	6	5
3.	**AA 9115**	Urban Design Studio	2	0	6	5
		Sub Total				**13**
SEMESTER II						
4.	**DG 9121**	Contemporary Processes in Architectural Design II	3	0	0	3
5.	**DG 9122**	Performance Evaluation of Buildings	3	0	0	3
6.	**DG 9123**	Visual Design through Algorithms	3	0	0	3
7.	**DG 9124**	Visualization Studio	1	0	4	3
		Sub Total				**12**
SEMESTER III						
8.	**AA 9112**	Architecture and Critical Theory	3	0	0	3
9.	**AA 9113**	Traditional and Contemporary Landscapes	3	0	0	3
10.	**AA 9131**	Research Methodologies in Architecture	3	0	0	3
11.	**DG 9132**	Digital Production, Solid Modeling and RP	1	0	4	3
		Sub Total				**12**
SEMESTER IV						
12.	**********	Elective I	*	*	*	3
13.	**********	Elective II	*	*	*	3
14.	**DG 9125**	Digital Design Studio I	0	0	12	6
		Sub Total				**12**
SEMESTER V						
15.	**********	Elective III	*	*	*	3
16.	**DG 9133**	Dissertation	0	0	6	3
17.	**DG 9134**	Advanced Digital Design Studio II	0	0	12	6
		Sub Total				**12**
SEMESTER VI						
18.	**********	Elective IV	*	*	*	3
19.	**DG 9141**	Portfolio Production and Web Publishing	0	0	6	3
20.	**DG 9142**	Thesis	0	0	16	8

		Sub Total				**14**
		Total no of credits required for the award of the degree				**75**
		List of Electives- M. Arch. (Digital Architecture)				
21.	**AA 9123**	Services in High Rise Buildings	3	0	0	3
22.	**AA 9151**	Building Management and Control Systems	3	0	0	3
23.	**AA 9153**	GIS Modeling in Urban Planning	3	0	0	3
24.	**DG 9153**	Introduction to Scripting	3	0	0	3
25.	**DG 9154**	Introduction to Algorithms	3	0	0	3
26.	**DG 9155**	Virtual Society	3	0	0	3
27.	**DG 9156**	High End 3 D Modeling	1	0	4	3
28.	**DG 9157**	Web Design	1	0	4	3
L- Lecture T- Tutorial P- Practical / S- Studio C- Credits						

M. ARCH. SYLLABUS

SEMESTER I

AA 9111 CONTEMPRORARY PROCESS IN ARCHITECTURE I L T P/S C
3 0 0 3

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

UNIT I INTRODUCTION 6
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

UNIT II ASPECT OF DIGITAL ARCHITECTURE 9
Aspects 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

UNIT III CONTEMPORARY PROCESS 15
Overview of various Contemporary design process and it 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

UNIT IV GEOMETRIES AND SURFACES 15
Fractal Geometry and their properties – Architectural applications - Works of Zvi Hecker–- Shape Grammar - Shapes, rules and Label - Shape Grammar as analytical and synthetic tools- Combining Shape grammar and Genetic algorithm to optimize architectural solutions - Hyper Surface– Introduction to Hyper surface and concepts of Liquid architecture.

TOTAL:45 PERIODS

REQUIRED READING
1. Peter Eisenmann, Diagram: An Original Scene of Writing, Diagram Diaries
2. MOVE, UN Studio
3. Grey Lynn, The Folded, The Pliant and The Supple, Animate form
4. Contemporary Techniques in Architecture, Halsted Press, 2002
5. Ali Rahim, Contemporary Process in Architecture, John Wiley & Sons, 2000

REFERENCES
1. Walter Benjamin, Practices of Art in the Age of Mechanical Reproduction Colin press, 1977
2. Work of Architecture in the Age of Mechanical Reproduction, Differences MIT press,1997.

3. William J Mitchell, the Logic of Architecture: Design, Computation and Cognition. MIT Press, Cambridge, 1995
4. Marcos Novak, invisible Architecture: An Installation for the Greek Pavilion, Venice Biennale, 2000

AA 9112 ARCHITECTURE AND CRITICAL THEORY L T P/S C
3 0 0 3

OBJECTIVE:
The term critical theory is a tautology. However, this term is used to differentiate traditional theories that understand and explain architecture as autonomous objects and hermetically sealed discipline. The objective of this course is to explain and show how architecture is enmeshed in the society and a product of larger socio-cultural issues and practices.

UNIT I INTRODUCTION 6
Architectural Theory and practice- Relation between theory and practice. Traditions in/of architectural theory. Critical Theory. Qualities and challenges of critical theory.

UNIT II POWER AND BUILT ENVIRONMENT 10
Forms of power. Power and knowledge. Panopticon. Colonialism as a form of dominance. Colonialism in India. Production of Indo-Saracen architecture. Ideas of segregation, control and surveillance in colonial towns. Discussing New Delhi as a part of imperial vision. Idea of Ghetto, surveillance and control in contemporary cities.

UNIT III ENCOUNTERING MODERNISM/MODERNITY 10
Phenomenology and architecture. Architecture and sense of place. Fragmentation and Nihilism as conditions of modern society. Counter claims. Encountering the idea of functionalism - Semiotic and Deconstruction as a critical tool. Architecture of Resistance. The idea of critical regionalism.

UNIT IV SPECTACLE AND ARCHITECTURE 10
Society of spectacle. Spectacle as a form of seduction. Debating aesthetisation of architectural issues. Critiquing learning from Las Vegas. World in a shopping wall. Thematic environments. Theme parks and privatization of public spaces. Visual regime in architecture. Media and architecture.

UNIT V ISSUES IN ARCHITECTURE 9
Gender and space. Heritage and politics of memory. City as contested geography. Technology and Architecture.

TOTAL:45 PERIODS

REQUIRED READINGS:
1. Neil Leach (ed) Rethinking Architecture, Routledge 2000
2. Paul Allan Johnson. Theory of Architecture, Routledge 2000
3. Michael Hays (ed) Architectural Theory since 1960,MIT Press, 2000
4. Anthony king, Urban Development in Colonialism
5. Nazzar Al Sayaad (ed) Forms of Dominance,
6. Lawrence vale. Architecture and Nationalism and identity,

REFERENCES:
1) Anil Lomba, Colonialism, 2000
2) Thomas Metcalf Imperial vision, Oxford
3) Neil Leach, Aesthetics and Anesthetics,
4) Guy Debord. Society of Spectacle.

5) Michael Sorkin (ed) Variations of Theme park
6) Lan Border (ed), Intersections.

AA 9113 TRADITIONAL AND CONTEMPORARY LANDSCAPES L T P/S C
3 0 0 3

OBJECTIVE

To study the social and cultural influences on traditional landscapes through analysis of form and space, citing principles of each period with examples.
To study contemporary landscape and the manifestation in the western and Indian context.

UNIT I EASTERN TRADITIONS AND ISLAMIC LANDSCAPES 15

Early traditions and beliefs about landscape and environment in east. Ancient Indian traditions – Vedic, Jainism, Buddhism and later Hindu movements. Symbolic meanings and sacred value of natural landscapes.
Transfer of concepts through Buddhism to China –Chinese landscape development – gardens of China – Pre Buddhist Japanese landscapes – impact of China on Japanese gardens – Japanese gardens.

Nomadic culture of central Asia – advent of Islam – concept of Paradise as a garden – spread of Islamic traditions to the West and East. Eastern expression of Islam – Samarkhand and Mughul India – Tomb and pleasure garden – Moghul concepts of site planning. Western expression of Islam – Spain Alhambra and General life, Granada.

UNIT II RENNAISSANCE AND THE EVOLUTION OF NEW THOUGHTS 6

Development of the enclosed garden in the Middle ages. Renaissance – Italy, France and England, Romanticism. Influences and linkages across cultures. Study of the western landscapes till the nineteenth century.

UNIT III THE EVOLUTION OF THE MODERN LANDSCAPE 9

Industrialization and urbanization – impacts and development of the concept of public open spaces, open space development in new towns, parks movement.
Open space development and its urban design and planning context, Early industrial towns and the garden city movement. Public park as a major component of urban landscape, the works of F.L.Ohmstead, and other pioneers. Open space development and Close conceptual relationship between Town planning, urban design and landscape architecture. Examples.

UNIT IV THE MODERN MOVEMENT, CONTEMPORARY CONCEPTS AND CONCERNS 9

Changing concepts of space and the relationship of architecture to landscape. Study of selected works of modern architects and landscape architects. Postwar development in Europe. The influence of Ian Mcharg on Landscape architecture. The works of Jellicoe, Burle Marx and others.

Concept of sustainable landscape development, Cultural landscapes their definition, identification, characteristics, policies, Artistic sensibility in landscape architecture and land art, New development in urban Landscape design.

UNIT V INDIAN CONTEXT 6

Issues in contemporary India, Analysis and understanding of philosophies of contemporary landscape works in India, case studies.

TOTAL: 45 PERIODS

REQUIRED READINGS:

1. Geoffrey and Susan Jellico, The landscape of Man, Thames & Hudson Publication, 1995
2. Robert Holden, New landscape Design, Lawrence king publishing, UK, 2003
3. Penelope Hill, Contemporary history of garden design, Birkhauser publishers, 2004.

REFERENCES:

1. Elizabeth Barlow Rogers, Landscape Design – A Cultural &Architectural History, Hary & Abram inc. publishers, 2001.
2. Phillip Pregill & Nancy Volkman, Landscapes in History, Van Nostrand publishers, 1993.
3. Jonas Lehrman, Earthly Paradise- Garden and courtyard in Islam, Thames and Hudson,1980.
4. G.B.Tobey, A history of American Landscape architecture, American elsevier Publishing Co.,NY, 1973.
5. Pieluigi Nicholin, Francesco Repishti, Dictionary of today's landscape designers, Skira Editores P.A, 2003.

AA 9114 SUSTAINABLE AND GREEN BUILDING DESIGN L T P/S C
2 0 6 5

OBJECTIVE:

To sensitize the students to the various aspects of sustainable and green building design in the context of global warming and climate change and to address the very process and tools of design to enable architecture that is environmentally friendly and sustainable.

UNIT I INTRODUCTION 15

Attitudes to architecture: a historical perspective- General premises and strategies for sustainable and green design- objectives and basis- Eco-mimicry as a design tool based on ecosystem analogy- theoretical basis for a sustainable and eco friendly design

UNIT II ECO HOUSE 30

The form of the house: the building as an analogy- design from first principles: conserving energy; working with climate: passive solar design; minimizing new resources; respect for users; respect for site and holism- photovoltaics and solar hot water systems; water usage; small scale wind systems and hydro power; Case studies- Studio project on design of eco houses: context specific

UNIT III ENVIRONMENTAL IMPACT OF BUILDING MATERIALS 15

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 analysis- Case studies and analysis

UNIT IV GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY 15

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 the environment – optimizing construction- site management- environmental management of buildings

UNIT V SUSTAINABLE AND GREEN BUILDING DESIGN STUDIO 30

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

TOTAL:120 PERIODS

REQUIRED READINGS:

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

REFERENCES:

1. Brenda and Robert Vale; Green Architecture- Design for a Sustainable Future; Thames and Hudson; 1996
2. Daniel Vallero and Chris Brasier; Sustainable Design- The science of sustainability and Green Engineering; Wiley; 2008
3. Catherine Slessor; Sustainable Architecture and High Technology- Eco Tech; Thames and Hudson; 1997
4. Dominique Gauzin- Muller; Sustainable architecture and Urbanism; Birkhauser; 2002

AA 9115 URBAN DESIGN STUDIO L T P/S C
2 0 6 5

OBJECTIVE:

To identify and address the issues of urban form through precedent studies; literature review; case studies and contemporary determinants of urban form including globalization, real estate, digital revolution, policy and infrastructure development

UNIT I INTRODUCTION 15

A brief historic review of the development of the urban design discipline and principles- Redefining urban condition – role of Globalisation – impact of Digital Revolution – sustainable development– Contemporary Processes in Urban Design

UNIT II SPLINTERING URBANISM 15

Transportation Networks –Information and communication networks Telecommuting and Urbanism

UNIT III RESTRUCTURING THE CITY 15

Place making in the Digital Age – reconfiguring public realm – Globalisation, and Generic Urban form– Urbanisation and Excursions on density

UNIT IV SUSTAINABLE DEVELOPMENT 30

Sustainable Cities Program - Revitalization of brown field sites- Transit Metropolis- Case Studies

UNIT V APPLICATION OF DIGITAL TECHNIQUES IN URBAN DESIGN 30

Depiction of Urban Spaces in Digital Media - Role of Digital Media in Reconfiguring Urban Space –Case studies – Application of Geographic Information Systems,

diagramming and 3D Modeling tools in Urban Design - Digital Media as a facilitator for participatory, sustainable urban design.

TOTAL:120 PERIODS

REQUIRED READING:

1. Crigore Birdea (ed.), Virtual Reality Technology. Wiley and Sons, New York, 1994
2. William J. Mitchell, City of Bits: Space, Place and the infobahn, MIT Press, 1996
3. Charles Correa, Housing and Urbanisation, Thames and Hudson, 1999
4. Neil leach, Designing for the digital world, John Wiley and Sons, 2002

REFERENCES:

1 Benjamin Woolley, Virtual Worlds. Penguin Books, 19931994
2 Peter Calthorpe, The Next American Metropolis, Princeton Architectural Press, 1993
3 Thomas A, Horan, Digital Places: Building our city of bits, Urban Land Institute, 2000

SEMESTER II

DG9121	CONTEMPORARY PROCESS IN ARCHITECTURAL DESIGN II	L	T	P/S	C
		3	0	0	3

UNIT I QUALITIES OF VIRTUAL ARCHITECTURE 9

Discussing the differences between the real and virtual space. Virtual space as the potential space. Qualities of the new space: Disconnection of the body, new laws of proximity and increased automatism and its influence on architectural form and space

UNIT II MEDIA AND ARCHITECTURE 9

Visions unfolding/ Media Architecture as desirable/ Films as a space for virtual architecture

UNIT III ISSUES 9

Towards new paradigm – A myth or a promise. / Need versus desire/ anxiety of new/ identity and Fashion.

UNIT IV IDEAS AND WORKS OF CONTEMPORARY ARCHITECTS 12

Ideas and works of contemporary architects - Greg Lynn, Reiser + Umemotto, Lars Spuybroek / NOX Architects, UN studio, Diller Scofidio, Dominique Perrault, Decoi, Marcos Novak, Foreign Office Architects, Asymptote, Herzog and de Meuron, Neil Denari.

UNIT V SEMINAR PRESENTATION 6

Students presentation on the ideas and works of architects known for process oriented approach to architecture. Topics to be discussed with course faculty prior to presentation.

TOTAL: 45 PERIODS

REQUIRED READING:

1. L. Convey et. al. Virtual Architecture, Batsford, 1995.
2. William J Mitchell, City of bits: Space, Place and the Infobahn. MIT Press, Cambridge, 1995

3. Michael Heim, Virtual Realism, OUP, New York, 1998.
4. John Beckman, The Virtual Dimension, Architecture, Representation and Crash Culture, Princeton Architecture Press, 1998.

REFERENCES:

1. Rob Shields (ed.) Cultures of the internet: Virtual Spaces, Real Histories, Living bodies, Sage, London
2. Marcos Novak, invisible Architecture: An Installation for the Greek Pavilion, Venice Biennale, 2000

DG9122 PERFORMANCE EVALUATION OF BUILDINGS L T P/S C
3 0 0 3

OBJECTIVE:

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

UNIT I SIMULATIONS AND DESIGN OF BUILDINGS 3

Principles of modelling and simulation – Classification and validation of simulation models – CAD/ CAM operations.

UNIT II PRINCIPLES OF SUSTAINABLE DESIGN 12

E's of sustainability **-** Integrated approach to environmental design- Case studies – Comparative analysis of green rating systems, LEED, BREAM and GRIHA – Cognitive , analytical and simulated modeling and design of buildings. Zero Carbon Footprint Building.

UNIT III ENVIRONMENTAL ASSESSMENT METHODS AND MODELING FOR PASSIVE SYSTEMS 12

Modelling and experimental techniques for building assessment/ evaluation and design – Basics of thermal comfort, solar shading/access/ control, day lighting, acoustics air movement etc. – issues and opportunities with current assessment modes/ evaluation tools- Evaluation and assessment based on Building type/ function and program – Building performance with respect to function, program, micro climate, urban planning, envelope design, material – Computer studio and simulation

UNIT IV ENVIRONMENTAL ASSESSMENT METHODS AND MODELING FOR ACTIVE SYSTEMS 12

Mathematical models of heat and mass transfer phenomena through building components: transfer function methods and numerical methods – Models of radiative and convective heat transfer phenomena within buildings – Application to equipment – based modelling of HVAC systems: first principle models and correlation – based models – System – based modelling of HVAC systems – Validation of computer models. Photovoltaic cells.

UNIT V SEMINAR AND CASE STUDY PRESENTATION 6

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

TOTAL: 45 PERIODS

REQUIRED READING

1. Energy Audit of Building Systems – Moneef Krarti (Ph.D) – CRC Press 2000
2. Clarke, J.A., "Energy simulation in building design", Adam Hilger Ltd, Bristol, 1985
3. ESRU,. "ESP-r A Building Energy Simulation Environment; User Guide Version 9 Series. "ESRU Manual U 96/1, University of Strathclyde, 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 (in Czech)

DG9123	VISUAL DESIGN THROUGH ALGORITHMS	L	T	P/S	C
		3	0	0	3

UNIT I LINEAR ALGORITHMS 12

Introduction to algorithms- finite element methods-application in 3d interface design, including sketch modeling-translation of architecture models into geometric data structures, structural abstraction such as nodes, elements, modeling forces and restraints- applications such as unified user interface.

UNIT II GENETIC ALGORITHMS 12

Introduction to genetic algorithms –evolutionary art- application of evolutionary principles of genetic algorithms in configuration design of complex structures- synthesis of topology, geometry and component properties of a structure using genetic algorithm-genetic algorithm application in site design, architectural design and modeling, structural design.

UNIT III BASICS OF NEURAL NETWORKS 9

Introduction to neural networks basics, computational models and application areas-identification of generic problem areas in building design suitable for neural network application- pre processing of data and capabilities of neural networks- selection of neural network model characteristics for a given application- learning algorithms for widely used neural network models.

UNIT IV APPLICATIONS OF NEURAL NETWORKS 6

Application of neural network models in architectural design and advanced modeling including acoustic design, diagnosis and forecasting , maintenance and control, building performance evaluation etc.

UNIT V FRACTALS 6

Introduction to Fractals- types of fractals- fractal creation, generators and initiators, direction and proportion – generating fractals based on spatial design and application in architectural design.

TOTAL: 45 PERIODS

REQUIRED READING:

1. Bovill. C, Fractals in architecture and design, Birhauser, Boston, 1996.
2. Mitchell, W and McCullough, M, Digital Design Media, 2nd edition. New York,Van Nostrand Reinhold , 1995
3. Stephen Todd and William Latham. Evolutionary Art and Computers. (Academic Press, New York, 1992)
4. Malcolm McCullough. Abstracting Craft : The Practiced Digital Hand. MIT Press, Reprint edition, September 1998.

REFERENCES

1 Black, R. G. and Duff, S. F, A Model for Teaching Structures: Finite Element Analysis and Architectural Education, Journal of Architectural Education 48(1), 38-55 , 199

2. B. J. Novitski. Rendering Real & Imagined Buildings : The Art of Computer Modeling. Rockport Pub., Book and CD-ROM edition, January 1999.
3. Matthews, K, Three Dimensional Sketching. Berkeley, California, College of Environmental Design Library, University of California, Berkeley, 1988

DG9124 VISUALIZATION STUDIO L T P/S C
1 0 4 3

OBJECTIVE:

This course is designed to introduce students to the importance of visualization as a tool in the interpretation of data and explores the role of computer graphics as a design tool.

UNIT I BASICS OF 3DS MAX 10

Basics of 3DsMax- Introduction to interface, standard and extended primitives, modifiers, splines. Basics of modeling – nurbs and polygon modeling, Exercises involving the above

UNIT II MATERIAL APPLICATION, LIGHTING AND CAMERA 10

Material editor - Various material types available in 3DS MAX, mapping materials – Types of lights and lighting systems – cameras – target and free camera.

UNIT III DYNAMICS 20

Dynamics – Particle systems, forces and deflectors in 3DS MAX – exercise involving the above.

UNIT IV ANIMATION 20

Animation – Introduction to timeline – playback controls – keyframe animation – path animation – fix and constraining cameras to path – render engines and rendering – exercises involving the above.

UNIT V 3DS MAX SCRIPT 15

Overview – Coordinate, object primitives and materials that mirror high-level concepts in the 3DS MAX user-interface. Learning MAX Script – Drawing an object in MAX Script,

Step by step execution of max script using Listener. Creating Scripts, Creating Scripted Utilities, Creating Scripted Plug-ins.

TOTAL: 75 PERIODS

REQUIRED READING

1. A. Watt, Fundamentals of Three-Dimensional Computer Graphics, Addis Wesley, Massachusetts, 1989.
2. J. Foley et.al. Computer Graphics: Principles and Practice, Addison-Wes Massachusetts, 1995
3. Mitchell, W. J. and McCullough, M, Digital Design Media, Van Nostrand Rheint New York, 1995.

DG9125 DIGITAL DESIGN STUDIO I L T P/S C
0 0 12 6

1. This course focuses in understanding various Contemporary process and translating them into architecture. To understand Methods of Quantifying architecture and developing Design from data. To develop process driven architecture.
2. Students will develop architectural project based processes like shape grammar, fractal, parametric models, Biometric etc.

TOTAL: 120 PERIODS

REQUIRED READING:

1. Gausa M, Metropolis Dictionary for advanced architecture, Published Actar – 2003.
2. Mathews K, Three Dimensional Sketching Berkeley, California, College of Environmental Design Library, University of California, Berkeley, 1988.

SEMESTER III

AA9131 RESEARCH METHODOLOGIES IN ARCHITECTURE L T P/S C
3 0 0 3

UNIT I INTRODUCTION 9

Basic research issues and concepts- orientation to research process- types of research: historical, qualitative, co-relational, experimental, simulation and modeling, logical argumentation, case study and mixed methods- illustration using research samples

UNIT II RESEARCH PROCESS 9

Elements of Research process: finding a topic- writing an introduction- stating a purpose of study- identifying key research questions and hypotheses- reviewing literature- using theory- defining, delimiting and stating the significance of the study, advanced methods and procedures for data collection and analysis- illustration using research samples

UNIT III RESEARCHING AND DATA COLLECTION 9

Library and archives- Internet: New information and the role of internet; finding and evaluating sources- misuse- test for reliability- ethics

Methods of data collection- From primary sources: observation and recording, interviews structured and unstructured, questionnaire, open ended and close ended questions and the advantages, sampling- Problems encountered in collecting data from secondary sources-

UNIT IV REPORT WRITING 6

Research writing in general- Components: referencing- writing the bibliography- developing the outline- presentation; etc.

UNIT V CASE STUDIES 12

Case studies illustrating how good research can be used from project inception to completion- review of research publications

TOTAL: 45 PERIODS

REQUIRED READING:

1. Linda Groat and David Wang; Architectural Research Methods;
2. Wayne C Booth; Joseph M Williams; Gregory G. Colomb; The Craft of Research, 2nd Edition; Chicago guides to writing, editing and publishing;
3. Iain Borden and Kaaterina Ruedi; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2000
4. Ranjith Kumar; Research Mehodology- A step by step guide for beginners; Sage Publications; 2005
5. John W Creswell; Research design: Qualitative, Quantitative and Mixed Methods Approaches; Sage Publications; 2002

REFERENCES

1. Amos Rapoport; House, form and culture;
2. Christopher Alexander; Pattern Language
3. Diagram Diaries; Peter Eissenman;

DG9132	DIGITAL PRODUCTION: SOLID MODELING AND RAPID PROTOTYPING	L	T	P/S	C
		1	0	4	3

This course focuses on advanced 3d modeling tools with Computer numerically controlled production processes. It aims to develop prototypes that will enhance design learning. Complex virtual 3d-models would be converted to tactile models through Prototyping. This is to achieve by combining lectures on fabrication technology, exercises on CNC machines and prototyping interfaces.

Working with Stereo Lithography Machines: Introduction to the stereo lithography tools Procedures to transfer solid model into a tessellated surface file. Using Polymer resin to produce prototypes. Practical exercise will be given to model simple objects.

TOTAL: 120 PERIODS

REQUIRED READING:

1. Daniel Schodek, Digital Design and Manufacturing: CAD/CAM applications in Architecture and Design, John Wiley&sons, 2005.
2. Nick Callicott, Computer Aided Manufacture in Architecture, Architectural press, 2001.
3. McGraw Hill Text, Rapid Prototyping and Manufacturing: Fundamentals of Stereo Lithography, 1993
4. Paul Jacobs, Stereo lithography and Other Rpandm Technologies : From Rapid Prototyping to Rapid Tooling, Amer Society of Mechanical Engineers, 1995.

REFERENCES

1. Michael D. Ciletti, modelling, synthesis, and Rapid Prototyping with the VERILOG (TM) HDL, Prentice hall, 1999.
2. Leu, Handbook of Rapid Prototyping and Layered Manufacturing, Academic Press, 2001.

DG9133 DISSERTATION L T P/S C
0 6 0 3

Students will identify research topics and in depth explore either the theoretical issue or develop mathematical models/ algorithms. While it is not mandatory, the students subsequently carry both the findings and research into the project work. The topic has to be approved by the supervisor and periodic reviews will be held to asses the progress of the work and also facilitate exchange of ideas. The final oral submission has to be accompanied by a CD and report submission.

TOTAL: 90 PERIODS

DG9134 ADVANCED DIGITAL DESIGN STUDIO II L T P/S C
0 0 12 6

This course investigates how digital media can be employed as a generative tool for derivation of form and its transformation. This course takes designers beyond the limits of the commercial digital tools. By applying algorithmic principles, computer programs can be used for form generation. The design projects will focus on parametric modeling and proceed towards complex form generation. Students will develop a brief for a design or a product and through generative process develop complex forms.

TOTAL: 180 PERIODS

REQUIRED READING:

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.

DG9141 PORT FOLIO PRODUCTION AND WEB PUBLISHING L T P/S C
0 0 6 3

UNIT I STATIC PAGES 60

Slice – URL in ADOBE IMAGEREADY. Creation and Editing of site map – layer, tables, frameset, - CSS style – Forms – tools like insert, roll over etc., in DREAMWEAVER – Exercise using the above said utilities.

UNIT II WEB PUBLISHING 30

Using the skills and concepts learnt in the multi media and web design courses, students will periodically submit their dissertation and design work in the form of web

pages. These pages have to be uploaded in free public domains prior to their respective reviews.

TOTAL: 90 PERIODS

REQUIRED READING:

1. M.E. Morris, and R.J. Hinrichs, Web Page Design, Prentice Hall, 1996.
2. Mark Von Wodtke, Mind over Media : Creative Thinking Skills for Electronic Media, McGraw-hill, New York, 1993

DG9142	THESIS	L	T	P/S	C
		0	0	16	8

Students will submit a detailed proposal on their topic of interest. The proposal will focus on the development of a product design/ building form/ developing interfaces between modeling and machining or between two graphic modeling tools/ building automation/ developing intelligent building controls. The project will be oriented towards developing prototypes and theoretical issues could be exhausted in the dissertation section. The Proposal has to be approved by the committee and the supervisor. There would be periodic reviews of the project. The final presentation will focus at developing and demonstrating a prototype.

TOTAL: 240 PERIODS

LIST OF ELECTIVES – M.ARCH(DIGITAL ARCHITECTURE)

AA9123	SERVICES IN HIGH RISE BUILDINGS	L	T	P/S	C
		3	0	0	3

OBJECTIVE:

This course will examine various services in high rise buildings and their integration into an intelligent and energy efficient system which will enable sustainability of the structure.

UNIT I INTRODUCTION 3

Standards of high Rise buildings- Aspects and Integration of services- Relative costs- Concepts of Intelligence Architecture and Building Automation

UNIT II WATER SUPPLY AND WASTE DISPOSAL 9

Water supply and waste water collection systems- water storage and distribution systems- Planning and Design- Selection of pumps- rain water harvesting – Sewage collection systems and recycling of water- solid waste disposal

UNIT III HVAC, ELECTRICAL AND MECHANICAL SYSTEMS 15

Natural and Mechanical Ventilation systems- Air conditioning systems and load estimation- Planning and design for efficiency- Automation and Energy Management
Natural lighting systems- Energy efficiency in lighting systems- load and distribution- Planning and Design for energy efficiency- Automation

Types of elevators, systems and services- Lobby design- Escalators- safety principles

UNIT IV SAFETY AND SECURITY 6

Security systems- Access Control and Perimeter Protection- CCTV Intruder alarms- Passive fire safety- Fire Detection and Fire Alarm Systems- Planning and Design- NBC

UNIT V CASE STUDIES 12

Case Studies of High Rise buildings and skyscrapers through appropriate examples- Norman Foster; Ove Arup; Ken Yeang, etc.

TOTAL: 45 PERIODS

REFERENCES:

1. William J. Mcguinness, Benjamin Stein and John S. Reynolds, Mechanical and Electrical Equipment for Buildings, John Wiley & Sons, Inc. 1980.
2. Donald Watson, Michael J. Crosbie and John Hancock Callender, Time-Saver Standards for Architectural Design Data, Mcgraw – Hill International Editions, 1997.

AA9151 BUILDING MANAGEMENT AND CONTROL SYSTEMS L T P/S C

3 0 0 3

UNIT I SAFETY SYSTEMS – FIRE ALARM SYSTEM 9

Objective of a Fire Alarm System, essential components of a Fire Alarm System, Technology of Detection, and Type of Statutory Standards followed in Detection. Explanation on the essential Clauses, and various types of Technologies employed in the Fire Alarm System, basic knowledge on how a Fire Alarm system is designed and installed.

UNIT II SAFETY SYSTEMS – FIRE SUPPRESSION SYSTEM 9

Objective of a Fire Suppression System, Explanation on Fire triangle, Essential Components of a Fire Suppression System, different type of Fire Suppression Systems, detailed design criteria for Wet Riser, Sprinkler Systems and various gas Based Fire Suppression System, and Type of Statutory Standards followed in Suppression, Explanation on the essential Clauses and Basic Knowledge on how a Fire Suppression System is designed and installed.

UNIT III SECURITY SYSTEMS – ACCESS CONTROL SYSTEM AND INTRUDER ALARM SYSTEM 9

Introduction to Access Control, Intruder Alarm, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they are designed and installed.

UNIT IV SECURITY SYSTEMS – CCTV AND PERIMETER PROTECTION 6

Introduction to CCTV, Perimeter protection system, Essential Components of each System, and Various types of Technologies employed in the system, Basic knowledge as how they are designed and installed.

UNIT V INTEGRATED BUILDING MANAGEMENT SYSTEM 12

The objective of the Integrated Building Management System (IBMS), the list of utility, safety & security systems that are generally monitored & controlled through IBMS, the various components of IBMS, types of integration with the utility, Safety & security systems, explanation in detail on how each utility, safety & security system is integrated

to IBMS, details of various parameters that can be monitored & controlled on each utility, safety & security system and the basic knowledge on how they are designed and installed.

TOTAL: 45 PERIODS

REQUIRED READING:

1. Building Automation Systems – A Practical Guide to Selection and Implementation, Maurice Eyke
2. The Principles and Practice of Closed Circuit Television, Mike Constant & Peter Turnbull
3. Rules for Automatic sprinkler Installation – second edition – Pub: Tariff Advisory Committee.
4. CCTV Surveillance, Herman Kruegle.

REFERENCES:

1. National Building Code of India 1983 (SP 7: 1983 Part IV) – Pub: Bureau of Indian Standards.
2. Security Systems and Intruder Alarm System, Vivian Capel.
3. Fire Suppression Detection System, John L. Bryan.

AA9153	GIS MODELLING IN URBAN PLANNING	L	T	P/S	C
		2	0	2	3

OBJECTIVE

This course will examine the role and application of Geographic Information Systems in environmental design, community charities and other urban design projects.

UNIT I INTRODUCTION 8

GIS – Spatial data, non Spatial data, Plan, Map, Scale, Map Projection, GPS, GCP collection, Spectral signature curve, Image processing – Geo coding / Geo referencing, GIS software, Two tier architecture, Three tier architecture, Thin client, Thick client

UNIT II DATABASE CONCEPTS 12

Data structures, Databases, Files, Types of Tables, Table operations, Creating a Table, Accessing Records in a Table, Manipulating records in a Table, Modifying Table structure, Reports, Advantages of database, Primary key and data access, Composite primary key, Defining a primary key, Sorting, Indexing, Master Detail relationships, Types of relationships, Foreign key, Deleting, updating and adding records to linked tables, ER Diagram, Data Model – Physical, logical and conceptual.

UNIT III SPATIAL DATA 10

Comparative methods for obtaining images, Aerial Photograph, Satellite Imagery – High resolution imagery – LISS, PAN, MSS – Ortho rectification, Digitization – Layers, Digital Elevation model, Digital Terrain Modelling, Existing maps – Problems and Issues, Rubber sheeting, Digitization, overlay, union, intersection.

UNIT IV INTRODUCTION TO GIS SOFTWARE 12

Arc Info – Coverage – Arc, Node, Tics, Add, get, put, Map extent, edit, Topology creation – Clean, Build, Tables – Creating tables, updating tables, join, drop item, Export, Import, overlay, union, intersection, buffer.

UNIT V MODELLING GIS PROJECTS FOR URBAN AREAS 18

Preparation of Land use map, Land use suitability analysis, Screen design, Visual Basic application using Map objects.

TOTAL:60 PERIODS

REQUIRED READING

1. Information systems for Urban Planning – Robert Laurini
2. Modelling our world – ESRI Press
3. An Introduction to Data base Systems – C.J.Date
4. Fundamentals of Data base Management System by Elmasri & Navethi
5. ESRI (1992) Understanding GIS, The Arc Info Methods, ESRI, USA

DG9153 INTRODUCTION TO SCRIPTING L T P/S C
2 0 2 3

UNIT I INTRODUCTION TO SCRIPTING 2

Definition and purpose of scripting – Introduction to programming language and software used for scripting.

UNIT II BASICS OF JAVA 23

Introduction to Java – Basic Object Oriented Programming – Advanced Object Oriented Programming – Basic Java Syntax – Java Input/Output – Applets and Basic Graphics – Mouse and Keyboard Events – AWT Components – Layout Managers – Java 2D.

UNIT III JAVA APPLICATIONS AND APPLETS 10

Basic Swing – Advanced Swing and MVC – Multithreaded Programming – Multithreaded Programming – Network Programming clients/severs.

UNIT IV DIRECTOR 15

Director Basics – Element of Animation – Time line – Simple presentation using Director

UNIT V DIRECTOR LINGO 10

Introduction to Interactive Anatomy of Lingo – Element of Scripting - Building Interactive Movie – Working with Multiple Movie and Casts – MIAW - Scripting with Net savvy Lingo – Lingo and Lists – Lingo and Audio Video – Xtras

TOTAL: 60 PERIODS

REQUIRED READING:

1. The Java Class Libraries, Volume 1& Volume 2by Patrick Chan, Rosanna Lee, Douglas Kramer
2. JavaScript: The Definitive Guide by David Flanagan
3. Java Software Solutions by John Lewis, William Loftus
4. Director 7 and Lingo Bible by Robert Martin, John R. Nyguist, Jonathan P. Bacon

DG9154 INTRODUCTION TO ALGORITHMS L T P/S C

2 0 2 3

UNIT I THE 'C' LANGUAGE AND CONTROL FLOW STRUCTURES 12

'C' program structure – Datatypes, Variables and constants – C Operators – Input/Output – Exercises and solutions using the above said utilities - Sequential control structure – Selective control structure – Iterative Control Structure – Exercises and solutions using the above said utilities.

UNIT II ARRAYS, STRING FUNCTIONS AND POINTERS 12

Single Dimensional arrays – Multidimensional arrays – String and String functions. Pointer declaration – Initialization of pointers – Using Pointers – Exercises and solutions using the above said utilities.

UNIT III FUNCTIONS AND STRUCTURES 12

User defined functions – Function categories – Storage classes. Introduction to structures – Arrays of Structures – Structures and functions – Exercises and solutions using the above said utilities.

UNIT IV FILE HANDLING AND FILE I/O 8

Introduction to files – Character I/O from files – Line I/O with Files - Writing records onto files – Reading records from files – Exercises and solutions using the above said utilities.

UNIT V DATA STRUCTURES, STACKS, QUEUES AND BINARY TREES 16

Introduction to Data Structures – Introduction to Linked lists – Manipulation of Singly Linked lists – Doubly linked list – Exercises and solutions using the above said utilities - Introduction of Stacks and Queues – Representing Stacks in C – Queues – Binary trees – Exercises and solutions using the above said utilities. **TOTAL: 60 PERIODS**

REQUIRED READING:

1. Thinking in C++ second edition Vol. one, Bruce Eckel
2. Thinking in C++ second edition Vol. two, Bruce Eckel & Chunk Allison
3. The C++ programming language (3rd edition) by Bjarne Stronstrup

DG9155 VIRTUAL SOCIETY L T P/S C

3 0 0 3

UNIT I CULTURAL BASIS 6

Social visualisation through readings, drawn from sociology / Psychology and interface design.

UNIT II ISSUES OF REPRESENTATIONS IDENTITY AND EXPRESSION 12

Meaning through association - subjective - transitory - cross cultural meanings ascribed to an object / Cultural phenomena in virtual objects: nature of identity in an immaterial and intangible environment / Issues of identity deception

UNIT III COMMODIFICATION , COMMERCE AND FASHION 6

Globalization, e-com and marketing- Fashion, identity and marketing- Machines as part of fashion - Role of Fashion and status in the virtual world.

UNIT IV COMMUNICATION AND PEDAGOGY 12

Virtual education and issues of Commodification/ virtual classrooms/ universities Virtual organisational existence / Society of Audience / online social world / Chat rooms / news groups and mailing lists

UNIT V CITY AND ONLINE WORLD 9

City as a metaphor for online world/ city as a hub of information/ place of strange fears/crime and doubtful morality/surveillance and security

TOTAL: 45 PERIODS

REQUIRED READING:

1. Nicholas Negroponte, Being Digital. 1995
2. Michael Benedikt (ed.), Cyberspace: The First Steps, MIT Press, Cambridge, 1991
3. G. Steven Jones, Cyber society: Computer-mediated Communication and Community. 1995
4. Jon Dovey, et.al, Fractal dreams: New media in social context. Sage Publications, 1996

REFERENCES:

1. McCracken. Culture and Consumption.
2. Judith Donath. Identity and Deception in the Virtual Community

DG9156 HIGH END 3D MODELLING L T P/S C
1 0 4 3

This course will train students on the high end-3D modeling and animation. This course would specifically focus on MAYA - The state of art modeling software. The training will look at the following sections

Hypergraph

Modeling: Nurb Modeling/ Polygon Modeling / Organic Modeling

Animation: Working with Key frames and Breakdowns/ Deformers/ Character setup/

Rendering: Lighting/ Shading/ Texture

Advanced Effects and MEL Scripting Language.

TOTAL: 60 PERIODS

REQUIRED READING:

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

DG9157 WEB DESIGN L T P/S C
1 0 4 3

UNIT I INTRODUCTION TO WEB DESIGN 2

Basics of web design – Introduction to software used for web design – ADOBE IMAGE READY DREAMWEAVER Macro Media, Flash etc.

UNIT II STATIC PAGES 10

Slice – URL in ADOBE IMAGEREADY. Creation and Editing of site map – layer, tables, frameset, - CSS style – Forms – tools like insert, roll over etc., in DREAMWEAVER – Exercise using the above said utilities.

UNIT III ANIMATION IN FLASH 20

Introduction to MACROMEDIA FLASH, importing other file formats to Flash – saving and exporting Flash files, Frame by frame animation – Motion Tweening – Shape Tweening – Symbols – Sound in Flash. Exercise using the above said utilities.

UNIT IV SCRIPTING IN FLASH 20

Introduction to Flash Scripting – Movie Control – Browser Network – Movie Clip Control – Variables – Conditions/ Loops – User Defined Functions – Miscellaneous Functions – Operators – Functions –Constants - Objects.

UNIT V DEVELOPING A WEB SITE 13

Exercise using the above said utilities using all necessary software in developing a Website.

TOTAL: 75 PERIODS

REQUIRED READING

1. Photoshop 7 Bible Professional Edition, Wiley John & Son INC, New York, DekeMcClelland, 2000.
2. Flash Web Design, The Art of Motion Graph, Curtis Hillman, New Riders Publishing, Indianapolis, IN. U.S.A, 2000
3. M.E. Morris, and R.J. Hinrichs, Web Page Design, Prentice Hall, 1996.
4. Mark Von Wodtke, Mind over Media : Creative Thinking Skills for Electronic Media, McGraw-hill, New York, 1993