VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

SCHOOL OF ARCHITECTURE

B. ARCH

(Bachelor of Architecture)

Curriculum

VISION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

Transforming life through excellence in education and research.

MISSION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

World class Education: Excellence in education, grounded in ethics and critical thinking, for improvement of life.

Cutting edge Research: An innovation ecosystem to extend knowledge and solve critical problems.

Impactful People: Happy, accountable, caring and effective workforce and students.

Rewarding Co-creations: Active collaboration with national & international industries & universities for productivity and economic development.

Service to Society: Service to the region and world through knowledge and compassion.

VISION STATEMENT OF THE SCHOOL OF ARCHITECTURE

V-SPARC School of Architecture strives to evolve socially sensitive individuals equipped with design, technology process and realization skills to contribute responsibly to the changing needs of the natural and built environment.

MISSION STATEMENT OF THE SCHOOL OF ARCHITECTURE

- To be seen as an institution promoting the interests of society and resolving physical and socio-economic challenges through research and socially responsible thought processes.

- To create a globally relevant, collaborative and confident student community, capable of independent thinking and effective action.

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Ability to apply technological and aesthetic principles in providing solutions to issues concerning the built environment
2. Ability to engage with other socio- economic and engineering disciplines in the provisions of architectural solutions
3. Ability to provide sustainable and humane directions in built form development

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PROGRAMME OUTCOMES (POs)

PO_01: Having an ability to apply mathematics and science in engineering applications.

PO_02: Having a clear understanding of the subject related concepts and of contemporary issues and apply them to identify, formulate and analyse complex engineering problems.

PO_03: Having an ability to design a component or a product applying all the relevant standards and with realistic constraints, including public health, safety, culture, society and environment

PO_04: Having an ability to design and conduct experiments, as well as to analyse and interpret data, and synthesis of information

PO_05: Having an ability to use techniques, skills, resources and modern engineering and IT tools necessary for engineering practice

PO_06: Having problem solving ability- to assess social issues (societal, health, safety, legal and cultural) and engineering problems

PO_07: Having adaptive thinking and adaptability in relation to environmental context and sustainable development

PO_08: Having a clear understanding of professional and ethical responsibility

PO_09: Having cross cultural competency exhibited by working as a member orin teams

PO_10: Having a good working knowledge of communicating in English – communication with engineering community and society

PO_11: Having good cognitive load management skills related to project management and finance

PO_12: Having interest and recognise the need for independent and lifelong learning

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ADDITIONAL PROGRAMME OUTCOMES (APOs)

APO_01: Having an ability to be socially intelligent with good SIQ (Social Intelligence Quotient) and EQ (Emotional Quotient)

APO_02: Having Sense-Making Skills of creating unique insights in what isbeing seen or observed (Higher level thinking skills which cannot be codified)

APO_03: Having design thinking capability

APO_04: Having computational thinking (Ability to translate vast data in to abstract concepts and to understand database reasoning

APO_05: Having Virtual Collaborating ability

APO_06: Having an ability to use the social media effectively for productive use

APO_07: Having critical thinking and innovative skills

APO_08: Having a good digital footprint

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PROGRAMME SPECIFIC OUTCOMES (PSOs)

On completion of B. Arch (Bachelor of Architecture) programme, graduates will be able to

- PSO1: Understand architecture through the knowledge of building sciences, civil engineering technology, pure and applied arts, and environmental studies, historical, cultural, socio-economic and legal parameters related to the built environment.

- PSO2: Analyse and evaluate built form and environmental needs pertinent to a specific context and apply the knowledge of architecture in providing directions for responsible development intervention.

- PSO3: Create sustainable architectural design solution to meet societal needs.

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CREDIT STRUCTURE

Category-wise Credit distribution

Category	Credits
Discipline Core Courses (DCC)	**147**
Building Sciences and Application Engineering (BSAE)	**52**
Discipline Electives (DE)	**28**
Ability Enhancement Courses (AEC)	**25**
Skill Enhancement Courses (SEC)	**16**
Open Elective (OC)	**12**
Total credits	**280**

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DETAILED CURRICULUM

Discipline Core Courses (DCC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC101P	Architectural Design I: Foundation Design Studio	0	0	12	12	NIL
2.	BARC102P	Architectural Graphics	0	0	4	4	NIL
3.	BARC103P	Visual Arts and Communication	0	0	8	8	NIL
4.	BARC104P	Architectural Design II: Spatial Exploration	0	0	12	12	BARC101L
5.	BARC107L	Architectural Design Thinking	2	0	0	2	NIL
6.	BARC111L	History of Architecture: Ancient	3	0	0	3	NIL
7.	BARC112L	Human Settlements andVernacular Architecture	3	0	0	3	NIL
8.	BARC201P	Architectural Design III: Rural Environment Studies	0	0	12	12	BARC104P
9.	BARC202L	History of Architecture: Medieval to Renaissance	3	0	0	3	BARC111L
10.	BARC203L	Site Planning and Landscape	3	0	0	3	BARC104P
11.	BARC204P	Architectural Design IV: Midscale Urban Built Forms	0	0	12	12	BARC201P
12.	BARC301P	Architectural Design V: CivicDesign	0	0	12	12	BARC204P
13.	BARC302L	History of Architecture: Industrial-Era	2	0	0	2	BARC202L
14.	BARC303L	Housing	3	0	0	3	BARC201P
15.	BARC305P	Architectural Design VI:Technical Drawings	0	0	12	12	BARC301P
16.	BARC401P	Architectural Design VII:Complex Typologies	0	0	12	12	BARC305P
17.	BARC402L	History of Architecture:Contemporary	2	0	0	2	BARC302L
18.	BARC403P	Architectural Design VIII: Urban Design	0	0	12	12	BARC301P
19.	BARC404L	Architectural Specifications and Estimation	3	0	0	3	BARC301P
20.	BARC499J	Architectural Thesis	0	0	0	15	BARC498J

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Building Sciences and Applied Engineering (BSAE)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC105E	Building Materials-Indigenous	1	0	4	5	NIL
2.	BARC106L	Structural Systems Evolution	3	0	0	3	NIL
3.	BARC108L	Environmental Science for Architecture	3	0	0	3	NIL
4.	BARC205E	Construction Technology: Concrete and Steel	1	0	4	5	BARC105E
5.	BARC207L	Principles of Structures	3	0	0	3	BARC106L
6.	BARC208L	Climate Responsive Architecture	3	0	0	3	BARC104P
7.	BARC304E	Construction Technology: Aluminium, Glass and Finishes	1	0	4	5	BARC205E
8.	BARC306L	Strength of Materials	3	0	0	3	BARC207L
9.	BARC315L	Building Services-I	3	0	0	3	NIL
10.	BARC316P	Building Environment Lab	0	0	4	4	BARC208L
11.	BARC405L	Construction Technology: Prefab Products and Manufacture	3	0	0	3	BARC304E
12.	BARC406L	Architectural Structural Design: Reinforced Concrete	3	0	0	3	BARC306L
13.	BARC407L	Building Services-II	3	0	0	3	BARC315L
14.	BARC410L	Architectural Structural Design: Steel and Timber	3	0	0	3	BARC409L
15.	BMAT103L	Mathematics for Built Environment	3	0	0	3	NIL

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Discipline Electives (DE)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC109P	Advanced Architectural Graphics	0	0	4	4	BARC102P
2.	BARC307L	Modern Architectural Thought	3	0	0	3	BARC107L
3.	BARC308P	Interior Design	0	0	4	4	NIL
4.	BARC309L	Art Forms Appreciation	3	0	0	3	NIL
5.	BARC310P	Ideation	0	0	4	4	NIL
6.	BARC311P	Advanced Visual Communication	0	0	6	6	BARC103P
7.	BARC312L	Theory of Landscape Design	3	0	0	3	BARC203L
8.	BARC408L	Architectural Photography and Journalism	2	0	0	2	BARC305P
9.	BARC409L	Sustainable Architecture	3	0	0	3	BARC208L
10.	BARC411P	Furniture Design	0	0	4	4	NIL
11.	BARC412L	Architectural Conservation	3	0	0	3	BARC201P
12.	BARC413L	Building Systems Integration	3	0	0	3	BARC407L
13.	BARC414P	Introduction to Computational Design and Digital Fabrication I	0	0	4	4	BARC210P
14.	BARC415P	Building Performance and Compliance	0	0	4	4	BARC316P
15.	BARC416L	Urban and Regional Planning	3	0	0	3	BARC301P
16.	BARC417L	Road Safety and Civic Sense	3	0	0	3	BARC301P
17.	BARC418P	Advanced Building Information Management	0	0	4	4	BARC209P
18.	BARC421E	Construction Technology: Advanced and Innovative Technologies	1	0	4	5	BARC405L
19.	BARC422L	Modular Coordination	3	0	0	3	BARC405L
20.	BARC424P	Advanced Computational Design	0	0	4	4	BARC414P
21.	BARC425P	Advanced Digital Prototyping and Fabrication	0	0	4	4	BARC424P
22.	BARC496J	Travel Learning	0	0	0	2	NIL

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Ability Enhancement Courses (AEC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC113L	Life Skills for Architects I	2	0	0	2	NIL
2.	BARC206L	Life Skills for Architects II	2	0	0	2	BARC113L
3.	BARC313L	Life Skills for Architects III	2	0	0	2	BARC206L
4.	BARC314L	Professional Practice and Advanced Construction Management	3	0	0	3	BARC305P
5.	BARC497J	Architectural Dissertation	0	0	0	2	NIL
6.	BARC498J	Architectural Internship	0	0	0	12	BARC305P
7.	BHUM101L	Ethics and Values	2	0	0	2	NIL

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Skill Enhancement Courses (SEC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC110P	Introduction to Digital Graphics	0	0	4	4	NIL
2.	BARC209P	Introduction to Building Information Management	0	0	4	4	BARC110P
3.	BARC210P	Advanced Digital Graphics: Skill Development	0	0	4	4	BARC110P
4.	BARC423L	Architectural Entrepreneurship	2	0	0	2	NIL
5.	BENG103P	Technical English	0	0	2	2	NIL

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Open Elective (OC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARB101L	Arabic	2	0	0	2	NIL
2.	BARC426P	Contemporary Architectural Products and Services	0	0	4	4	BARC498J
3.	BARC427J	Professional Skill Enhancement I	0	0	0	2	NIL
4.	BARC428J	Professional Skill Enhancement II	0	0	0	2	NIL
5.	BARC429P	Python for Architects	0	0	4	4	NIL
6.	BARC430E	Virtual Reality for Architects	1	0	4	5	NIL
7.	BARC431J	Architectural Travel Learning I	0	0	0	2	NIL
8.	BARC432J	Architectural Travel Learning II	0	0	0	2	NIL
9.	BARC433L	Construction Project Management	3	0	0	3	NIL
10.	BARC434P	Geographical Information Systems (GIS) for ARCHITECTS	0	0	4	4	NIL
11.	BARC435P	Architectural Model Making	0	0	4	4	NIL
12.	BBIT414L	Bioinspired Design	3	0	0	3	NIL
13.	BCHI101L	Chinese I	2	0	0	2	NIL
14.	BCLE210L	Al in Civil Engineering	3	0	0	3	NIL
15.	BCLE213E	Remote Sensing and GIS	2	0	2	3	NIL
16.	BCSE101E	Computer Programming: Python	1	0	4	3	NIL
17.	BCSE306L	Artificial Intelligence	3	0	0	3	NIL
18.	BCSE316L	Design of Smart Cities	3	0	0	3	NIL
19.	BCSE401L	Internet of Things	3	0	0	3	NIL
20.	BESP101L	Spanish I	2	0	0	2	NIL
21.	BFRE101L	French I	2	0	0	2	NIL
22.	BGER101L	German I	2	0	0	2	NIL
23.	BHUM201L	Mass Communication	3	0	0	3	NIL
24.	BITL101L	Italian	2	0	0	2	NIL
25.	BJAP101L	Japanese I	2	0	0	2	NIL

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S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
26.	BKOR101L	Basic Korean - Level 1	2	0	0	2	NIL
27.	BKOR102L	Basic Korean - Level 2	2	0	0	2	NIL
28.	BMGT106L	Digital Marketing	3	0	0	3	NIL
29.	CFOC191M	Forests and their Management	0	0	0	3	NIL
30.	CFOC661M	Architectural Approaches to Decarbonization of Buildings	0	0	0	3	NIL
31.	CFOC691M	Urban Services Planning	0	0	0	3	NIL
32.	CFOC702M	Structure, Form and Architecture: The Synergy	0	0	0	2	NIL
33.	CFOC703M	Development and Applications of Special Concretes	0	0	0	2	NIL
34.	CFOC704M	Bioclimatic Architecture: Future Proofing with Simple and Advanced Passive Strategies	0	0	0	3	NIL
35.	CFOC705M	Introduction to Graphic Design	0	0	0	2	NIL
36.	CFOC706M	Project Management	0	0	0	2	NIL

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Syllabus

Discipline Core Courses (DCC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC101P	Architectural Design I: Foundation Design Studio	0	0	12	12	NIL
2.	BARC102P	Architectural Graphics	0	0	4	4	NIL
3.	BARC103P	Visual Arts and Communication	0	0	8	8	NIL
4.	BARC104P	Architectural Design II: Spatial Exploration	0	0	12	12	BARC101L
5.	BARC107L	Architectural Design Thinking	2	0	0	2	NIL
6.	BARC111L	History of Architecture: Ancient	3	0	0	3	NIL
7.	BARC112L	Human Settlements andVernacular Architecture	3	0	0	3	NIL
8.	BARC201P	Architectural Design III: Rural Environment Studies	0	0	12	12	BARC104P
9.	BARC202L	History of Architecture: Medieval to Renaissance	3	0	0	3	BARC111L
10.	BARC203L	Site Planning and Landscape	3	0	0	3	BARC104P
11.	BARC204P	Architectural Design IV: Midscale Urban Built Forms	0	0	12	12	BARC201P
12.	BARC301P	Architectural Design V: CivicDesign	0	0	12	12	BARC204P
13.	BARC302L	History of Architecture: Industrial Era	2	0	0	2	BARC202L
14.	BARC303L	Housing	3	0	0	3	BARC201P
15.	BARC305P	Architectural Design VI:Technical Drawings	0	0	12	12	BARC301P
16.	BARC401P	Architectural Design VII:Complex Typologies	0	0	12	12	BARC305P
17.	BARC402L	History of Architecture: Contemporary	2	0	0	2	BARC302L
18.	BARC403P	Architectural Design VIII: Urban Design	0	0	12	12	BARC301P
19.	BARC404L	Architectural Specifications and Estimation	3	0	0	3	BARC301P
20.	BARC499J	Architectural Thesis	0	0	0	15	BARC498J

BARC101P	Architectural Design I-Foundation Design	L	T	P	C
		0	0	12	12
Pre-requisite	NIL	Version 1.0			

Course Objectives:

1. In this studio course, students are introduced to the concepts of visual and spatial cognitive perceptionthrough a process of understanding the properties of space, colour and light and creative exercises tounderstand their inter relationships. The process also develops a skillset for communicating abstract ideas through drawings and models

Expected Course Outcome: At the end of the course the student should be able

1. To understand the properties of point, line and space in cognitive applications.
2. To understand and apply the principles of composition of visual and spatial elements in defining spaceand its qualities.
3. To create tangible forms of communication to express abstract ideas.

Module: 1	Introduction to spatial coordinates	12 Hours

Introduction to the concepts of point, line and plane in defining space through simple model making exercises, origami and compositional exercises. Development of surfaces and volumes, point and planarcompositions with elementary drawings of representation.

Module: 2	Volumetric compositions	12 Hours

Understanding simple platonic volumes through models and representation drawings. Experiencingstructural stability through stick and string models with drawings.

Module: 3	Colour	24 Hours

Introduction to the colour palette, primary,secondary, tertiary colours with rendering exercises to generatetangible means to express abstract ideas.

Module: 4	Light	24 Hours

Exercises in light of various intensities and shadow analysis of simple compositions. Sketches of light and shade and experiments in light quality over multiple geometric volumes. Photo documentation and sketching exercises of generated models.

Module: 5	Texture and Material	24 Hours

Creation of spatial models using articulated linear elements, planar surfaces and geometric solids incorporating different materials and textures with photo documentation and sketching exercises.

Module: 6	Fractal geometry	24 Hours

Introduction to fractal geometry. Exercises in modelling fractal geometric forms.

Module: 7	Scale, measurement and proportion	24 Hours

Introduction to scaling of objects, measurement formats, proportion studies, analysis of simple functionalobjects and creation of a utilitarian object.		
Module: 8	**Project Presentation**	**36 Hours**
Seminars and exercises on art, music and the deliberation of abstraction into tangible forms with real lifeexamples. Discussions and analysis on the elements of art and design.		
Total Lecture Hours		**180 Hours**
Reference Books		
	Ching Francis.D.K. 2014. Architecture - Form, Space and Order: Phaidon Press.	
	Leonard Parker, et al. 2014. Basic Design Principles of Architecture. Kindle books.	
	De. Chiara and Callender. 2014. Time Saver Standards for Building types. McGraw Hill N.Y.	
	Neufert, E., Neufert, P., & Kister, J. 2012. Architects' Data. Chichester. West Sussex. UK: Wiley-Blackwell.	
	Jackson Paul. 2011. Folding Techniques for Designers: From Sheet to Form: Laurence King Publishing.	
	Anthony di Mari & Nora Yoo. 2013.Operative Design: A Catalog of Spatial Verbs: BIS Publishers.	
	Anthony di Mari . 2014.Conditional Design: An introduction to elemental architecture: BIS Publishers.	
	Khoda Ritu, Pai Vanita et al. 2016. Raza’s Bindu .illustrated by Kundan Sharbaz.	
Mode of evaluation: Assignments, Final Assessment Test		
List of exercises (Indicative)		
1. Investigate the symbiotic relationship between positive and negative spaces in a cubic volume. Represent your findings graphically and through 3D physical models		12 Hours
2.Create geometric volumes through combination of lines and planes to simulate a pavilion environment		12 Hours
3. Study the effect of light and colours on interior spaces through simulation models and photographic documentation		12 Hours

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC102P	Architectural Graphics	L	T	P	C
		0	0	4	4
Pre-requisite	NIL	Version 1.0			

Course Objectives:

To understand and generate geometric shapes and volumes through manual methods and there developing a cognitive approach using had eye hand coordination in geometric construction.

Expected Course Outcome:

At the end of the course, the student should be able to

[1] U**nderstand** basic architecture drafting principles, sheet formatting and lines and lettering ingraphic communication.

[2] D**istinguish** different geometric shapes and their projections, graphic scales.

[3] **Understand** architectural projections, types of arches and conic sections.

[4] **Visualize,** understand, and document spaces using various methods of measure drawing.

Module: 1	Introduction to technical tools related to manual architectural drafting and sheet size and formatting.	**4 Hours**
Module: 2	Introduction to architectural lettering & font types and sheet composition	**4 Hours**
Module: 3	Line weights & types - Dimensional lines and formats	**4 Hours**
Module: 4	Line drawing of simple geometric shapes demonstratingline weights, dimensions	**4 Hours**
Module: 5	Introduction to linear & graphic scales. Exercise inscale reduction & scale enlargement	**4 Hours**
Module: 6	Scaling of building elements through photo-interpretation.	**4 Hours**
Module: 7	Principles of Orthographic projections - simple platonic volumes	**4 Hours**
Module: 8	Exercise in drawing elements - Arch types & Conics.	**8 Hours**
Module: 9	Exercises in orthographic projection and section of asimple abstracted architectural volume	**8 Hours**
Module: 10	Isometric drawings of geometric solid volumes of building elements	**8 Hours**
Module: 11	Exercise in simple measured drawing - Architectural details, furniture, etc.	**8 Hours**
Total Lecture Hours		**60 Hours**

Reference Books

1.	Morris, I.H. 2012.Geometrical Drawing for Art Students: Orient Black swan Pvt.Ltd.
2.	Bhatt, N.D. and Panchal V.M. 2000. Engineering Drawing Plane and Solid Geometry, 42nd edition: Charotar Publication.

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC103P	Visual Arts and Communication	L	T	P	C
		0	0	8	8
Pre-requisite	**NIL**	**Version 1.0**			

Course Objectives:

The course is aimed to encourage students for free expression and creativity and to be able to understand the basic characteristics of different techniques in sketching and its practical applications.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Obtain the skill of observation** and demonstrate the observation through different medias.
[2] **Understand visual concepts** of colour, scale, proportion, composition, harmony, rhythm, contrast and related attributes of visual imagery.
[3] **Understand** visual principles and attributes defining an interior space such as light, shade, textures,etc)
[4] **Explore and demonstrate** two-dimensionally the principles of Design (contrast, balance, emphasis, proportion, hierarchy, repetition, rhythm, pattern, white space, movement, variety, and unity)
[5] **Form Based Exploration** and iterating to abstract results.
[6] **Exploration of skills** like photography as an offhand attempt to document a building which will stimulate understanding of form-space relation, aspects of visual cognition and psychological responses of humans.
[7] **Be competent** with a variety of common digital illustration media and imply learning of previously taught COs
[8] **Exert** skills & narrate design through illustrations.

Module: 1	**Study of Objects in Light and shade**	**8 Hours**

Still Life: Eye-Mind-Hand synchronization
(1) Short Time Observation-Sketch Exercises (Stimulation Exercise for Observation)
(2) Different Mediums Application – Monochrome
(3) Different Mediums Application – Colored

Module: 2	**Sketching Exercises**	**16 Hours**

An immersive live sketching exercises in numerous outdoor settings
(The exercises may focus on the scale, proportions, context, lines, etc)

Module: 3	**Sketching Exercises**	**16 Hours**

An immersive live sketching exercises of Interiors of Built spaces
(The exercises may focus on the play of light and shade, textures, pattern, etc.)

Module: 4	**Two- Dimensional Composition**	**8 Hours**

The exercises will enable the students to create aesthetic organization of various design element i.e. line, shape, form. The process should be iterative and deliverable can be two-dimensional.

Module: 5	**Composition and Understanding of Form**	**16 Hours**

The exercises will enable the students to create composition with different existing. The exercise can be iterative and scale can be increased eventually.

Module: 6	**Photo Documentation**	**16 Hours**
An exercise for analytical appraisal of building form in terms of visual characters through documenting various settings through photos captured by the students.		
Module: 7	**Digital Media Exploration**	**16 Hours**
Exercise to learn image editing, expurgating, processing and enhancing using basic computer software. (Compositional principles, Poster Design, Signages Study and Design)		
Module: 8	**Interaction with Visual CommunicationExperts**	**24 Hours**
Hands on Experience of few illustration methods to be effective in explaining Architecture.		
Total Lecture Hours		**120 Hours**

Reference Books

1.	Basic Visual Concepts and Principles for Artists, Architects and Designers by Charles Wallschlacgerm & Cynthia Busic-Snyder, McGraw Hill, New York 1992
2.	Design fundamentals in Architecture by V. S. Parmar, Somaiya Publications Minorions Pvt. Ltd., New Delhi, 1973.
3.	Art Fundamentals Theory & Practice by Ocvirk, Stinson, Wigg, Bone, Cayton, Mc Graw Hill, 2012.
4.	Foundations of Art and design by Alan Pipes, Lawrence King Publishing limited, 2008.
5.	Rendering with Pen + Ink, Thames & Hudson, 2003
6.	Foundations in Architecture: An Annotated Anthology of Beginning Design Project, Van Nostrand Reinhold NY, 1993.

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC104P	Architectural Design II: Spatial Exploration	L	T	P	C
		0	0	12	12
Pre-requisite	BARC101P: Architectural Design I: Foundation Design	Version 1.0			

Course Objectives:

1. The studio course is aimed at understanding spatial experience relating to people, built form and material in a certain activity within a context. The focus would be to enhance the qualityof spatial experience and to build stronger links between people, context, materiality and activity. This is also to explore cross cultural spatial relationships and conceptualize the ideaof Space within a Space.

Expected Course Outcome: At the end of the course the student should be able

1. To understand activity and spatial relationship in terms of privacy, daylight, circulation and furniture layout.
2. Evaluate existing examples correlating human anthropometrics and spatial relationship using visual tools like drawing and models.
3. Design personal spaces using architectural elements and anthropometric principles
4. Understand and apply simple principles of structural design and form and evaluate building components in terms of materials and disposition and communicate them clearly.

Module: 1	Introduction to building components	12 Hours

Visit an existing built space- understanding and exploring the building components and sketching basic elements like Walls, Floors, beams, windows, doors, staircase, facade, etc.

Module: 2	Experiments in spatial volume, scale and proportion	12 Hours

Creation of geometric volumes in different scales of a simple functional enclosed entity and experiencinginner and outer spaces Understanding simple platonic volumes through models and representation drawings.

Module: 3	Experiments in anthropometrics	24 Hours

Full scale studies and experiments of interior functional models like kitchen units and wardrobes. Toiletsand understanding of anthropometric qualities.

Module: 4	Experiments in internal elements	24 Hours

Full scale experiments in interior applications like seaters, staircases, balusters, and fenestration.

Module: 5	Design exercise-Introduction	24 Hours

Design of a small structure like a residence, visitor's information center, café, to demonstrate understanding of internal and external spaces and low-level complexity of internal space relationships-Zoning and spatial scale, proportion and dimension.

Module: 6	**Design Schematics 1**	**24 Hours**
Development of 3-D models and schematic design works.		
Module: 7	**Design Presentation**	**24 Hours**
Presentation drawings of the project with appropriate presentation formats.		
Module: 8	**Project Seminar**	**36 Hours**
Design charrette to discuss and analyse works at different stages.		
Total Lecture Hours		**180 Hours**

Reference Books	
1	Ching Francis.D.K. 2012. Architecture - Form Space and Order. Phaidon Press.
2	Mark Jarzombek, et.al. 2015. A Global History of Architecture. John Wiley and Sons.
3	No author. 1995. Documentation of Kerala's Domestic Architecture, MCF, Dakshinchitra.
4	No author. 2014. Vernacular Architecture of Tamilnadu MCF. Dakshinchitra.
5	Kolkman René & Blackburn Stuart.2014. Tribal Architecture in Northeast India. Brill.
6	Kalfazade Nihat. 2009. Diagrammatic Potency of the "Nine Square Grid in Architecture. VDM Verlag.
7	Clark H. Roger and Pause Michael. 1996. Precedents in Architecture, Van, Nostrand Reinhold.
8	Story Kevin.J. 2020. The Complexities of John Hejduk's Work: Exorcising Outlines, Apparitions and Angels: Routledge.

Mode of evaluation: Continuous Assignments, Final Assessment Test		
List of exercises (Indicative)		
1. Site visits to gain knowledge about building components – Documentation work		
2. Design a simple habitable space and providing a schematic drawing showing the spatial planning, materials, interior furnishing, sizes and other details		
3.Create a public interactive space area to an appropriate scale and spatially study the internal volumes and build a short narrative on the spatial quality.		
Recommended by Board of Studies	21/2/2022	
Approved by Academic Council	**No. 66**	Date 16-6-2022

BARC107L	Architectural Design Thinking	L	T	P	C
		2	0	0	2
Pre-requisite	**Nil**	**Version 1.0**			

The objective of the course is to understand and analyze the factors which contribute to the design process and to review processes for design realization from theoretical studies.

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Develop** abstract ideas into tangible entities through linear or lateral thought processes.
[2] **Analyze** design solutions and create tangible guidelines for abstract outcomes.
[3] **Create** design solutions that meet the needs of users through enhanced aesthetic and sensorial sensibility.
[4] **Devise** a systematic approach while providing design solutions.
[5] **Determine** how forms and material properties may be used to create particular user experiences.

Module: 1	Introduction to Design Theory Concepts of abstractionand ideation to application. Linear and lateral thought processes. Subjective and Objective analyses.	**4 Hours**
Module: 2	Design thinking - History and Theory.	**4 Hours**
Module: 3	Building Empathy: Analysis of everyday objects, understanding the synthesis of form and function.	**4 Hours**
Module: 4	Understanding users through empathy maps, Architectural examples balancing built form spirit, aesthetics and user needs.	**4 Hours**
Module: 5	Exploration and ideation of design process. Identifying problem statement, review of requirements, casestudies, analysis of constraints, user needs statement togenerate big ideas development of final product, feedback and improvement, Evolution of concepts andtheir types.	**4 Hours**
Module: 6	Sensorial studies, Sequencing of space, introverted and extroverted spaces, relationships among volumes, factors influencing spatial experience, sensorial features, psychology of space, phenomenology.	**4 Hours**
Module: 7	Role of Technological advancement and innovative approaches in design thinking processes with examples	**4 Hours**
Module: 8	Lectures by contemporary designers	**2 Hours**
Total Lecture hours		**30 Hours**

Text Books	
1.	Francis D.K.Ching. Architecture-Form, Space and Order: John Wiley & Sons.2001.
2.	Unwin Simon. Analysing Architecture: Taylor and Francis.2014.
3.	Pandya Yati.. Elements of Space making. Mapin.2014
Reference Books	
1	Parker Tom.. Architect's Eye: Taylor and Francis.2014
2	
3	Bachelard Gaston., The Poetics of Space: Penguin Classics.2014
4	Bono de Edward.. Lateral Thinking: Penguin. UK, 2016
5	Pallasmaa Juhani.. The Eyes of the Skin: John Wiley & Sons.2012

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test, Project component.			
Recommended by Board ofStudies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC111L	History of Architecture: Ancient	L	T	P	C
		3	0	0	3
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

1) The course would bring questioning and critical thinking skills, commencing with why there is a need to study history with reference to architecture.
2) The discourse should manoeuvre from reading, learning, and understanding the tools of architectural analysis.
3) The course should provide an insight into the architecture of the prehistoric period and early civilizations across the world.
4) The course delivery is framed by taking different crucial lenses to trace and examine the path, pattern, and language the various civilizations have taken up.
5) The different aspects can include social, religious, and political character; construction methods; building materials; and the influence of geology, geography, and climate.

Expected Course Outcome:

At the end of the course, the student should be able to

1) Explore the history and theory of architecture from prehistoric times and the evolution of architectural typologies based on function or form across the globe.
2) Examine the earliest types of settlement patterns as well as various ancient civilizations.
3) Apply architecture to track the emergence and evolution of important societal institutions such as intelligence, religion, and culture pertaining to the Indian Continent.
4) Analyse the evolution and development of architecture in China and Japan.
5) Discover how Greek architecture evolved in response to social, political, and economic upheavals, as well as cultural and environmental factors.
6) To investigate and comprehend how architecture evolved in response to various classical texts, and thus in Rome.
7) Recognize the evolution, transformation, and architectural manifestation of a religion in historical, cultural, geographic, and technological contexts.
8) To develop an understanding of the given construct and develop critical thinking skills to lead towards an ideal construct.

Module: 1	**Prehistoric Architecture & early settlement (1200BC & Before)**	**4 Hours**

Theoretical and practical with evidence relevance of History in architecture. Introduction of different ages of human history. Typology & Evolution of form in Architecture manifestations- Acquired from indigen natural resources, monolithic and constructed manifestations- cave dwelling, earliest known man-made shelter, Ritual Spaces and Burial Structures and Early Settlements

Module: 2	**River valley civilizations (3500 -800 BC)**	**9 Hours**

Introduction to chronology of human civilizations and first societies , elements and determinants of human settlements, Agro-pastoral Settlement , Contextual Understanding - Geography, Political Scenario, social, religious, cultural and economic systems and Trade

Ancient Egypt- Understanding the culture and evolution of Architecture with respect to contextual Understanding – Trade, Political system, religious beliefs and practices, evolution of funerary architecture- Mastaba , Stepped Pyramids(Zoser), evolution of Pyramids (Bent, Red, Giza),process of mummification, temples , hypostyle Halls, cult temple

Mesopotamia - Urbanization in the fertile crescent – Sumerian, Akkadian, Babylonian, Assyrian and onset of Persian culture, evolution of city, Gods and empires and manifestation through architecture- ziggurat, temples , palaces , gates, Babylonia- Hamurabi and his contribution to the world- code of law, hanging garden

India-Indus Valley Civilization - Ghaggar-Hakra River valley, Harappa, Mohenjo-Daro, Rakhigarhi, Muziris, Arikmedu

Ancient China- Henan Culture , Shang Dynasty, Zhou Dynasty China

Module: 3	**Ancient Indian Architecture (800BC- 0 BC)**	**6 Hours**

Evolution of Ancient Indian architecture, cultural and spiritual heritage (Reference to various ancient religion- Buddhism, Jainism, and Hinduism)

Rock-Cut Architecture- Barabar Hills , Buddhist Caves, Ajanta Caves, Ellora, Elephanta, Rani Gumpha, Chaitya Hall- Karli.

Buddhist Architecture- Educational Institutions and other related structures, Takshila, Sanchi Stupa, Lion Capital, Sarnath. Jainism – Jandial, Mt Abu

Module: 4	**Japanese and Chinese Architecture (800BC- 0 BC)**	**4 Hours**

Japanese and Chinese Civilizations' architectural characteristics, building typologies, settlement patterns, planning principles, and construction techniques. The relationship of the leadership of the various dynasties to the architecture of the respective lands.

China – Hongshan (Ritual Centers & Ritual altars).

Japan- Kofun Period, Nara Period

Module: 5	**Classical Period: Greece (800CE- 400 CE)**	**4 Hours**

Introduction to Classical Greek history & architecture -Polis, Politics & Mythology.

Ancient Greek Cities - Minoan and Mycenaean cultures, Hellenic Greek and relevance to India. Building Typology: Public Buildings- agora, stoas, theaters, bouletrion and stadias, domestic architecture, Orders (Doric, lonic, Corinthian) and Temples.

City Planning(Acropolis, Agora, Athens)

Architectural Concepts & evolutions of principles : Optical Correction, Golden Mean, Golden Ratio, Fibbonachi Sequence

Module: 6	**Classical Period: Rome (800 CE- 200 CE)**	**5 Hours**

Introduction to Classical Roman History & Architecture- Eutrascan, Imperial and Republic Rome, City planning and Vitruvius Principles

Architectural Typology- Civic Buildings : Thermae, Circus, Forums and basilicas, Aqueducts**.** Domestic architecture(Domus). Commemorative architecture.

Construction Techniques and Innovations – Arches, Domes and orders in architecture-Tuscan and Composite		
Module: 7	**Rise of Christian Architecture (400 CE)**	**4 Hours**
Birth and spread of Christianity – Transformation of the Roman Empire – Early Christian worship and burial, Church Planning & Types - Construction, Material & Form Development, Byzantine, Baptisteries , Christian architecture in India		
Module: 8	**Guest Lectures and model making workshops**	**6 Hours**
Interactions with experts of History, Theory and Criticism Model making workshop for the case examples.		
Total Lecture Hours		**45 Hours**

Text Book

1.	Ching, F. D. K., Jarzombek, M. and Prakash, V, A Global History of Architecture, 2nd Ed. John Wiley and Sons, 2010.
2.	Kostof, S. (1995). History of Architecture, New York: Oxford University Press.
3.	Bannister Fletcher, A History of Architecture, 21st Edition, Bloomsbury Publishing, 2020

Reference Books

1.	Brown, Percy. Indian Architecture (Buddhist, Hindu, Islamic period), DB Taraporevala Sons & Co, Mumbai, (reprint 2011)
2.	ChristoperTadgell, The History of Architecture in India from the Dawn of civilization tothe End of the Raj, Longman Group U.K. Ltd., London, 1990.
3.	Benevolo, The History of the City, MIT Press 2010 (reprint)
4.	Marcus Vitruvius Pollio, The Ten Books on Architecture, 2016, Elibron Classics
5.	Bubbar, D. K. (2005). The Spirit of Indian Architecture. New Delhi : Rupa & Co.
6.	Copplestone, T. and Lloyd, S. (1971). World Architecture: An Illustrated History. London: Verona Printed.
7.	Leland M Roth, Understanding Architecture: Its Elements, History and Meaning, Craftsman House, 2004

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC112L	Human Settlements and Vernacular Architecture	L	T	P	C
		3	0	0	3
Pre-requisite	Nil	**Version 1.0**			

Course Objectives:

1.	To create insights into the evolution of human settlements from ancient to modern era w.r.t social,cultural, economic and environmental aspects and human values.
2.	To provide an understanding of human settlements' vocabulary together with concepts and processes inplanning and urban renewal.
3.	To analyze major human settlements issues and challenges at all scales (from global to the local i.e.dwelling level)
4.	To expose students to the varied Vernacular architecture of different regions (India and Abroad)

Expected Course Outcome: At the end of the course the student should be able to

1.	**Analyze** the evolution of human settlements through history and conclude solutions towards sustainablesettlement.
2.	**Develop** a critical understanding to examine the multi-faceted challenges of human settlements in thecontext of dynamic change through multi-disciplinary and multi-scalar perspectives.
3.	**Understand** and appreciate the diversity of vernacular architecture at local and global context.
4	**Develop** an understanding of traditional knowledge systems and construction techniques of differentregion over architectural expressions and forms that lead to sensible context specific design.

Module: 1	**Introduction**	**6 Hours**
Definition of Ekistics and the earlier works of Doxiadis , Elements and Goals of Human Settlements – human beings and settlements – Anatomy & classification of Human settlements, Ekistic Grid and Anthropocosmos Model		
Module: 2	**Forms of Human Settlements**	**6 Hours**
Principles and laws of ekistics, internal balance and physical characteristics, human needs, forces shapingsettlements, Structure and Forms of human settlements, ekistics synthesis.		
Module: 3	**Planning Principles in India**	**6 Hours**
Traditional Vastu treatise - Mayamata, Manasara, and Smirti Shastra, the planning of towns, villages, thedesign of temples, halls, pavilions, City Planning Principles – Vedic Period, Temple Towns -Madurai, Srirangam, Kanchipuram, Mughal Towns etc		
Module: 4	**Planning Concepts – India and Abroad**	**6 Hours**
Administrative Town – Canberra, Washington, Beijing, Agriculture Market Towns – Kansas city, Lahore,Baghdad, Cultural Towns – Jerusalem, Varanasi, Puri		
Module: 5	**Introduction to Vernacular Architecture**	**6 Hours**
Definition, Scope and the role of vernacular architecture, Causative forces and underlying principles of itsform, Symbols and meanings		
Module: 6	**Study of Practices and Design Principles of VernacularArchitecture**	**6 Hours**
Identifying various Contemporary Architects (national and International) who have taken inspiration andapplied vernacular principles in their contemporary architecture interventions		

Module: 7	**Study of Different Settlements**	**6 Hours**
Study of different settlements that encompasses people's dwellings and other constructions, relating to theirrespective environments and resources using traditional techniques.		
Module: 8	**Contemporary Issues:**	**3 Hours**
Guest Lectures, Seminars and students' final presentation		
Total Lecture Hours		**45 Hours**

Text Book(s)	
1.	Doxiadis, C.A Ekistics: An introduction to the Science of Human Settlements (Oxford University Press,London, 1968.
2.	Doxiadis, C. A Architecture in Transition. New York: Oxford University Press. 1963
3.	Doxiadis C.A., Anthropopolis: City For Human Development, Athens Publishing Center, Athens, 1974.
Reference Book (s)	
1.	Sandra Piesik, 2017, "Habitat -Vernacular Architecture for a Changing Planet", Thames & Hudson Ltd.
2.	Ward B. & Dubos R., 1972, "Only One Earth: The Care and Maintenance Of A Small Planet", New York, W.W. Norton.
3.	Meir. R..L. 1965. "Megalopolis Formation in the Midwest, Ann Arbor, Dept. of Conservation",University of Michigan.
4.	Beatley, Timothy. 2012. "Sustainability in Planning: The Arc and Trajectory of a Move-ment, and New Directions for the Twenty-First Century." In Planning Ideas that Matter: Livability, Territoriality,Governance and Reflective Practice, pp. 91-124. Cambridge, MA: The MIT Press.
5.	Song, Yan. 2012. "Suburban Sprawl and "Smart Growth" In the Oxford Handbook of Urban Planning 418.
6.	Cooper, I. (1998), "Traditional buildings of India". Thames and Hudson Ltd, London.
7.	Christian Schittich, 2019. "Vernacular Architecture - Atlas for Living Throughout the World", BirkhaÜser.
8.	John May and Anthony Reids, 2010, "Handmade Houses & Other Buildings: The World of Vernacular Architecture". Thames and Hudson.
List of Challenging Experiments (Indicative)	
1.	Analyzing the neighborhood with respect to forces shaping the settlement (social, economic, environment, physical)
2.	Abstract the elements of an indigenous dwelling (any region) and explore its relation to climate and wayof life.

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board ofStudies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC201P	Architectural Design III: Rural Environment Studies	L	T	P	C
		0	0	12	12
Pre-requisite	ABARC104P: Architectural Design II-Spatial Exploration	Version 1.0			

Course Objectives:

1. To understand/engage with the basic issues of socio-cultural and physical context of built environmentand experience rural contexts of diverse typologies and in transformation.
2. To understand planning and design through abstraction of the various elements of village settlementsand their relationships.
3. To study basic materials, technologies in design and explore vernacular construction and sustainability

Expected Course Outcome: At the end of the course the student should be able to

1. To **understand/engage** with the basic issues of socio-cultural and physical context of built environmentand experiencing rural contexts of diverse typologies and in transformation.
2. To **understand** the settlement pattern, evolution of rural architectural expression and various aspectssuch as value system, and their ingenious relationships to the built environment.
3. To **identify** best practices, technologies in settlement design, and propose a community drivensustainable people-oriented solution.
4. To **apply** sensitive development options for development of the rural community.

Module: 1	Understanding the Rural and Urban Continuum	12 Hours

Understanding the Rural and Urban Continuum, Influence of Urbanization and villages in trans-formation, Contemporary challenges, Village types according to their structure, Problems of rural system

Module: 2	Documentation Project	24 Hours

Documentation Project (in-situ- travel to site and in Studio) - Drawings to understand village forms, settlement patterns, contextual responsiveness, dwelling typologies, cultural influences, constructionmaterials and techniques, community spaces and natural resources. Preparation of report

Module: 3	Analysis and Identification of issues	24 Hours

Analysis and Identification of issues - quantitative and qualitative analysis, Spatial mapping anddigitization

Module: 4	Macro level intervention	24 Hours

Macro level intervention – Envisage future changes or demands on a large-scale policy or infrastructural proposals or recommendations benefitting the entire community. Proposals include disaster management,rural road infrastructure, solid and liquid waste management plan, energy management plan, etc.

Module: 5	Micro level intervention	24 Hours

Micro level intervention - Rural projects that involve design at settlement and building level - noon mealcentre, market, primary health centre, department store, primary school, vocational training institute			
Module: 6	**Design Development**		**24 Hours**
Exercises detailing Site plan and presentation of concepts of different typologies through various modesand techniques that will move constantly between 2D representation and 3D massing based on function and need: user requirements, anthropometrics, space standards.			
Module: 7	**Detailing Architectural Drawings**		**24 Hours**
Exercises detailing Sections and elevation studies/ 3D Models			
Module: 8	**Presentation**		**24 Hours**
Final Charrette/ Juries with practicing architects			
Total Lecture Hours			**180 Hours**
Reference Book (s)			
1.	Desai. A. R, "Rural Sociology in India" (2011). Popular Prakashan Ltd. New edition.		
2.	URDPFI guidelines. 2015. Ministry of Urban Development		
Mode of Evaluation: Continuous Assessment Test, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC202L	History of Architecture– Medieval and Renaissance	L	T	P	C
		3	0	0	3
Pre-requisite	BARC111L: History of Architecture - Ancient Period				

Course Objectives:

1) This course is a survey of world architecture in the medieval and renaissance period in a broad range of historical, regional and cultural contexts.
2) Major social, physical and technical factors which influence architecture are identified.
3) The concepts and styles will be read, discussed and analysed from the evolution to the execution in different eras.
4) Readings and discussions to investigate the discourse of architectural history and establishing a framework in rationalization of the role of architecture in larger systems of civilizations and mannerisms can be explored.

Expected Course Outcome:

At the end of the course, the student should be able to

1) Distinguish place- and period-specific architectural styles across the world from 500 AD to 1750 AD
2) Interpret and analyse early mediaeval art and architecture and place it in its original social, political, and spiritual contexts to understand how archetypes were constructed, defined, and understood.
3) Analyse the architecture in the medieval era and its evolution, influences and responses on current built forms across the world.
4) Understand the central tenets of medieval art and architecture in India during Provincial Rule.
5) Understand the impact of dynastic power on architectural development and examining the role of patrons.
6) Analyse the architecture in the Renaissance Period and its evolution, responses and influences on current built forms across the world.
7) Develop architectural vocabulary related to certain styles, visual literacy abilities, and a basic comprehension of the methodologies and goals of art historical research.
8) Develop an understanding of the given construct and develop a critical thinking skill to lead towards an ideal constructs.

Module: 1	Introduction (500-1600)AD	2 Hours

Introduction to history and theory of Medieval Era – Brief Discussion on Broad chronological boundaries. Outline of approach and attitude to historiography and the approach to the evolution of architecture and cultures. Changing social conditions in the world during Medieval and Renaissance period.

Module: 2	Indian Architecture (500 - 800)AD	4 Hours

Brief history of South India, Temple architecture –temples as community spaces & temple City Planning , Temple Types and Styles : Dravidian Style Temples - Pallavas, Cholas, Pandyas - Tanjore, Srirangam, Temples in Kanchipuram, Kumbakonam, Darasuram& Rameswaram, Pancharathas, Mamallapuram Monuments, Meenakshi Amman temple, Brihadeeshwara Temple, Gangaikonda Cholapuram . Nagara Style - Modhera Sun Temple, Jain temple Mt. Abu

Text Book	
1.	Ching, F. D. K., Jarzombek, M. and Prakash, V, A Global History of Architecture, 2nd Ed. John Wiley and Sons, 2010.
2.	Kostof, S. (1995). History of Architecture, New York: Oxford University Press.
3.	Bannister Fletcher, A History of Architecture, 21st Edition, Bloomsbury Publishing, 2020
Reference Books	
1.	Leland M Roth, Understanding Architecture: Its Elements, History and Meaning, Craftsman, House,2004
2.	Brown, Percy "Indian Architecture (Islamic period), , DB Taraporevala Sons & Co, Mumbai, 2011
3.	Paul Letarouilly, Edifices de Rome Moderne (Classic Reprints), Princeton Architectural Press,1981
4.	Benevolo, The History of the City, MIT Press 2010 (reprint)
5.	Bannister Fletcher, A History of Architecture, 21th Edition, Bloomsbury Publishing, 2020 (reprint)
6.	Rudolf Wittkower, Architecture Principles in the Age of Humanism, Wiley ,1998
7.	Monica Juneja, Architecture in Medieval India, Univ of Michigan, Permanent Black, 2001
8.	Adam Hardy, The Temple Architecture of India, Wiley & Sons, 2008
9.	Ching, F. D. K., Jarzombek, M. and Prakash, V, A Global History of Architecture, 2nd Ed.John Wiley and Sons, 2010.

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC203L	Site Planning & Landscape	L	T	P	C
		3	0	0	3
Pre-requisite	BARC104P: Architectural Design II: Spatial Exploration	Version 1.0			

Course Objectives:

1.	To equip students with the basic principles and theories which underlie the systematic study of topographicfeatures, basic skills of Surveying and Levelling related to Architecture.
2.	To make students understand the relationship between the built and the un-built environment and principles of site analysis and site planning for various building typologies for varied site conditions.

Expected Course Outcome: At the end of the course the student should be able to

1.	Understand the objectives, principles of surveying, leveling and advanced techniques of surveying
2.	Understand the process and the stages involved in site analysis and site planning
3.	Design the spatial aspects in a site and site circulation.
4.	Introduce the various aspects of Landscape design and site planning in enhancing and improving thequality of building environs, functionally and aesthetically.
5.	Develop and strengthen the competence in dealing with site utilities and infrastructure.

Module: 1	Surveying	12 Hours

Definition of plot, site, land and region, units of measurements. Introduction to methods of surveying and context of use. Modern surveying Instruments such as Electronic Distance Measurement (EDM) and TotalStations and their application. Understanding of administrative maps and site drawings, including Field Measurement Book (FMB). Obtaining site metadata using GIS maps.

Module: 2	Landscape Masterplan and Grading	4 Hours

Identification of contours, contour analysis & 3d modelling of the site, zoning of open spaces and built up areasas per site contours, use of existing levels to minimize cut and fill and use of site contours for effective site drainage and rainwater harvesting.

Module: 3	Site inventory and site analysis	4 Hours

Importance of site inventory and site analysis, use of symbols and graphical representations. Collection of data on Onsite & Offsite Factors. Site as offering potential/ limitations to architectural design. Site Ecosystem and Analysis. Site analysis – Process of Site Analysis - Site Synthesis - Site Essence Map. Maps of matrix analysis& composite analysis methods. Case studies. Preparation of site analysis diagrams.

Module: 4	Soft scape identification & design	4 Hours

Identifying existing site vegetation, introduction of planting in relationship to the locality, aesthetic approachtowards planting, design of soft scape in relationship with built up areas.

Module: 5	Site circulation	6 Hours

Design considerations for circulation networks. Pedestrian circulation: movement, material, design consideration, linkage and visual system, spatial experience. Vehicular circulation – types of roads, hierarchy ofroads, road networks, Turning radii, street intersections and safety, parking standards and layouts. Relationship between site circulation and existing contour profile & Landscape.		
Module: 6	**Site Context And Regulations**	**6 Hours**
Detailed understanding of context of the site. Introduction to master plans, land use for cities, Developmentcontrol rules, Ecologically sensitive areas, Environmental Impact Assessment (EIA) studies, Site selection criteria.		
Module: 7	**Landscape/Site services design**	**6 Hours**
Water Supply and Sanitation - Conveyance of Water at Site Level - Conveyance of Sewage at Site Level. Principles of positive drainage and grading for drainage. Location and design of sewage treatment plants. Surface Runoff management for different site contexts. Rain Water Harvesting - Techniques at Site Level, FireFighting Systems at site level. Electrical Services - Distribution from the Source to Campus, Outdoor Lighting Systems. Preparation of a site plan/site Layout with site circulation and services for a small project.		
Module: 8	**Expert Lectures**	**3 Hours**
Guest Lectures by subject experts		
Total Lecture Hours		**45 Hours**

Text Book(s)

1.	Punmia B.C, Surveying, Volume1, Standard Book House, New Delhi, 2005
2.	Surveying and Levelling for Architects – January 2014 by Prof. Harbhajan Singh (Author)

Reference Book (s)

1.	Kevin Lynch and Gary Hack, Site planning, MIT Press, Cambridge, 2005
2.	John Ormsbee Simonds, Landscape architecture – A manual of site planning and design Mc.Graw Hill,1977
3.	John I.Motloch, Introduction to landscape design, New York : John Wiley, 2001.
4.	Edward.T.White., “SiteAnalysis”, Architectural Media, 1983
5.	Storm Steven, “Site engineering for landscape Architects”, John wiley & Sons Inc, 2004.

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC204P	**Architectural Design IV: Midscale Urban Built Forms**	**L**	**T**	**P**	**C**
		0	**0**	**12**	**12**
Pre-requisite	**BARC201P: Architectural Design III: RuralEnvironment Studies**	**Version 1.0**			

Course Objectives:

1.	In this studio course, students learn to study midscale urban architecture encompassing conventionaltypologies such as housing, commercial workspaces, retail environments, industrial buildings, infill context architecture, health facilities, vocational centers, youth hostels, mixed use typologies, hotels,resorts, food courts, markets and other commercial entities commonly found in the urban context. Students will learn to integrate an architectural form into the cultural context and environmental conditions of the site and will apply the knowledge gained from courses on materials, structures, construction, computation, history, and theory of architecture in relevant precedent courses and makechoices regarding the incorporation of such principles into their design project. The course will further help build design ability to produce responsive design proposals for multifunctional buildingsof intermediate scale. A time constrained problem to develop conceptual proposals for a small projectmay be introduced appropriately as part of the process.

Expected Course Outcome: At the end of the course the student should be able to

1.	To analyse site features, context and statutory provisions in relation to design processes.
2.	To design buildings of simple generic typologies normally encountered in the urban context.
3.	To understand principles of design and deliver context-specific architectural design solutions.

Module: 1	**Introduction to Building Typologies and Regulatory Codes**	**12 Hours**
Introduction to common building typologies in the urban context, Master Planning and Detailed Development Planning. Introduction to building bye laws and built form statutory regulations. Preliminaryunderstanding of purpose and structure of the National Building Code, 2016. Discussions on typologies and relevance to urban planning.		
Module: 2	**Design Studio Brief**	**12 Hours**
Introduction of multiple projects in the realm of housing, commercial workspaces, retail environments,industrial buildings, infill context architecture, health facilities, vocational centers, auditoria, youth hostels, mixed use typologies, resorts, food courts, markets and other commercial entities commonly found in the urban context. Outline of design exercise (intermediate scale) with site specific details andcontextual references.		
Module: 3	**Case studies**	**24 Hours**
Case studies to understand functional and spatial relationships including integration of structural conceptsand utilities. Investigations into scale and relationship between different functional areas. Qualitative studies in spatial design, materials, structural and visual thematic. Site and climate analyses. Group presentations and discussions.		
Module: 4	**Mind mapping and concept formation**	**24 Hours**

Ideation of preliminary design directions using multiple parameters of form, material, scale and site based upon inputs derived from Module 3 with emphasis on three-dimensional modelling and discovery of form-function relationships with hand drawn sketches. Emphasis on abstract thinking and mind mapping.		
Module: 5	**Schematic design**	**24 Hours**
Drawing of mind mapped three-dimensional entities into orthographic projections of plans, elevations andsections while iterating scale and proportion to suit structural and functional needs.		
Module: 6	**Technology Integration and Design Refinement**	**24 Hours**
Resolving structural needs and envelope articulation towards creating a spatial entity equipped to meet technical needs of built form and sustainable environmental relationships.		
Module: 7	**Detailed Architectural Drawings**	**24 Hours**
Comprehensive design development including evolution of architectural details		
Module: 8	**Project Presentation**	**36 Hours**
Presentation drawings and physical/virtual modelling to demonstrate the contextual response, spatial quality and functional appropriateness of the design proposal. Final Charrette/ Juries with practicing architects		
Total Lecture Hours		**180 Hours**

Reference Book (s)

1.	Ching Francis.D.K. 2014. Architecture - Form, Space and Order: Phaidon Press.
2.	De. Chiara and Callender. 2014. Time Saver Standards for Building types. McGraw HillN.Y.
3.	Smithles KW. 1983. Principles of Design in Architecture. Chapman and Hall.
4.	Neufert, E., Neufert, P., & Kister, J. 2012. Architects' Data. Chichester. West Sussex. UK: Wiley-Blackwell.
5.	National Building Code of India, 2016, Bureau of Indian Standards.
6.	Agkathidis, A., Hudert, M. and Schillig, G. (2007) Form Defining Strategies: ExperimentalArchitectural Design. Wasmuth.
7.	Williams D. (2007) Sustainable Design: Ecology, Architecture & Planning. John Wiley & Sons.

Mode of Evaluation: Continuous Assessment, Final Assessment Test with External Review

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC301P	Architectural Design V: Civic Design	L	T	P	C
		0	0	12	12
Pre-requisite	BARC204P: Architectural Design IV: Midscale UrbanBuilt Forms	Version 1.0			

Course Objectives:

1.	To understand the purpose of civic building and its architectural sensibility to define the health and wellbeing of citizens, public education, community interaction, administrative structure, correctionalfacility and their architectural expression through history.
2.	To comprehend the role of built environment in enhancing the civic sense and responsibility amongthe citizens.
3.	To enquire and understand the intricate and mutual relationship between architecture of civic space and the imageability of the its immediate context
4.	To understand the role of built environments in therapeutic and nurturing institutions, etc or/andinstitutions of similar scale and complexity in urban/semi-urban context.
5.	To initiate a basic integration and understanding of technologies and building services.
6.	To investigate the role of history, philosophy, aesthetics, and thematic abstractions influencing contemporary architecture and other emerging trends in practice.

Expected Course Outcome: At the end of the course the student should be able to

1.	Understanding the gamut of civic buildings through research work, field visits and seminars andidentifying sites for specific typologies.
2.	Analysis of sites and building programs including the physical, environmental, regulatory, visual and spatial requirements for designing specific institutions.
3.	Providing context-specific architectural design solution to meet specific civic needs.

Module: 1	Introduction to Civic Institutions	12 Hours
Introduction to the studio, understanding design parameters pertaining to civic design, Different typologiesof institutions		
Module: 2	**Documenting Tangible and Intangible factors**	**24 Hours**
Documenting various tangible and intangible factors in a neighborhood/city context that influence the site forcivic design and relevant precedent studies - Sketches, drawings, photographs, study models Evaluating the design philosophies followed by architects in the design process of public buildings.		
Module: 3	**Site Analysis and Design programme**	**12 Hours**
Identifying and delineating the site; Formulation of design programme of an appropriate scale pertaining tothe functions of the identified civic project		
Module: 4	**Ideation and Design narratives**	**30 Hours**
Exercises that motivate students to ideate relevant design narratives/vision that underlies the heart of architectural design to accommodate the intended civic proposals - Sketches, drawings, photographs, studymodels, digital and computational simulation involving iterative process		
Module: 5	**Design Development**	**36 Hours**
Drawings and simulations to iterate/explore design process to develop sustainable architectural solutions thatcomprehensively address the design requirements of the civic project		
Module: 6	**Small project**	**30 Hours**
Time problem/ small project to evoke specific issues – like urban art installations/ temporary structures.Advanced design processes; detail form finding and production of drawings to understand quality representations to explicitly discuss the design ideas		

Module: 7	**Design Representations**	**24 Hours**
Detailed Development of presentation drawings that communicate the design ideation, technicalities and thespatial tectonics.		
Module: 8	**Design Charrettes**	**12 Hours**
Design Charrette(s) and final jury/ discussion with practicing architects and related disciplines		
Total Lecture Hours		**180 Hours**

Reference Book (s)

1.	"Planning the Architects Hand Book - Edward. D. Mills, Butterworth, London, 1985
2.	Time Saver Standards for Building types", De. Chiara and Callender, McGraw – Hill Co., N.Y., 2017
3.	The Dynamic Decade, Campus Planning, David Godchalk, 2011
4.	"Sustainable Design: Ecology, Architecture & Planning", Daniel Williams, John Wiley & sons,2007

Mode of Evaluation: Continuous assessment and Design Viva-voce.

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC302L	History of Architecture: Industrial Era	L	T	P	C
		2	0	0	2
Pre-requisite	BARC202L: History of Architecture: Medieval to Renaissance	Version 1.0			

Course Objectives:

The course is aimed at

[1] Providing an introduction to architecture of industrial era.

[2] Studying the relevance of building technologies in relation to industrial revolution and colonialism.

[3] Developing skills of observation, critical appreciation and writing, complementing the experience of buildings during that time period.

[4] Critical appreciation of the broad changing complexities and aspirations (cultural, social, economic, Technological etc.) in society that impacts architecture.

Expected Course Outcome:

At the end of the course the student should be able to

1. **Understand** the social, cultural and economic scenarios that led to the development of Industrial Era in architecture.
2. **Study** the relationship with the preceding architectural era's such as renaissance, Baroque and Rococo.
3. **Develop** observational skills to recognize the style depending upon the context and time period.
4. **Understand** the evolution of urban design in architecture in industrial era
5. **Analyze** the outcomes of industrial era with respect to industrial architecture.

Module: 1	Introduction 1600 AD – 1700 AD	4 Hours

Influence of Baroque art on architecture in Europe

End of Baroque and Rococo and beginning of Industrial Era

Eg: Palace of Versailles, Hall of Mirrors

The change in social and familial systems.

Module: 2	Socio – cultural changes in Europe and America – 1740 AD – 1800 AD	4 Hours

Change in the hierarchy of society, perception on economy, evolution of industrial materials and technology in Europe

Evolution of Industrial towns – London - UK, George town - Chennai, Fort Williams – Kolkata

Evolution of styles of Building based upon utilitarianism and public use – Banks, Insurance, public words, mills, hospitals, schools and infrastructure.

Issues of the early Industrial towns – Slums

Module: 3	Impact of Industrial revolution on architecture in Europe and America 1700 – 1850 AD	4 Hours

Industrial materials and construction technology

Neo – Classical Architecture in the west

Eg: Eiffel Tower, Crystal Palace, Pulteney Bridge, The white House, Academy of Athens, Eclecticism. Eg: Russian eclecticism

Module: 4	Revival Architecture in Europe and India	5 Hours

Gothic, Renaissance, Egyptian Revival architecture using modern material and technology. John Ruskin and his writings on Gothic Revival, Seven lamps of architecture.		
Module: 5	**Colonies of India 1500 AD – 1800 AD**	**4 Hours**
Portuguese, French and Dutch colonies in India Amalgamation of architectural styles between the colonial style and Indian style. Socio – cultural context. Eg: Colonial architecture of Pondicherry, Goa, Kerala, Nayak architecture in Madurai		
Module: 6	**British in India – 1800 AD – 1947 AD**	**4 Hours**
Neo classical. Ex: St. Andrews Kerk - Chennai, Town Hall – Kolkatta. Eclecticism: Indo-saracenic style and Robert Chisholm Revival styles – Ex: Victoria Railway station, High court – Mumbai.		
Module: 7	**Impact of Industrial era to the development of modern architecture 1800 AD – 1900 AD**	**4 Hours**
Contributions of Nicolas Durand and Viollet Le Duc in the development of modern architectural concepts. Learning of early modern architects such as William Morris, Mies Van De Rohe, Daniel Burnham,William Le Baron		
Module: 8	**Interaction with an Historian**	**1 Hours**
Interactions with architectural historians - The significant aspects of The Industrial Era		
Total Lecture Hours		**30 Hours**

Projects	
Draw and analyze the elements of a historic building and its spatial organization	
Reference Books	
1.	Leland M Roth, Understanding Architecture: Its Elements, History and Meaning, Craftsman, House, 2004
2.	Brown, Percy "Indian Architecture (Budhist, Hindu, Islamic period), DB Taraporevala Sons & Co, Mumbai, (reprint 2011)
3.	Christoper Tadgell, The History of Architecture in India from the Dawn of civilization to the End of the Raj, Longman Group U.K.Ltd., London.
4.	Madras Craft Foundation Publications
5.	Benevolo, The History of the City, MIT Press 2010 (reprint)
6.	Bannister Fletcher, History of Architecture, 20th Edition, 2011 Architectural Press, (reprint)
7.	Andreas Volvahsen, Splendors of Imperial India, Prestel, 2004
8.	Giles Tillotson, Building Jaipur, Reaktion Books 2002
9.	Giles Tillotson, Paradigms in Indian Architecture, Routledge Press, 1998
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test	
Recommended by Board of Studies	21-2-2022

Approved by Academic Council	No. 66	Date	16-6-2022

BARC303L	Housing	L	T	P	C
		3	0	0	3
Pre-requisite	BARC201P: Architectural Design Studio III: Rural Environmental Studies	Version 1.0			

Course Objectives:

1. To create awareness about the causes and consequences of housing problems and to impart knowledge about the possible solutions. ·
2. This course is intended to expose the students about the housing scenario in the Indian Context and Global context. It is imperative for the students to learn the Housing project formulation techniquesand Housing Design strategies to be competent enough in the growing housing market.

Expected Course Outcome: At the end of the course the student should be able to

1. Evaluate the various National and Global Housing policy and its impact on housing development inIndian and Global context.
2. Understand the various issues concerning housing & housing development in Indian & globalcontext covering a cross section of income groups
3. Understand the housing standards, site planning principles, housing concepts and types.
4. Analyze the factors governing the design of housing projects of various scales and types and thefuturistic trends in housing design

Module: 1	Housing and Development	4 Hours

Importance and Reflections of Housing on Social, Cultural and Economic Development – Role of Government and Public Agencies in Housing Development – National Housing Policy in India – Comparison of Housing Policies and Programmes of Developed and Developing Countries

Module: 2	Housing Scenario In India	6 Hours

Housing Quality and its Determinants – Housing Supply and Demand Assessments –Factors of influenceon Housing Development – Trends in Housing Market – Five Year Plans of GOI. Nature and Type of housing development Programmes - Public and Private Sector Housing. Housing agencies for Policymaking - Objectives and Functioning of State Government agencies

Module: 3	Evolution Of Housing- Global context	6 Hours

Historical review of development of dwelling typologies in various contexts. History of modern housingtypologies, the age of the Renaissance, the industrial revolution, Post world war socialist housing, Modern Movement in housing, current practices.

Module: 4	Evolution Of Housing- Indian context	6 Hours

Context of urban and rural housing - Indigenous /traditional vernacular settlements – Typologies way of life technologies and materials. Influence of socio economic and environmental factors on Physical formof housing. Influence of colonial architecture. Critical Regionalism - Experiments in housing by Charles Correa, B.V.Doshi, Laurie Baker, current practices.

Module: 5	Housing Design Methodology	6 Hours

Factors affecting Housing Design Physical, Socio- Economical and Resources. Site Planning for housing. Selection of site for housing, consideration of physical characteristics of site, Integration of services and parking. Housing layout concepts – Row housing, cluster housing, Terrace housing, Incremental Housing, High rise housing and New Townships.- Refugee Housing - Incremental housing concept. Large Scale housing/ Mega townships and informal settlements. Housing for aged – EmployeesHousing

Module: 6	Housing Design and Case Studies	9 Hours

Understanding of various Housing categories through case studies of Private and Public Sector Housing – Built-form and Development Control– Design Issues in Private-Public Partnership Projects		
Case studies for Traditional Housing- its characteristics, tenure ship problems and issues. Case studies – Renowned housing Projects in India and abroad		
Module: 7	**Modern Techniques in housing construction**	**6 Hours**
Prefabrication techniques –modular house, panelized and precast homes, Disaster resistance and mitigation, Industrialized mass housing construction systems, sustainable practices – zero energy home,eco-friendly home, green homes - Teri – GRIHA and its rating system.		
Module: 8	**Expert Lectures**	**2 Hours**
Interaction with Practicing Architects, Planners, Builders, NGO's etc.		
Total Lecture Hours		**45 Hours**

Reference Book (s)

1.	B.V. Doshi - Aranya low-cost housing case study. Vastu Shilpa Foundation Ahmedabad, 2014 (reprint).
2.	Charles Correa, „Housing and Urbanization: Building Solutions for People and Cities", Thames &Hudson. May 2003, 2012 (reprint)
3.	Joseph De Chiara, Time-Saver Standards for Housing and Residential Development 2, Sub Edition.
4.	Heinrich Engels, The Japanese House, A Tradition for Contemporary Architecture, Tuttle, 2009 Gautam Bhatia, Laurie Baker - Life, works and writings, Penguin Books, 2003
5.	J. Rosie Tighe and Elizabeth J. Mueller „The Affordable Housing Reader" Routledge; 2012
6.	Annual Report 2010-2011, Ministry of Housing & Urban Poverty Alleviation, Government of India
7.	National Urban Housing and Habitat Policy – 2007,
	Government of India, Ministry of Housing & Urban Poverty Alleviation, New Delhi.
	Manual under right to information act, 2005, Government of Tamil Nadu, Tamil Nadu Slum Clearance Board, Chennai

List of Challenging Experiments (Indicative)

1.	Housing Management and Community Participation. Exercise on study of local Neighborhood housing through observation, activity mapping charts with temporal changes, figure ground map foropen and built space analysis, connectivity, landuse analysis, Site plan and sections.

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC305P	Architectural Design VI: Technical Drawings	L	T	P	C
		0	0	12	6
Pre-requisite	BARC301P: Architectural Design V: Civic Design	Version 1.0			
Course Objectives:					
1.	To understand the process of translation of design into built reality and the realities of site conditions through an understanding of conventional architectural communication process				
2.	To understand and communicate graphically the tangible integration of design, structure and utilities.				
3.	To explore concepts of architectural detailing and working drawings.				
Expected Course Outcome: At the end of the course the student should be able to					
1.	Understand the nomenclature, graphics symbols, formats conventions and compositional clarity associated with technical drawings.				
2.	Apply architectural detailing and planning refinements including engineering systemsintegration				
3.	Produce construction drawings for a specific project.				
Module: 1	**Architectural Drawing – Introduction**	**36 Hours**			
Introduction to construction drawings, formatting and scheduling including understanding of working drawings, detailed drawings and schedules, shop drawings. Design level refinement in architectural andlandscape drawings of precedent learning, correction of preliminary drawings to match spatial standards and drafting standards.					
Module: 2	**Digital drafting methods and techniques**	**24 Hours**			
Preparation of drawings as per industry standards and formatting methods using digital drafting applications. (CAD, BIM, Revit).					
Module: 3	**Case studies & Site visits**	**12 Hours**			
Case studies and site visits to architectural projects to explore structure, finishes and architectural details.					
Module: 4	**Structural and Utilities Integration**	**24 Hours**			
Integrating structural components such as columns and beams. Understanding and application of utility services including comprehension of scale and location of appropriate MEP provisions.					
Module: 5	**Detailed drawing Exploration**	**24 Hours**			
Exploring sample architectural details as pertinent to the project and creation of technically correct drawings.					
Module: 6	**Application of Building information modeling**	**18 Hours**			
Hands on application Building Information Modeling in decision making, collaboration, coordination of multiple trades, potential time savings and development of a successful architectural detailed model.					
Module: 7	**Product Specifications**	**12 Hours**			
Discussions with product suppliers on various building components and analysis of contemporary specifications and applied methods in construction.					
Module: 8	**Preparation of GFC package as per industry standards**	**30 Hours**			
Preparation of Good for Construction Drawing Package including title block preparation, layouts, Sheet numbering, Scaling of drawings, sheet size decisions, enlarged details, creative detailing, vendor specific detailing and presentation.					
Total Lecture Hours		**180 Hours**			

Text Book(s)			
1.	Architect's pocket book by Charlotte Baden-Powell, Jonathan Hetreed & Ann Ross, 2008		
2.	Landscape architect's pocket book by Garmory, Rachel Tennant and Siobhan Vernon, 2009		
3.	Building Planning and Drawing by M. V. Chitawadagi and S. S. Bhavikatti, Dreamtech Press,2019		
Reference Book (s)			
1.	RIBA working Drawings Handbook, Keith Styles, 2014		
2.	Campus Planning, University Planning - The search of perfection - Jonathan Coulson, 2015		
Mode of Evaluation: Continuous Assessment, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC401P	Architectural Design VII: Complex Technologies	L	T	P	C
		0	0	12	12
Pre-requisite	BARC301P: Architectural Design VI: TechnicalDrawings	Version1.0			

Course Objectives:

1. To present a thesis through a process of architectural learning involving text and field research, user feedback and precedent studies, identifying a focal point of research interest and demonstrating an application of the research process through a tangible architectural project based upon a definitive built form programme integrating all architectural, structural and technology integration to sustain the same in an environmentally responsible manner.

Expected Course Outcome: At the end of the course the student should be able to

1. Research architectural data for solutions to complex planning needs, identify the issues to be resolved,undertake field work and identify suitable development directives for projects.
2. Analyse options for design development and prepare design drawings and models to communicatethese ideas.
3. Provide context-specific architectural design solution to meet specific civic needs. Provide thesisreports in relevant formats.

Module: 1	Introduction to the project	12 Hours

Introduction to the studio, approval of the project with goals and objectives, scope and limitations, precedentexamples if any. Focal study of the object pertaining to specific technologies or architectural character or
other direction of research may be indicated. The project could be identified from multiple developmentprojects proposed by public or private bodies. The scale and rigour may also be indicated appropriately.

Module: 2	Documenting Tangible and Intangible factors	24 Hours

Documenting various tangible and intangible factors in a neighborhood/city context that influence the design. Study of statutory development control guidelines. Focus study research and directions for application. Case studies of similar nature.

Module: 3	Site Analysis and Design programme	12 Hours

Formulation of design programme of an appropriate scale pertaining to the functions of the identified development project including relevant studies of MEP standards, statutory limitations, etc. Preparation ofbuilt form programme/environmental programme

Module: 4	Ideation and Design narratives	30 Hours

Preliminary larger level ideation including imageability of the development, built volume disposition,zoning, open and built-up area delineation, city level integration, entries and exits, volumetric options.Exercises that motivate students to ideate relevant design narratives/vision that underlies the heart of architectural design to accommodate the intended proposals - Sketches, drawings, photographs, study
models, digital and computational simulation involving iterative processes

Module: 5	Schematic Design Development-Stage 1	36 Hours

Drawings and simulations to iterate/explore design process to develop sustainable architectural solutions thatcomprehensively address the design requirements of the project.

Module: 6	Schematic Design Development-Stage 2	30 Hours

Detailed development of plans and technical systems integration including detailed 3-D volumetric drawings.

Module: 7	**Design Representations**	**24 Hours**
Detailed Development of presentation drawings that communicate the design ideation, technicalities and thespatial tectonics. Mandatory presentation of thesis report, architectural models and visuals as appropriate.		
Module: 8	**Design Charrettes**	**12 Hours**
Design Charrette(s) and final jury/ discussion with practicing architects and related disciplines		
Total Lecture Hours		**180 Hours**

Reference Book (s)	
1.	"Planning the Architects Hand Book - Edward. D. Mills, Butterworth, London, 1985
2.	Time Saver Standards for Building types" ,De. Chiara and Callender, McGraw – Hill Co., N.Y., 1973
3.	The Dynamic Decade, Campus Planning, David Godchalk, 2011
4.	"Sustainable Design: Ecology, Architecture & Planning", Daniel Williams, John Wiley & sons,2007

Mode of Evaluation: Continuous assessment and Design Viva-voce.

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC402L	History of Architecture: Contemporary	L	T	P	C
		2	0	0	2
Pre-requisite	BARC302L: History of Architecture: Industrial Era	Version 1.0			

Course Objectives:

The course is aimed at:

[1] Providing an introduction to contemporary Indian and international architecture.
[2] Using information from courses on earlier periods, the students will analyse, identify the influence and forces evolving contemporary architecture.
[3] Understanding the design philosophies of selected contemporary architects.
[4] Enhancing students' knowledge of contemporary architectural concepts and capacity to discuss them.

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Understand** the social, economic, geographic and technological influence on architecture and the influence of architecture on our societies.
[2] **Study** the styles of contemporary styles of design and the architects who founded them with respect to Europe, America and India.
[3] **Analyze** the impact of international style and post modernism in west and India.
[4] **Understand** the evolution of architecture towards today's architect and practices.

Module: 1	Initial Impulses toward contemporary architecture. 1800 AD to 1900 AD	2 Hours

Industrial Age, technological change, political change, (railways, mass housing, etc.). Global colonial rule and in India. Growth of Indian towns - Madras, and Kolkata etc.

Module: 2	Foundations of Modern Architecture in Europe 1800 AD – 2000 AD	5 Hours

Evolution of early modern architecture from Industrial architecture
Social, economic and cultural scenarios in Europe – War, population explosion, migration
Modernism in Europe: William Morris, Victor Horta, Mies Van de Rohe, Alvar Alto, Peter Behrens,Le Corbusier
Socialist housing (Vienna, Soviet Union), Constructivism, De Stijl, and Bauhaus etc,

Module: 3	**Early North American Modernism and its Influence 1800 AD – 2000 AD**	**4 Hours**
American Modernism and F.L Wright. Post war influencers - Richard Neutra, Victor Gruen. The advent of high rise and commercial architecture.		
Module: 4	**Indian Independence, post 1947 AD**	**4 Hours**
Pre-independence: Indo-saracenic, art deco and classical, Lutyens and New Delhi. Post-independence - Le Corbusier, Charles Correa The Indian Pioneers/ post - war: Achyut Kanvinde, Charles Correa, B.V Doshi, Louis Kahn, Anant Raje, Raj Rewal, Nari Gandhi etc.		
Module: 5	**The Indian Pioneers and Global Modernism and International Style (1940 – 1970 AD)**	**5 Hours**
Other influencers in India: Laurie Baker, Joseph Stein, Louis Khan International developments: Mies Van der Rohe, C. Mackintosh, A. Perret, Peter Behrens, AdolfLoos, Architects of MoMa. The rise of the corporate architecture firm: SOM, KPF etc.		
Module: 6	**Post-modernism and Critical Regionalism, Late 1900 AD**	**5 Hours**
Post-modern: Charles Jenks, Philip Johnson, Venturi. Deconstructivism: Charles Moore, Peter Eisenman, Frank Gehry Critical regionalism - Kenneth Frampton, Alexander Tzonis and Liane Lefaivre, Jørn Utzon, AlvaroSiza, Tadao Ando. Hasan Fathy, B.V Doshi, Laurie Baker, Geoffrey Bawa etc		
Module: 7	**Indian modern Architecture and Continuing Modernism around the globe**	**4 Hours**
New modernism: Peter Zumthor, OMA, Renzo Piano, Toyo Ito, Herzog &De Meuron Architects firms: MVRDV in Netherlands, MASS Design Group. India: Review of current practicing architects and women practitioners.		
Module: 8	**Invited Guest Lectures with Practicing Architectural Historians etc.**	**1 Hours**
Emerging trends, Parametric Architecture, bio-mimicry, complex collaborative.		
Total Lecture Hours		**30 Hours**

Reference Books			
1. Nikolaus Pevsener, "Sources of modern architecture and design", Themes and Hudson, 1989. 2. William J.R., Curtis, "Modern architecture since 1900", Prentice hall, New Jercy USA, 1983. 3. Peter Scriver and Amit Srivastava, Modern Indian Architecture, Reaktion books, 2015 4. Rahul Mehrotra, Architecture in India since 1990, GmbH & Company KG, 2011 5. Kenneth Frampton, Modern Architecture - A Critical History, Thames & Hudson, 2007 6. Rayner Banham, Theory and Design in the First Machine Age. (Various publishers). Originally 1960. 7. K.R. Sitalakshmi,.RArchitecture of Indian Modernity, the case of madras.2015 8. Neera Adarkar, The chawls of Mumbai. 2012 9. Jon Lang, A concise history of modern architecture in India. 2002.			
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC403P	Architectural Design VIII-Urban Design	L	T	P	C
		0	0	12	12
Pre-requisite	BARC301P: Architectural Design V: Civic Design	Version 1.0			

Course Objectives:

1.	To understand and design the physical structure of urban areas through an analysis of physical builtforms, transportation networks, landscape, socio economic influences and environmental factors.
2.	To understand the concepts of public space, urban renewal, redevelopment and conservation withinthe urban context and create sustainable urban development models through an understanding of the concept of master planning.
3.	To understand the relationship between individual site developments and the cityscape. To studylegislation and apply the principles of zoning and development control byelaws
4.	To understand and demonstrate the concept of urban design through analyzing its relationship to urban planning and architecture.
5.	To understand urban services and utilities.
6.	To use advanced graphic communication tools to communicate design ideas.

Expected Course Outcome: At the end of the course the student should be able to

1.	Study and develop urban districts to provide directions for urban design derived from an analysis ofthe prevailing physical, social, economic and environmental factors
2.	Design building environments and infrastructure which demonstrate understanding of contextual relevance and appropriateness.
3.	Design master plans for sites and appropriate utility configurations.

Module: 1	Introduction to Urban Design Principles	12 Hours

Introduction to Master Plan and definitions of land use, density, planning controls, etc. Introduction to the subject of urban design through discussions on examples of cities and districts. identification of a city and district which would serve to discuss multiple issues and include the potential to provide suitable directionsfor analysis, planning and design

Module: 2	Documentation of study area precincts	36 Hours

Documenting and analysis of various physical attributes of delineated areas within the urban context chosen,including physical characteristics such as architectural character, landscape, transport networks and environmental, social and economic parameters. Study of the Master Plan provisions for the town and urban
districts. Lectures and discussions on streetscape and urban design. Models, sketches and photodocumentation and interviews with stakeholders.

Module: 3	Site Analysis and Design programme	24 Hours

Formulating a goal and series of objectives for the project through identification of the issues, problems andpotentials analysed from the study process. Creation of optional strategy plans for development.

Module: 4	Ideation and Design narratives	24 Hours

Conceptual built form development and street design including landscape conforming to Master Plans. Directions for transport strategy, heritage area conservation, area redevelopment, renewal, environmental protection, enhancement of social and economic order, street design and public spatial quality enhancement.

Module: 5	**Schematic Design Development**	**24 Hours**
Drawings and simulations to iterate/explore alternative schematic design processes to develop sustainable architectural and urban design solutions that comprehensively address the design requirements of the project.		
Module: 6	**Detailed design proposal**	**24 Hours**
Demonstration project incorporating schematic drawings of architectural developments and street/landscape/environmental design.		

Module: 7	**Design Representations**	**12Hours**
Time problem-incorporation of public art and detailed architectural small project to evoke specific issues –like urban art installations/ temporary structures.		
Module: 8	**Design Charrettes**	**24 Hours**
Detailed Development of presentation drawings that communicate the design ideation, technicalities and spatial tectonics. Design Charrette(s) and final jury/ discussion with practicing architects and relateddisciplines		
\Total Lecture Hours		**180 Hours**

Reference Book (s)

1.	"Planning the Architects Hand Book - Edward. D. Mills, Butterworth, London, 1985
2.	Time Saver Standards for Building types", De. Chiara and Callender, McGraw – Hill Co., N.Y., 2017
3.	The Dynamic Decade, Campus Planning, David Godchalk, 2011
4.	"Sustainable Design: Ecology, Architecture & Planning", Daniel Williams, John Wiley & sons,2007

Mode of Evaluation: Continuous assessment and Design Viva-voce.

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC404L	Architectural Specifications and Estimation	L	T	P	C
		3	0	0	3
Pre-requisite	BARC301P: Architectural Design V: Civic Design	Version 1.0			

Course Objectives:

1. To determination of quantities of items and labor requirement of constructional engineering works.
2. To prepare various aspects of estimating of quantities of items of works involved for all types of building typologies
3. To prepare specification for all the construction items
4. To introduce quantity analysis of construction works like, multi-storied structures, water-supply & sanitary works, etc

Expected Course Outcome:

1. Understand the components of specification & estimation
2. Prepare estimate of cost for works. Evolve rates for various building works based upon given parameters
3. Assess Detailed specifications for civil works, Building services, infrastructure, interior and landscape Design
4. Evaluate the processes of Estimation and Specification
5. Analyse the rates for various items of work
6. Understand the application of computation tools in estimation

Module:1	Introduction	3 Hours

Purpose of estimating and costing in Practice, Types of estimates.
Objectives and importance of specification, Specification of materials, specification of works, specification as per building classification, Language of specific writing

Module:2	Procedure & Elements of Building Estimate	9 Hours

Unit of measurement, Estimate, Actual cost, Essentials of an estimator, Detailed Estimate, Principle of units for various items of work, the units of measurement and payments, size of standard modular items, Degree of accuracy in estimating and main items of the work
Methods of estimating quantities, estimating quantities of building.
Estimation of quantity of load bearing structure with single room & two rooms, Estimation of quantity single storied residential building, Estimation of quantity
Different R.C.C. structures, Estimation of quantity of water supply and sanitary works, Estimation of quantity of Trusses.

Module:3	Specification	6 Hours

Detailed specifications for civil works-excavation, plain and reinforced cement concrete, steel reinforcement, masonry of different kinds, wall and floor finishes, joinery, weathering and waterproofing systems, cladding and other related works integral to civil construction

Module:4	Estimation & Specification of buildingservices	6 Hours

Overview of estimation & specifications for electrical and mechanical and associated infrastructure works such as illumination, acoustics, security systems and network infrastructure with broad understanding of processes

Module:5	Rate Analysis & Abstracting and Billing	6 Hours

Prerequisites, factors affecting rate analysis, overhead expenses, procedure for rate analysis, schedule of rates, Task work: labour requirement for different works, material requirement for different works, Rate analysis of different Items of work.

Purpose of abstract, preparation of abstract, measurement and billing, Checking of bills and final bill		
Module:6	**Application of BIM in Estimation &Specification & Report writing**	**6 Hours**
Building Information Systems and their applications in computation of quantities and estimates Principle for report writing & presentation		
Module:7	**Estimation & Specification of interior &landscape**	**6 Hours**
Overview of estimation & specifications for interior and landscape works with examples		
Module:8	**Interactive session & Professional training**	**3 Hours**
Expose to practical implications & Real time projects with Industrial engagements		
	Total Lecture Hours:	**45 Hours**

Text Book(s)	
1.	Dutta, B. N., 'Estimation and Costing in Civil Engineering', UBS Publishers & Distributors pvt.ltd, 2012
2.	Kohli, D D and Kohli, R C., 'A Text Book of Estimating and Costing (Civil)', S Chand & Company Ltd., 2012
3.	S. C. Rangwala, Estimating And Costing, Charotar Publishing House, Anand, 2017
4.	Gurcharan Singh and Jagdish Singh, 'Estimating ,Costing and Valuation' Standard Publishers, 2012
Reference Books	
1.	Aggarwal, A., Upadhyay, A.K., Civil Estimating, Costing &Valuation, S.K Kataria & Sons, New Delhi. 2021
2.	Patil, B.S., Civil Engineering Contracts, Vol. – I, Orient Longman Publication, 2015

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar		
List of Challenging Experiments (Indicative)		
1.	Market Survey: Traditional and modular materials, Market survey of materials of Construction, Wages of labour, Tools plant and equipment of construction	X Hours
Mode of assessment: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC499J	Architectural Thesis	L	T	P	C
		0	0	0	15
Pre-requisite	BARC498J: Architectural Internship	Version 1.0			

Course Objectives:

1.	To focus on a deliverable thesis through a process of architectural learning involving text and field research, user feedback and precedent studies, identifying a focal point of research interest and demonstrating an application of the research process through a tangible architectural project based upon a definitive built form programme integrating all architectural, structural and technology integration to sustain the same in an environmentally responsible manner.

Expected Course Outcome: At the end of the course the student should be able to

1.	Research architectural data for solutions to complex planning needs, identify the issues to be resolved,undertake field work and identify suitable development directives for projects.
2.	Prepare thesis reports in relevant formats. Author research papers wherever possible.
3.	Provide context-specific architectural design solution to meet specific civic needs.

Module: 1	**Introduction to the project**

Introduction to the studio, approval of the project with goals and objectives, scope and limitations, precedentexamples if any. Focal study of the object pertaining to specific technologies or architectural character or
other direction of research may be indicated. The project could be identified from multiple developmentprojects proposed by public or private bodies. The scale and rigour may also be indicated appropriately.

Module: 2	**Documenting Tangible and Intangible factors**

Documenting various tangible and intangible factors in a neighborhood/city context that influence the design.. Study of statutory development control guidelines. Focus study research and directions forapplication. Case studies of similar nature.

Module: 3	**Site Analysis and Design programme**

Formulation of design programme of an appropriate scale pertaining to the functions of the identified development project including relevant studies of MEP standards, statutory limitations, etc. Preparation ofbuilt form programme/environmental programme

Module: 4	**Ideation and Design narratives**

Preliminary larger level ideation including imageability of the development, built volume disposition, zoning, open and built up area delineation, city level integration, entries and exits, volumetric options.Exercises that motivate students to ideate relevant design narratives/vision that underlies the heart of
architectural design to accommodate the intended proposals - Sketches, drawings, photographs, studymodels, digital and computational simulation involving iterative processes

Module: 5	**Schematic Design Development-Stage 1**

Drawings and simulations to iterate/explore design process to develop sustainable architectural solutions that
comprehensively address the design requirements of the project.

Module: 6	**Schematic Design Development-Stage 2**

Detailed development of plans and technical systems integration including detailed 3-D volumetric drawings.

Module: 7	**Design Representations**
Detailed Development of presentation drawings that communicate the design ideation, technicalities and thespatial tectonics. Mandatory presentation of thesis report, architectural models and visuals as appropriate.	
Module: 8	**Design Charrettes**
Design Charrette(s) and final jury/ discussion with practicing architects and related disciplines	
Total Lecture Hours	**225 Hours**

Reference Book (s)	
1.	"Planning the Architects Hand Book - Edward. D. Mills, Butterworth, London, 1985
2.	Time Saver Standards for Building types" ,De. Chiara and Callender, McGraw – Hill Co., N.Y., 2017
3.	The Dynamic Decade, Campus Planning, David Godchalk, 2011
4.	"Sustainable Design: Ecology, Architecture & Planning", Daniel Williams, John Wiley & sons,2007

Mode of Evaluation: Continuous assessment and Design Viva-voce.

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

Building Sciences and Applied Engineering (BSAE)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC105E	Building Materials-Indigenous	1	0	4	5	NIL
2.	BARC106L	Structural Systems Evolution	3	0	0	3	NIL
3.	BARC108L	Environmental Science for Architecture	3	0	0	3	NIL
4.	BARC205E	Construction Technology: Concrete and Steel	1	0	4	5	BARC105E
5.	BARC207L	Principles of Structures	3	0	0	3	BARC106L
6.	BARC208L	Climate Responsive Architecture	3	0	0	3	BARC104P
7.	BARC304E	Construction Technology: Aluminium, Glass and Finishes	1	0	4	5	BARC205E
8.	BARC306L	Strength of Materials	3	0	0	3	BARC207L
9.	BARC315L	Building Services-I	3	0	0	3	NIL
10.	BARC316P	Building Environment Lab	0	0	4	4	BARC208L
11.	BARC405L	Construction Technology: Prefab Products and Manufacture	3	0	0	3	BARC304E
12.	BARC406L	Architectural Structural Design: Reinforced Concrete	3	0	0	3	BARC306L
13.	BARC407L	Building Services-II	3	0	0	3	BARC315L
14.	BARC410L	Architectural Structural Design: Steel and Timber	3	0	0	3	BARC409L
15.	BMAT103L	Mathematics for Built Environment	3	0	0	3	NIL

BARC105E	Building Materials-Indigenous (ETH)	L	T	P	C
		1	0	4	5
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

The course is aimed
To understand properties, manufacture and application of raw and natural building construction materials.

Expected Course Outcome:

At the end of the course the student should be able to
[1] Identify building's primary, physical, structural and functional aspects.
[2] Understand naturally occurring materials and their properties for application in building construction.
[3] **Evaluate** various types of natural building materials and construction techniques.
[4] **Appraise** vernacular building materials and construction techniques

Module: 1	**Introduction to material science**	**1 Hours**

Explanation of various core building components and their function-the concepts of foundations, support systems like walls and columns, exterior skins of buildings, roofing, protection from and integration with natural elements, openings for lighting and access.

Module: 2	**Soil based Design and construction techniques**	**2 Hours**

Foundations design details, Base courses, walls, Design of openings, arches vaults, floors and roofs. Design of buildings using rammed earth
Mud Blocks: Stabilised mud blocks, Soil and its properties. Properties of construction quality soil, additives in stabilised soil blocks.

Module: 3	**Vernacular Materials:**	**2 Hours**

Mud and lime, bamboo and casuarinas as construction materials. Different kinds of thatch, use of palm trunks, palm rafters. Description of usage of these materials.

Module: 4	**Stone as a construction material**	**3 Hours**

Types of construction stone and their properties and use in building construction. Nature of stone wall construction in various building components like foundations, walls, buttresses, arches and roofing
Mortars -Mortars and their applications. Study of sand and aggregate.

Module: 5	**Brick as a construction material**	**3 Hours**

Brick composition, sizes, strength, and method of manufacture, properties and types. Study of bonds and mortars of different types.
Bricks and their usage
Bricks in different building components like foundations, walls (conventional and cavity walls), arches, staircases, cladding, copings, flooring, brick jalis, decorative brickwork, Madras terrace roofing.

Module: 6	**Terracotta products**	**1 Hours**

Hollow bricks, jalis, weathering tiles, Mangalore tiles, hollow clay roofing blocks.

Module: 7	**Timber**	**2 Hours**
Quality of timber used in buildings, defects, seasoning and preservation, popular timber varieties used in India, properties, strengths. **Typical usages of timber in building components Timber Construction** Timber in joinery, light weight roofing structures, staircases, interior walls, flooring, details of galvalinice roofs, wooden staircases.		
Module: 8	Interaction with alternate construction experts.	**1 hour**
Total Lecture Hours		**15 Hours**

Reference Books

1.	S.P Arora and S.P. Bindra, Text book of Building Construction, GanpatRai publications (P) Ltd New Delhi - 110002, 2005.
2.	S.K.Sharma, "A Text book of Building Construction", S.Chand& Co Ltd., New Delhi, 1998
3.	KlansDukeeberg, Bambus – Bamboo, Karl Kramer verlag Stuttgart Germany, 2000
4.	Barry, the construction of buildings Affiliated East West press put Ltd New Delhi 1999.
5.	Francis D.K. Ching Building Construction illustrated John Wiley & Sons 2000

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC105E	Building Materials-Indigenous (ELA)	L	T	P	C
		1	0	4	5
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

To understand and Impart drawing skills for the application of construction materials in architectural practice.

Expected Course Outcome:

[1] Demonstrate graphical representation of building components (Apply)
[2] Demonstrate the construction techniques of various building components using natural and vernacular building materials (Apply)
[3] Produce technically correct architectural details in construction of simple built form elements (Create)

Module: 1	Graphical representation of building components	**4 Hours**
Module: 2	Mud wall construction, compacted earth, stabilised mud blocks, roofing using thatch, damp proofing.	**4 Hours**
Module: 3	Bamboo in architectural construction	**4 Hours**
Module: 4	Stone Construction - Walls, Arch, Flooring, Lintel & Cladding	**8 Hours**
Module: 5	Brick – Brick bonding, Walls, Arches.	**8 Hours**
Module: 6	Brick – Staircase, Cladding, Decorative Brickwork, creative Jali pattern using bricks, Rat trap bond	**4 Hours**
Module: 7	Clay block partition walls, screen walls, terracotta flooring	**4 Hours**
Module: 8	Mangalore Tile works, Hollow clay roofing blocks, Weathering tiles on roofs.	**8 Hours**
Module: 9	Typical details of timber usage in door frames & window frames, door & window shutters, louvered windows, ventilators.	**4 Hours**
Module: 10	Wooden flooring, wood composites, fibre boards, pre-laminated.	**4 Hours**
Module: 11	Ventilators: top hung, bottom hung, louvered, glazed	**4 Hours**
Module: 12	Construction using natural timber in various structural components of the building.	**4 Hours**
Total Lecture Hours		**60 Hours**

Reference Books

1.	S.P Arora and S.P. Bindra, Text book of Building Construction, GanpatRai publications (P) Ltd New Delhi - 110002, 2005.
2.	S.K.Sharma, “A Text book of Building Construction”, S.Chand & Co Ltd., New Delhi, 1998
3.	Reference books -
4.	KlansDukeeberg, Bambus – Bamboo, Karl Kramer verlag Stuttgart Germany, 2000
5.	Barry, the construction of buildings Affiliated East West press put Ltd New Delhi 1999.

6.	Francis D.K. Ching Building Construction illustrated John Wiley & Sons 2000		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC106L	Structural Systems Evolution	L	T	P	C
		3	0	0	3
Pre-requisite	Nil	Version 1.0			

Course Objectives:

To instil an understanding of structural concepts as they have evolved over history and to appreciate the application of structural systems in tandem with architectural design evolution

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Understand** about the structural forms, tools, resources and techniques used in the construction of primitive dwelling units and rock cut shelters.
[2] **Understand** about building of multi-level structures using lintel and column elements.
[3] **Understand** construction and structural techniques using different types of bricks and mortars and Arches.
[4] **Understand** different types of construction techniques using reinforced concrete and steel employed in small to mega structures.
[5] **Understand** about innovative structural systems, sustainability aspects related to structures and construction and innovative and state-of-the-art materials, composites and alloys used in constructions.

Module: 1	Introduction to Shelter	6 Hours

Introduction to shelter as a fundamental aspect of existence. The relationship between resources, technology and structural ideation. Rock-cut caves and primitive dwellings: Structural forms and tools- use of natural materials.

Module: 2	Trabeated System	6 Hours

The concept of multilevel structures using basic concepts. Trabeated systems and stability -use of monolithic blocks for posts and lintels, articulation of joints in stone and timber, monolithic columns, multi-drum columns.

Module: 3	Modular Construction	6Hours

Modular construction- use of modular units in sun-dried mud blocks, stone, fired clay brick dry-stack construction to wet construction - role of binding mortars: mud and lime, the advent of concrete, vertical joints in wall construction, single leaf to multi-leaf constructions, cavity walls, and rationale behind dimensioning of walls.

Module: 4	Arcuated System	6 Hours

Arcuated systems-semi-circular, segmental, pointed arches, catenary curves, thrust lines and buttressing, corbelling, cross and groin vaults and domes, squinch. Development of the arching system

Module: 5	Advent of Steel and Reinforced Concrete	6 Hours

The advent of steel and reinforced cement concrete. Fundamental structural concepts of steel and RCC structures and the conquest of span and height, advances in strength of materials/structural analysis methods and fabrication.

Truss action (strut and tie) and connections, bridges and towers, steel frame structures. Bending resistance and framing action in RCC Foundation systems/RC beams/columns/beam-column joints/slabs (one-way, two-way, flat slabs, waffle slabs)		
Module: 6	**Advanced Systems in Reinforced Concrete and Steel**	**6 Hours**
Developments in structural RCC-prestressing and post-tensioning, prefabrication principles. Mega structures in steel and reinforced concrete and unique structural concepts employed-skyscrapers and bridges, stadia, structures for special applications. Composite steel-concrete structures, tensile structures, RCC shells		
Module: 7	**New Building Materials**	**6 Hours**
Structures in consonance with mechanical systems, pneumatic shelters, dismantlable structures, new-age systems. High performance materials, Nano mechanics, environmental impact, sustainability, energy efficiency High performance computing for structural analysis. Building skins Composites –fibre reinforced plastics, alloys, allotropes, carbon nanotubes, shape memory alloys.		
Module: 8	**Workshop**	**3 Hours**
Lecture on building up on simple structural form based on the basic understanding of the course and constructing a prototype in 1:1 scale (Three day hands on workshop can be conducted to conclude the course with external experts).		
Total Lecture Hours		**45 Hours**

Reference Books

1.	Roma Agrawal. 2018. *Built: The hidden stories behind our structures*. Bloomsbury Publishing.
2.	Bannister Fletcher. 2001. *History of Architecture*, 20th Edition: Architectural Press. 1996 Reprint.

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC108L	Environmental Science for Architecture	L	T	P	C
		3	0	0	3
Pre-requisite	Nil	Version			
		1.0			

Course Objectives

The course intends to familiarize students about growing global environmental concerns and orientate them to professional standards of sustainable development.

Course Outcomes

At the end of the course the student should be able to

1. Recall the fundamental components of Ecological systems, threats and their preservation
2. Understand the relationship between human needs and their impacts on the environment
3. Relate to global environmental issues and the need for sustainable development
4. Analyse the cause-and-effect phenomena behind Climate Change and examine the resolutions brought by various national and global organizations
5. Explore the scope of renewable energy sources as an alternative to conventional sources towards energy efficiency
6. Assess the causes of global water crisis and familiarize with water management methods
7. Relate to national and global environmental monitoring strategies and legislations

Module: 1	Components of Environment	6 Hours

Ecosystem and its components, food chain and food web, energy flow in ecosystem, ecological succession – Primary and Secondary, Biodiversity – significance and threats, biodiversity types – Terrestrial and Aquatic, D-P-S-I-R Framework, Conservation measures – National Parks, Wildlife Sanctuaries, ecologically sensitive zones.

Module: 2	Carrying capacity and footprints	4 Hours

Natural capital and ecosystem services, overshoot, limits to growth, IPAT model for human impact on the environment; Ecological footprint analysis, Virtual water and Water Footprint

Module: 3	Global Environmental Concerns and sustainability	12 Hours

Types of urban environmental problems – causes and impacts (urbanization, over-population, over-exploitation of resources, pollution, global warming, deforestation, climate change) environmental hazards such as chemical leaks, nuclear hazards, toxic waste mismanagement, etc., Sustainable development – its need and importance; Sustainable Development Goals - 2030 Agenda for sustainable development, environmentally sustainable cities – case examples

Module: 4	Climate change and Mitigation	9 Hours

Climate Change – causes (urbanization – emissions – GHG effect - global warming) and impacts (sea-level rise, flooding, cyclones and landslides, etc.), Carbon sequestration methods, Global Climate Agreements - Kyoto protocol, Paris Agreement, The United Nations Framework Convention on Climate Change (UNFCCC), IPCC, Climate Action Plans of India and other countries

Module: 5	Energy Resources	3 Hours

Renewable and Non-renewable energy resources - Advantages and disadvantages - Oil, Natural gas, Coal, Nuclear energy. Renewable energy for human sustainability (solar, wind, hydroelectricity, biomass, and geothermal energy), Energy-efficient approaches, energy systems for the future.

Module: 6	**Water resource Management**	**3 Hours**
Water and precipitation – Water cycle, sources of water. Over-utilization of surface and ground water, causes of water degradation, prevention and control of water pollution, conservation and management methods.		
Module: 7	**Environmental Monitoring and Regulation**	**6 Hours**
Environmental Monitoring and its significance, introduction to Environmental Impact Assessment (EIA), need for EIA, EIA in Indian context, impact mitigation case studies and best practices, salient features of Environmental Protection Act, Coastal Regulation Zone (CRZ), Functions of the National Green Tribunal.		
Module: 8	**Industry Expert Lecture**	**2 Hours**
Total Lecture hours		**45 hours**

Text Book(s)	
1.	G. Tyler Miller and Scott E. Spoolman. 2016. Environmental Science. 15th Edition
Reference Books	
1.	Gerret Hardin. 1968. Tragedy of the commons. American Association for the Advancement of Science
2.	George Tyler Miller, Jr. and Scott Spoolman (2012), Living in the Environment – Principles, Connections and Solutions, 17th Edition, Brooks/Cole, USA.
3.	Perlman, D. and Miclder, J., Practical Ecology for Planners Developers and Citizens, Island Press.
Mode of evaluation: Internal Assessments (CAT I and CAT II), Assignments, Final Assessment Test	

Recommended by Board of Studies	DD-MM-YYYY		
Approved by Academic Council	No. xx	Date	DD-MM-YYYY

BARC205E	Construction Technology: Concrete & Steel (Embedded Theory)	L	T	P	C
		1	0	4	5
Pre-requisite	**BARC105E: Building Materials-Indigenous**	**Version 1.0**			

Course Objectives:

To acquaint the students with contemporary construction practices primarily pertaining to the usage of cement concrete, ferrous and non-ferrous metals in various core building components and some important interrelationships and to create familiarity to apply this knowledge.

Expected Course Outcome:

Students will be able

[1] **Understand** the concepts of cement and concrete as a building construction material.

[2] Ability to **Apply** concrete as a versatile material in different contexts and innovatively in simple projects.

[3] **Understand** of properties of ferrous and non-ferrous metals as materials for buildings.

[4] **Understand** the possibilities of steel as an important building construction material.

[5] **Apply** metal innovatively in building projects.

Module: 1	**Cement**	**1 Hours**
Brief overview of cement manufacture, functions of cement ingredients, field tests for cement, uses of cement, varieties of cement, specifications of ordinary cement		
Module: 2	**Cement Concrete**	**2Hours**
Understanding plain cement concrete and its uses, ingredients and properties of cement concrete, effects of concrete additives, concrete proportioning, water cement ratio, workability and slump, concrete mixing, transportation, placement, consolidation, vibration, curing.		
Module: 3	**Special types of Concrete**	**2 Hours**
Types of concrete, precast concrete, ready mix concrete, batching plants. Ferro cement		
Module: 4	**Ferrous Metals In Building Construction**	**2 Hours**
Ferrous metals, brief review of pig iron, cast iron, wrought iron		
Module: 5	**Steel in Building Construction**	**2 Hours**
Brief review of steel manufacture process, its properties and uses, various forms of architectural steel		
Module: 6	**Non-Ferrous Metals In Building Construction**	**2 Hours**
Non-ferrous metals -aluminium, copper, lead, zinc, tin, nickel. Alloys of aluminium copper and steel , galvanised iron, gal volume		
Module: 7	**Stainless steel and structural steel**	**2 Hours**
Stainless steel and structural steel in architectural construction		
Module: 8	Industry specialist lectures	**1 hour**
Total Lecture Hours		**15 Hours**

Reference Books

6.	Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt. Ltd.2014 ed.		
7.	Building Materials-P.C.Varghese, Prentice Hall of India Pvt.Ltd. New Delhi 2005 ed.		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC205E	Construction Technology: Concrete & Steel (Embedded Lab)	L	T	P	C
		1	0	4	5
Pre-requisite	**BARC105E: Building Materials-Indigenous**	**Version 1.0**			

Course Objectives:

To understand and Impart drawing skills for the application of Steel and concrete in architectural practice.

Expected Course Outcome:

[1] Ability to **design** and detail the basic components of a building as well as specific components in concrete where there is scope for architectural design.
[2] Ability to **design** and detail structural and non-structural components of simple buildings using metals.

Module: 1	Study of principles and methods of construction of RCC elements in buildings- a) foundations and columns– Raft foundations, Isolated footings, piles, grillage foundations, beams and slabs, porticos, sunshades, post tensioned slabs, prestressed beams inRCC construction.	**12 Hours**
Module: 2	RCC in staircases-spiral, helical, waist slab, folded plate, review of formwork	**12 Hours**
Module: 3	Structural steel in construction – steel columns, truss works, staircases, sheet metal cladding and roofing in industry	**12 Hours**
Module: 4	steel windows, doors, collapsible gates, rolling shutters, mechanical gate systems, detailing of masonry, concrete, metal systems, high strength fasteners	**16 Hours**
Module: 5	Field visits and discussions on creative detailing	**8 Hours**
Total Lecture Hours		**60 Hours**

Reference Books

7. A Text Book of Building Construction by B.C.Punmia, Laxmi Publications Pvt.Ltd. New Delhi 2005
8. Construction of Buildings by Barry, Vol.1 and 2, Blackwell Publishing House, Oxford 2005

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC207L	Principles of Structures	L	T	P	C
		3	0	0	3
Pre-requisite	**BARC106L: Structural Systems Evolution**	**Version 1.0**			

Course Objectives:
The course aims to impart foundation knowledge on structural principles for application in subsequent modules of structural design.

Expected Course Outcome:
At the end of the course the student should be able to
[1] **Understand** principles related to physics, relevant to structural design.
[2] **Determine** simple stresses and strains
[3] **Apply** structural principle to real time analogies.
[4] **Understand** the Types of structures and structural loads
[5] **Analyse** trusses and frames
[6] **Evaluate** various building materials that can be used for various components of buildings

Module: 1	**Basics of behavior of structure**	**6 Hours**
Fundamental Principles - Vectorial Representation of Forces and Moments, Coplanar forces - Resolution and Composition of forces and equilibrium of particles - Free body diagram		
Module: 2	**Centre of gravity and Moment of Inertia**	**6 Hours**
Centre of gravity and Moment of Inertia- Radius of gyration- section modulus		
Module: 3	**Stress and Strain**	**6 Hours**
Stress and strain - Hooke's law -tension -compression and shear Stress strain diagram for mild steel-Elastic constants- Applications		
Module: 4	**Stresses in composite sections**	**6 Hours**
Principal stresses and strains-Stresses in composite sections- Thermal stresses		
Module: 5	**Types of structures and structural loads**	**6 Hours**
Types of loads on structures-support and support reactions- Types of structures-analysis of beams		
Module: 6	**Truss and frames**	**6 Hours**
Analysis of plane truss-Stresses in truss and frames		
Module: 7	**Components of buildings**	**6 Hours**
Modern Construction Materials-Various components of buildings- Bricks- Stone- Structural Steel and Aluminum – Roofing Materials- Flooring		
Module: 8	**Latest/Emerging technology**	**3 Hours**
Total Lecture Hours		**45 Hours**

Reference Books

1.	Timoshenko.S, Young.D.H, J V Rao, Sukumar Pati (2013), Engineering Mechanics, McGraw Hill International Edition
2.	Gere & Thimoshenko (2004), Mechanics of Materials, CBS Publishers & Distributors.
3.	R.K.Bansal (2005), Strength of Materials, Laxmi Publications
4.	S.S.Bhavikatti (2012), Engineering Mechanics, New Age International Publishers.

5.	S.Ramamrutham & R.Narayanan (2005), Strength of Materials, Dhanpat Rai publications.		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC208L	Climate Responsive Architecture	L	T	P	J	C
		3	0	0	0	3
Pre-requisite	**BARC104P: Architectural Design II: Spatial Exploration**	**Version 1.0**				

Course Objective: To impart a holistic understanding to the students on different aspects involved and considerations that need to be adopted in designing of building that are climate responsive.

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Understand** the factors which influence global climate and classification of climates across the world, climate pertaining to a region and site level.

[2] **Understand** different factors affecting the human comfort and associated metrics reporting the comfort.

[3] **Understand** the thermophysical properties of materials and construction types as well as heat loss and gain in buildings.

[4] **Design** buildings and associated elements for solar protection and allowing the natural ventilation to and daylight to achieve thermal and visual comfort.

[5] **Design** building for different climatic conditions incorporating appropriate strategies.

Module: 1	**Introduction to Climate**	**4 Hours**

Climate, weather, seasons; Factors affecting the global climate; Elements of climate and their measurements; Sources of weather data; Graphical representation of weather data; Brief introduction to weather data visualizing tools.

Module: 2	**Classification of Climate and Types**	**5 Hours**

Climatic zones: World & India; Climatic classification: Koppen; Characteristics of climates: Tropical region; Site climate and factors affecting it.

Module: 3	**Human Thermal Comfort**	**6 Hours**

Case studies of existing buildings in different geographies to understand and evaluate following concepts.

Introduction to Human thermal comfort; Environmental variables influencing thermal comfort (Dry-bulb-temperature (DBT), Relative Humidity (RH), Mean Radiant Temperature (MRT); Wind speed & ventilation, Operative Temperature (OP); Subjective variables (Metabolic Activity, Clothing type); Human body response (i.e., heat loss and gain) to different indoor environmental conditions in architectural spaces; Comfort Indices: Heat Stress Index (HSI); Effective Temperature (ET), Corrected Effective Temperature (CET), Standard Effective Temperature (SET); Introduction to Thermal comfort models: ASHRAE and Adaptive Comfort Model Predictive Mean Vote (PMV), Predicted Percentage of Dissatisfied (PPD); Thermal comfort tool: CBE, Olgyay bioclimatic chart, Giovani's Building Bioclimatic Chart.

Module: 4	**Thermophysical Properties of Building Materials**	**6 Hours**

Case studies of existing buildings in different geographies to understand and evaluate following concepts.

Thermal quantities: Heat, Heat flow, Heat flow rate, Temperature and temperature difference, Sol-air temperature; Modes of Heat Transfer in Buildings: conduction; convection and radiation; Thermal properties building materials [walls, floors, roofs multilayer body]: conductivity,

conductance (U-Value), resistivity and Resistance (R-Value), transmittance, reflectance, absorptance, sustainable building material; Time lag and decrement factors of different construction types; Properties of fenestration systems: Shading Coefficient (SC) and Solar Heat Gain Coefficient (SHGC); Special Glass Types: Low-Emissivity Glass; Electro-Chromatic glass.		
Module: 5	**Passive Solar Design Principles for Buildings (Radiation)**	**7 Hours**
Solar Geometry: Sun path for a location, optimization of building orientation; Building Heat loss and gain & control strategy: Thermal Mass, Structural insulation and cavity, design of shading devices, role of vegetation; Renewable energy technologies: Photovoltaic panels and Wind turbines.		
Module: 6	**Passive Solar Design Principles (Ventilation and Daylighting)**	**7 Hours**
Wind flow, site planning consideration to facilitate wind movement; Natural Ventilation strategies and Methods: Single sided, Cross ventilation and Stack effect, wing walls, wind catchers, earth air tunnels, Evaporative and convective cooling, Night flushing; Sources and nature of daylight; Building design consideration for facilitating daylight into spaces; Daylight Indices: Daylight Factor (DF), Daylight Autonomy; Useful Daylighting Illuminance; Daylighting Strategies; Glare and Glare Control.		
Module: 7	**Climate Specific Building Design Principles**	**4 Hours**
Principles of design of buildings in different climates: Tropical, Temperate and cold climates around the world.		
Module: 8	**Sustainable Building Rating Systems, Energy Codes and Special Topics**	**4 Hours**
Green Rating Systems: GRIHA, LEED, IGBC, ECBC; Lectures by experts.		
Total Lecture Hours		**45 Hours**

Reference Books

1. Szokolay, S.V., 2014. *Introduction to architectural science: the basis of sustainable design*. Routledge.
2. Koenigsberger, O.H., 1975. *Manual of tropical housing & building*. Orient Blackswan.
3. Krishan, A. ed., 2001. *Climate responsive architecture: a design handbook for energy efficient buildings*. Tata McGraw-Hill Education.

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC304E	Construction Technology: Aluminium, Glass & Finishes (Embedded Theory)	L	T	P
		1	0	4
Pre-requisite	**BARC205E: Construction Technology: Concrete and Steel**	**Version 1.0**		

Course Objectives:

To understand properties, manufacture and application of Aluminium and glass in building construction.
To study various construction Finishes employed in architecture practice.

Expected Course Outcome:

Students will be able
[1] To **understand** Aluminium and glass as construction materials and their properties for application in building construction.
[2] To **demonstrate** application knowledge of Finishing and speciality materials.
[3] **Choose** materials for wall cladding, Acoustic and thermal insulation based on specific purposes
[4] **Identify** different types of Paints, varnishes, adhesives and sealants for varied uses

Module: 1	**Manufacturing of glass**	**1 Hours**
Brief review of glass manufacture, composition, properties and uses of glass		
Module: 2	**Types of Glass**	**2 Hours**
Types of glass, treatment of glass		
Module: 3	**Finishing materials**	**2 Hours**
Finishing materials for walls and floors-wall putties, textures, cementitious floor finishes, tiles and natural stones, speciality floors, grouts, etc		
Module: 4	**Wall cladding**	**2 Hours**
Wall cladding on exteriors-composite panels, structural glazing, marble, granite and other cladding materials		
Module: 5	**Acoustic and thermal insulation**	**2 Hours**
Acoustic and thermal insulation materials, plastics, fibre glass		
Module: 6	**Paints**	**2 Hours**
Paints, varnishes and distempers		
Module: 7	**Adhesives and sealants**	**2 Hours**
Speciality chemicals, sealants, adhesive		
Module: 8	Industry specialist lecture	**1 hour**
Total Lecture Hours		**15 Hours**

Reference Books

1.	Engineering Materials-Material Science by S.C.Rangwala, Charotar Publishing House Pvt.Ltd.2014 ed.
2.	Building Materials by Duggal S.K., New Age international, New Delhi 2009

3.	Materials and Construction by Reshpande B, Oriental Watchman Publishing House, Poona-2, 2007 Construction Technology-Embedded Lab		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC304E	Construction Technology: Aluminium, Glass & Finishes (Embedded Lab)	L	T	P	C
		1	0	4	5
Pre-requisite	**BARC205E: Construction Technology: Concrete and Steel**	**Version 1.0**			

Course Objectives:

[1] To understand and Impart drawing skills for the application of Aluminium and Glass in architectural practice.
[2] To study various construction Finishes employed in architecture practice.

Expected Course Outcome:

[1] **Demonstrate** the construction details and application of Glass and Aluminium for various building components
[2] **Demonstrate** the application of different materials for wall cladding and flooring
[3] **Analyse** and demonstrate the suitability of different acoustic and thermal insulation materials and their application in building construction.

Module: 1	Glass, aluminium and UPVC in partitions, windows, doors, handrails, balusters	**12 Hours**
Module: 2	Glass and aluminium in frameless glass systems, structural glazing	**12 Hours**
Module: 3	Wall cladding and flooring details of various kinds	**12 Hours**
Module: 4	Waterproofing of basements, roofs, toilets, expansion joints, sealant details, acoustic panelling, thermal insulation	**16 Hours**
Module: 5	Field visits and discussions on creative detailing	**8 Hours**
Total Lecture Hours		**60 Hours**

Reference Books

9. A Text Book of Building Construction by B.C.Punmia, Laxmi Publications Pvt.Ltd. New Delhi 2005
10. The Text Book of Building Construction by S.P.Arora and S.P.Bindra

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC306L	Strength of Materials	L	T	P	C
		3	0	0	3
Pre-requisite	**BARC207L: Principles of structures**	**Version 1.0**			

Course Objectives:

The course is aimed at
This course deals with the concept of forces, force systems and moments under static condition. It also introduces the concept of simple stresses and strains subjected to axial force, bending and shearto understand the behaviour of member of a structure. It introduces various concepts and simple analysis techniques of structural components.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Practice** shear force and bending moment computations and construct shear force and bending moment diagrams
[2] **Compute** bending stresses and deflection in determinate beams
[3] **Evaluate** theories to design columns and understand effect of eccentric loading.
[4] **Analyse** the structural concept of determinate & indeterminate structures and Combined loading
[5] **Understand** the combined loadings and Theories of failure

Module: 1	**Concept of shear force and Bending Moment**	**8 Hours**

Concept of shear force and Bending Moment-shear force and bending Moment diagrams for cantilever andsimply supported beams subjected to point load, uniformly distributed loads and their combinations

Module: 2	**Theory of simple bending**	**7 Hours**

Theory of simple and pure bending-Bending equation- Section modulus (only for Rectangular, hollow rectangular)- Shear stress distribution for rectangular beam section- Torsion. Case study: Lab experiments on bending and Torsion test

Module: 3	**Slope and deflection**	**7 Hours**

Slope and deflection at a section - Double Integration and Macaulay's method for simply supported and
Case Study: Lab experiments on Deflection of cantilever beams.

Module: 4	**Theory of columns**	**6 Hours**

Short and long columns - Euler's method and its limitation - Rankine's formula for columns- effect of
eccentric loading – Case study: Lab experiments on Combined bending and direct stresses on column

Module: 5	**Introduction to determinate & indeterminate structures**	**6 Hours**

Introduction to determinate and indeterminate structures-Static and kinematic indeterminacies-Energy Theorems

Module: 6	**Bending and torsion**	**6 Hours**

Combined loading- Beams with axial load- bending and torsion- torsion and tension- bending and shear.
Case study: Lab Experiment on Bending of beams with combination of loads

Module: 7	**Theories of failure**	**3 Hours**
Case study: Lab Experiments on Theories of failure - Strain energy in bending		
Module: 8	Latest/Emerging technology	**2 Hours**
Total Lecture Hours		**45 Hours**

Reference Books:

1. Timoshenko,S.P..and D.H. Young, Elements of Strength of Materials, Fifth Edition, East West Press
2. Gere & Thimoshenko (2004), Mechanics of Materials, CBS Publishers & Distributors.
3. R.K.Bansal (2005), Strength of Materials, Laxmi Publications
4. S.S.Bhavikatti (2012), Engineering Mechanics, New Age International Publishers.
5. S. Ramamrutham & R.Narayanan (2005), Strength of Materials, Dhanpat Rai publications

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC315L	Building Services: I	L	T	P	C
		3	0	0	3
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

To acquaint students with the principles of water supply, water distribution and drainage, standards and codes, and design considerations for plumbing systems in building. The course will familiarize students with the electrical, security and communication systems of a building including the design aspects associated with their performance. It will further acquaint students with the systems for fire safety, codes relevant to them, and incorporation of the systems in building design.

Expected Course Outcome:

[1] Ability to **estimate** water demand and draw plumbing layouts, drainage and sewage networks for small buildings.

[2] **Understand** the Sources of generation, methods of collection, its treatment and disposal, Sanitary requirements and regulations as per building codes.

[3] **Ability** to workout electrical networks for a simple building through the knowledge gained on basics of electrical systems and various electrical installations.

[4] **Ability** to work out various system like security, communication, and firefighting system layouts for buildings in project planning

Module: 1	**Water supply**	**3 Hours**

Introduction to water resources; collection, processing, distribution and storage of water; calculation of water demand and consumption; sizing of storage tanks and water quality standards for code compliance, importance of water conservation. Storm water collection, drain design, regulators, filtration beds and ground water recharge systems, surface drainage and subsoil drainage

Module: 2	**Water distribution**	**6 Hours**

Water Distribution: Conceptual understanding of public water distribution system. Service connections and systems of hot and cold-water supply; plumbing networks; sanitary fixtures, fittings, valves and pipes, dual-plumbing systems. Principles of hydro pneumatic systems. Control systems including valves and metering devices, user end controls such as angle valves, shower panels, jacuzzi systems

Module: 3	**Waste water and Sewage Disposal systems**	**12 Hours**

Filtration, disinfection, water softening, standards for various uses, especially for potable use and in construction. Systems and components for sewage and stormwater drainage; wastewater treatment systems and septic tanks; building and site planning for water drainage and sewage disposal; water harvesting and water recycling; solid waste collection, segregation and disposal.

Sanitary requirements for various types of buildings as per the National Building Code		
Module: 4	**Electrical Services**	**6 Hours**
Power transmission and distribution via overhead lines and underground cables. General structure of electrical power systems, Fundamentals of electricity, current, voltage. Power Factor, Earthing, Substations, Low-Voltage Power Distribution Systems Requirements, and Dimensions of power distribution systems, low voltage switchboards, bus bar system and types. Common domestic installations- water heater, radiator etc. Un-interrupted power supply, Emergency service, Inverters, Phase change over and methods		
Module: 5	**Electrical System Design**	**6 Hours**
Wires- specifications and carrying capacity and calculation of electrical loads. Types of switches, sockets and fixtures. Distribution boards, circuit breakers, fuses, electrical meters and their layout. Design considerations for electrical installations. Protection against overload, short circuit, earth fault, lightening conductors and other safety measures for buildings. Wiring systems- methods of wiring, joint and loop in. Types of electrical wiring- batten, capping & casing, concealed conduits etc. Wiring material- types, sizes and specifications, main switch, MCB, DB meter.		
Module: 6	**Security System, Communication systems**	**6 Hours**
Introduction to security systems – Access control, Public Address systems, CCTV, fire detection and their interconnected role in protection. Intercoms, Wi-Fi, broadband data cabling, and CCTV systems. Networking. Schematic layout of installations and points for different building types		
Module: 7	**Introduction to Fire Safety**	**3 Hours**
Fire sources, spreading, and growth decay curve; material fire response and fire-retardant materials; fire hydrants, fire escapes, refuge areas, fire tender access; smoke detector, alarm, and sprinkler systems; representation of fire considerations in drawings. Discussion of fire safety measures by using case studies.		
Module: 8	**Industry/Expert lecture. Visiting site under construction and post construction and submission of project report.**	**3 Hours**
Total Lecture Hours		**45 Hours**

Reference Books			
1.	RS Deshpande “Sanitary Engineering – (Vol I and II)” 2011		
2.	S.C. Rangwala, Water Supply and Sanitary Engineering, Charter Publishing House, 1989.		
3.	Birdie, G S, and J S Birdie. Water Supply and Sanitary Engineering. New Delhi, Dhanpat Rai, 1992.		
4.	P.N. Khanna ,Indian Practical Civil Engineers Hand Book, Engineers Publishers New Delhi 2005		
5.	H Cotton. Electrical Technology ... Seventh Edition, Etc. London, CBS publications, 2003		
6.	P.N. Khanna, Indian Practical Civil Engineers Hand Book, Engineers Publishers New Delhi 2005		
7.	National Building Code, 2015, Bureau of Indian Standards		
8.	Bureau of Indian Standards. Code of Practice for Electrical Wiring Installations IS-732. 2005		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC316P	Building Environment Lab	L	T	P	C
		0	0	4	4
Pre-requisite	BARC208L: Climate Responsive Architecture	Version 1.0			

Course Objectives:

1. To expose students to the process and pertinent aspects to modern surveying methods and designingclimate-responsive buildings using manual methods and environmental analysis software tools.

Expected Course Outcome: At the end of the course the student should be able to

1. **Analyze** the terrain of a given site and prepare a topographical map for architectural design projects
2. **Analyze** a given climate and represent climatic data graphically to make meaningful inferences.
3. **Design** shading devices for windows based on the overheating period and optimize orientation of building as per solar radiation and wind direction.
4. **Analyze** the indoor thermal comfort based on different comfort models.
5. **Analyze** thermophysical properties of building materials and construction type and select appropriate material for construction for a given climate.
6. **Evaluate** the daylighting performance of a space/building.
7. **Design** a climate responsive building for a given climate.

Module: 1	Surveying	8 Hours
Surveying using Total Station equipment. Digitization of data and Contour Map preparation		
Module: 2	**Representation and Analysis of Climate**	**4 Hours**
Graphical Representation of Weather Data: Manual Methods, Using software tool.		
Module: 3	**Design of Shading Devices, Mahoney Tables/ Bio Climatic Chart**	**12 Hours**
Sun path diagram; Plotting overheating period on sun path diagram; shading protractor and design of shadingdevices. Design Recommendation based on Climate: Bioclimatic Chart, Ma- honey tables.		
Module: 4	**Radiation Analysis and Orientation Optimization and Wind Analysis**	**8 Hours**
Solar Radiation optimization of building form; Wind Ross and Wind Analysis; Building Orientation Optimization: Based on Solar Radiation or Wind direction.		
Module: 5	**Assessment of Thermal Comforts**	**8 Hours**
Computing Mean Radiant Temperature (MRT): Experimentally, Analytically or Software tools Assessing Indoor Thermal Comfort: Using ASHRAE PMV/PPD and Adaptive Comfort Models.		
Module: 6	**Thermal Properties of Building Materials and Construction. &Building Load Calculations**	**12 Hours**
Calculation of U & R-Value; thermal diffusivity, Time-lag of multi-layered Building Elements and construction. Estimation of Building Heating and Cooling Load: CLTD/CLF method;		

Module: 7	**Daylighting Performance Analysis**	**4 Hours**
Daylighting Performance Matrices: Daylight Factor (DF); Daylight Autonomy (DA), Useful Daylight Illuminance (UDI), Annual Sunlight Exposure (ASE). Daylight Performance Analysis of Indoor spaces usingsoftware tool, Scale models and field study. LEED daylight credits.		
Module: 8	**Design of Building & Expert Workshops**	**4 Hours**
Designing of a climate responsive building based on different types of analyses. Workshop by external experts.		

Total Lecture Hours		**60 Hours**
Text Book(s)		
1.	Szokolay, S.V., 2014. Introduction to architectural science: the basis of sustainable design. Routledge.	
Reference Book(s)		
1.	Koenigsberger, O.H., 1975. Manual of tropical housing & building. Orient Blackswan.	
2.	Krishan, A. ed., 2001. Climate responsive architecture: a design handbook for energy eff icientbuildings. Tata McGraw-Hill Education.	
3.	Givoni, B., 1969. Man, climate and architecture. Elsevier.	
4.	Rabl, A., Curtiss, P. S., Kreider, J. F. (2009). Heating and Cooling of Buildings: Design for Eff iciency,Revised Second Edition. United States: CRC Press.	
List of Challenging Experiments (Indicative)		
1.	Analyze the topography of a given site using total station and prepare a contour map for a architectural design project.	**8 Hours**
2.	Analysing a given climate using climate consultant and ladybug environmental analysistools and a brief summary on given climate.	**8 Hours**
3.	Design of shading devices for a window for each orientation using shading protractor.	**8 Hours**
4.	Analysing a given climate using Mahoney tables and arriving at design recommendations.	**8 Hours**
5.	Conducting radiation analysis for a building form with context and ascertaining the optimized orientation using ladybug environmental analysis tools.	**8 Hours**
6.	Wind speed and direction analysis using weather file for a given location	**8 Hours**
7.	Thermal comfort analysis of a small indoor room using ladybug environmental analysistools.	**8 Hours**
8.	Computing U & R-value, time lag for a given wall, roof and floor assembly.	**8 Hours**
9.	Heating and cooling load calculation of a single room or a building.	**8 Hours**
10.	Assessing the daylight performance of a small room with and without shading using climate studio software or dive for rhino.	**8 Hours**
Mode of Evaluation: Continuous Assessment, Final Assessment		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC405L	Construction Technology: Prefabrication Products andManufacture	L	T	P	C
		3	0	0	3
Pre-requisite	BARC304E: Construction Technology: Aluminum andGlass and Finishes	Version 1.0			

Course Objectives:

1.	To appreciate modular building modules, industrial production for construction industry and designof the prefabricated elements for Indian context.

Expected Course Outcome: At the end of the course the student should be able to

1.	**Understanding** prefabrication & modular production process from pre-design to assemble
2.	**Appraise** prefabrication modular building elements and construction techniques
3.	**Integration** of BIM in modular construction and fabrication of MEP components in modular construction

Module: 1	Introduction to Prefabrication	6 Hours

Need, principles, materials, modular coordination, standardization, systems, production, transportation anderection of prefabricated structure. Per-design, design, develop, detail, order, fabricate, deliver and assemble

Module: 2	Prefabricated Components	6 Hours

Behavior of structural components, large panel constructions, Construction of roof & floor slabs, Wallpanels, Columns and Shear walls (External skin) with case studies

Module: 3	Design Principles	6 Hours

Disuniting of structures, Design of cross section based on efficiency of material used, Problems in designbecause of joint flexibility, Allowance for joint deformation.

Module: 4	Joint in structural members	6 Hours

Joints for different structural connections, Dimensions & detailing, Design of expansion Joints

Module: 5	Design for Abnormal Loads	6 Hours

Progressive collapse, Code provisions, Equivalent design loads for considering abnormal effects such as
earthquakes, cyclones, etc., Importance of avoidance of progressive collapse.

Module: 6	Schedule of construction	6 Hours

Site built & modular construction schedule - Design engineering, permits and approvals, site development& foundations, building construction at plant and installation & site restoration

Module: 7	Application of Building Information Modeling	9 Hours

Application of BIM in construction document development, conceptual design support, and pre-projectplanning services in prefabrication and modular construction

Module: 8	Interaction with alternate construction experts.	3 Hours

Case Studies

Total Lecture Hours	45 Hours

Text Book (s)	
1.	Prefab Architecture: A Guide to Modular Design and Construction, Dec 2010
2.	CBRI, Building materials and components, India, 1990
3.	Gerostiza C.Z., Hendrikson C. and Rehat D.R., Knowledge based process planning for constructionand manufacturing, Academic Press Inc., 1994
Reference Book (s)	
1.	Koncz T., Manual of precast concrete construction, Vols. I, II and III, Bauverlag, GMBH, 1971.
2.	Structural design manual, Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 1978.
3.	National Institute of Building Sciences - Off-Site Construction Council Resourceshttps://www.nibs.org/index.php/reports/modular-construction-multifamily-housing

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC406L	Architectural Structural Design: Reinforced Concrete	L	T	P	C
		3	0	0	3
Pre-requisite	BARC306L: Strength of Materials	Version 1.0			

Course Objectives:

1.	Main purpose of this course is to understand the relationship between structural design and Architectural design. The course aims to impart basic knowledge on structural principles forapplication in subsequent modules of structural design.

Expected Course Outcome: At the end of the course the student should be able to

1.	**Understand** principles related to physics, relevant to structural design and the different concepts ofRCC structural elements and their role in building design.
2.	**Analyze** different structural component depending on various theories of load mechanism.
3.	**Evaluate** and optimize the suitable structural elements for design
4.	**Design** different structural elements including beams, columns, footing, slabs and staircase
5.	To **equip** students with skills in evaluating the usability of Thumb rules and standard design codes in designing structural systems and building components
6	**Evaluate** the load and soil bearing capacity of the structural elements.

Module: 1	Design principles of structural components	5 Hours

Introduction to statically determinate and indeterminate structures - Design principles and standards ofstructural components – Beams, Column, Floor, Roof slabs and Staircases, Arches and cables.

Module: 2	Structural Design of beams	7 Hours

Analysis and design of singly and doubly reinforced beam section - Neutral axis, Lever arm, Moment ofresistance, Balanced, Under reinforced and Over reinforced Beam section - Introduction to Reinforced Cement Concrete – Difference in working stress method (W.S.M) and Limitstate method (L.S.M) of design.

Module: 3	Detailing of Reinforcement	6 Hours

Introduction to Reinforcement – Cover, Main reinforcement, Distribution steel – Shear reinforcement stirrups, 2 & 4 legged stirrups, Lateral ties, Area of steel, Spacing and splicing of steel bars. Case studies:
Preparation of cross-sectional drawings for reinforcement details of beams, Slabs and columns.

Module: 4	Codal provision for structural members	6 Hours

Thumb rules for design based on Indian standard codes IS – 456, 2000 and usage of SP 16. - Causes of failures of the structural components - Case studies on slab collapsed at Chennai due to heavy rainfall andstructure collapsed during construction at Pune - Classification of buildings as per National Building code(NBC) SP7 - Introduction and Structural System in Architecture.

Module: 5	Structural Design of Staircases	5 Hours

Design principles of staircase construction and its elements - Different types of staircase - RCC – Free standing stair cases, pergolas and covered walkways. Case study: Affordable white painted and exposedtimber staircase and LAPD Glass staircase.

Module: 6	**Structural Design of slabs and footings**	**9 Hours**
Design principles of cantilever slab for Balconies, Shop fronts, False and suspended ceilings and One wayand two-way slabs. Introduction to types of soils - Characteristics of soil – Safe and Ultimate bearing capacity of soil - Load bearing and framed structure, Types of foundations and footings. Case Study: Green roof, Folded plates and shells.Case Study: Soil testing methods.		

Module: 7	**Structural design of prestressed concrete**	**5 Hours**
Introduction to Prestressed concrete - Classification and Types of prestressing system, End anchorage, Advantages and disadvantages of prestressed concrete, Case Study on performance of prestressed concreteover reinforced concrete construction.		
Module: 8	**Industry guest lecture**	**2 Hours**
Guest Lectures by industrial experts		
Total Lecture Hours		**45 Hours**

Text Book(s)	
1.	Unni Krishnan pillai & Devadoss menon - Reinforced concrete design
Reference Book (s)	
1.	B.C.Punmia & Ashok kumar Jain – RCC design
2.	Syed Mehdi Ashraf - Practical Design of Reinforced Concrete Buildings, Taylor & Francis
3.	Design of Reinforced concrete structure: IS456 -2000 – N. Krishnaraju

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC407L	Building Services-II	L	T	P	C
		3	0	0	3
Pre-requisite	BARC315L: Building Services-I	Version 1.0			

Course Objectives:

1.	To introduce students to HVAC, Vertical transportation, Illumination and Acoustical servicesassociated with buildings.

Expected Course Outcome: At the end of the course the student should be able to

1.	**Summarize** the knowledge of heating, ventilation and air conditioning systems and their need inbuildings.
2.	**Calculating** air conditioning loads for different spaces/ building typologies and analyse the type ofsystem required.
3.	**Understand** how HVAC services are installed in small- and large-scale buildings.
4.	**Summarize** the knowledge of vertical transportation systems to design the vertical services likeelevators, escalators and travelators for varied building typologies.
5.	**Understand** the fundamentals of electrical and natural light, its source and designing of electricallighting for different building typologies.
6.	**Analyze** building spaces and give design proposals pertaining to the aspects of lighting.
7.	**Understand** the fundamentals of sound, its propagation in spaces, acoustical defects of spaces andtheir mitigation and rectification.
8.	**Analyze** the source and the types of noise in and around the buildings and to provide suitable noisecontrol or sound reinforcement.

Module: 1	Basics of HVAC & Ventilation Requirement	5 Hours

Need for HVAC in a building, Ventilation requirements, Rate of ventilation as per NBC, ASHARE 62.2 standards; Introduction to psychrometric process; Sources of heat gain and loss for buildings, Introductionto Indoor Thermal Comfort; Types of refrigeration cycles, DX sys- tems and Chilled Water systems, HeatPump.

Module: 2	HVAC equipment and Systems Types	5 Hours

HVAC equipment; Zoning: Purpose and advantages; HVAC System Types: All air systems, VRV and VRFSystems, Hydronic Systems; Chilled water Systems, Radiant Heating and Cooling, Geo-thermal Heat- Pump, District heating and Cooling and their selection criterion.

Module: 3	HVAC Application	5 Hours

Calculation of air conditioning loads, Space requirements, Energy conservation techniques; HVAC systemsfor Small Scale (Case-studies); HVAC systems for Large-scale Building and Campus (Case-studies).

Module: 4	Vertical Transportation: Elevators, escalators and Travelators	5 Hours

Types of Elevators-Traction, sky lobby, lift lobby, Provision of elevators for a building; Service requirements: Quality of service, time, passenger handling capacity, space and physical requirements, machine room spaces and their typical layout; Planning considerations - location in building, Recommendations of the National Building Code, etc. Safety features and codes. Design of typical lift banks; Escalators, Application - Location and arrangement in buildings. Space requirement, travelators.		
Module: 5	**Fundamentals of Lighting**	**5 Hours**
Fundamental quantities of light, Photometry; Lamp types and specifications including lumen, color temperature, color rendering index, etc.; Luminaire components and types; Luminaire rating system (Ingress Protection), Lighting distribution patterns; Materials types and Interaction of light with materials. .		
Module: 6	**Lighting considerations and design**	**10 Hours**
Quantity of lighting: Minimum Illumination levels for different facilities Quality of lighting: Glare (Directand Reflected/Veiling); Luminous eff icacy of light sources; energy eff icient lighting; general lighting considerations; lighting principles; Lighting calculation methods: Lumen method, Zonal cavity method andpoint method; Daylighting and Designing with daylight (PSALI).; Lighting Design for Hospitals; LightingDesign for Schools and Off ices.		
Module: 7	**Acoustics in Architectural spaces and Noise control.**	**8 Hours**
Sound and its physical properties; spherical dissipation and inverse square law; Quantities of sound, Intensity, energy and power and pressure, loudness. Behavior of sound in enclosed spaces; Reverberation and reverberation time calculation, Sabine's formula, and optimum reverberation levels for speech and music. Sound in enclosed spaces: Acoustical defects of architectural space; Sound attenuation - absorption,dispersion, etc. types of sound absorption materials, Sound Absorption Coeff icient (SAC), Noise ReductionCoeff icient (NRC), Type of Sound absorption Products; Acoustical design criteria for speech, music and open-air auditorium; methods adopted in designing acoustics for architectural spaces; Noise, Airborne and Structural Borne, Types of Noise and its sources in buildings, Noise attenuation: noise control methods for various noise types, Sound Transmittance Class (STC) for various for building elements and acoustical products; Outdoor noise, planning to mitigate outdoor noise, Sound barriers, Principles of sound barrier attenuation, shadow zone, distance from receiver etc.		
Module: 8	**Expert Lectures**	**2 Hours**
Expert Lectures related to HVAC, Illumination & Acoustics		
Total Lecture Hours		**45 Hours**

Text Book(s)	
1.	Mechanical and Electrical Equipment for Buildings 12th, By Walter T. Grondzik, Alison G. Kwok, John Wiley & Sons 2014.
Reference Book (s)	
1.	The Lighting Handbook: Reference and Application: David L. DiLaura, Illuminating EngineeringSociety of North America: Illuminating Engineering Society of North America, 2011
2.	Architectural Acoustics Illustrated; Michael Ermann; John Wiley & Sons, 2015

BARC410L	Architectural Structural Design: Steel & Timber	L	T	P	C
		3	0	0	3
Pre-requisite	BARC409L: Architectural Structural Design: Reinforced Concrete	Version 1.0			

Course Objectives:

1. This course will help the student to design the structural components of steel and reinforcement of structural components such as beams, columns, trusses as per the recommendations of BIS codal provisions.

Expected Course Outcome: At the end of the course the student should be able to

1. **Evaluate** and optimize the suitable structural materials and elements for design
2. **Design** different structural components like steel columns, girders, Steel and Timber Trusses
3. **Identify** the steel section for various structural components simple beams, columns and trusses.
4. **Evaluate** force systems to create structure systems
5. **Analyse** the architectural applications in steel and Timber section. of prestressed concrete

Module: 1	Properties of materials – Steel & Timber	6 Hours
Bureau of Indian Standard (BIS) codes for Design loads, Properties of Structural Materials -Steel and Timbermasonry. Types of connections and joints – Riveted and Bolted joints – Efficiency – Permissible stresses.		
Module: 2	**Design of Tension members (Beams)**	**7 Hours**
Design principles – Design of Steel beams using single section and Built-up sections.		
Module: 3	**Design of compression member (Columns)**	**6 Hours**
Design principles – Design of steel columns – Single section –Built-up-section		
Module: 4	**Steel Trusses**	**7 Hours**
Introduction to Steel Trusses and Industrial Buildings – Steel framed structures - Behavior of structures underwind and seismic loads. Case study on construction of steel trusses.		
Module: 5	**Timber Trusses**	**7 Hours**
Timber trussed roofs - Design requirements and principles of Timber using National Building Code (NBC).Case study on construction of Timber trusses.		
Module: 6	**Steel Section in Structural Components**	**5 Hours**
Types of steel section – Various forms of steel - Design and drawings of steel beams and steel columns, steel trusses		
Module: 7	**Synthesis of Force Systems**	**5 Hours**
Synthesis of force systems to create Structural and Architectural systems - Vector active, surface active and built- active systems – Case Study on high rise and large span steel structures.		
Module: 8	**Industrial guest Lectures**	**2 Hours**
Guest Lectures by subject experts		
Total Lecture Hours		**45 Hours**

Text Book(s)			
1.	S. Duggal - Design of Steel Structures, 3rd edition.		
2.	N.Subramanian - Steel Structures – Design and Practice		
Reference Book(s)			
1.	S.S.Bhavikatti - Design of Steel structures by Limit state design as per IS 800-2007		
2.	Alexander Reichel, Peter Ackermaan, Alexander Hentschel, Anette Hockberg.- Building with steel:Details, Principles and Examples.		
Mode of Evaluation: Continuous Assessment, Final Assessment			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

Discipline Electives

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC109P	Advanced Architectural Graphics	0	0	4	4	BARC102P
2.	BARC307L	Modern Architectural Thought	3	0	0	3	BARC107L
3.	BARC308P	Interior Design	0	0	4	4	NIL
4.	BARC309L	Art Forms Appreciation	3	0	0	3	NIL
5.	BARC310P	Ideation	0	0	4	4	NIL
6.	BARC311P	Advanced Visual Communication	0	0	6	6	BARC103P
7.	BARC312L	Theory of Landscape Design	3	0	0	3	BARC203L
8.	BARC408L	Architectural Photography and Journalism	2	0	0	2	BARC305P
9.	BARC409L	Sustainable Architecture	3	0	0	3	BARC208L
10.	BARC411P	Furniture Design	0	0	4	4	NIL
11.	BARC412L	Architectural Conservation	3	0	0	3	BARC201P
12.	BARC413L	Building Systems Integration	3	0	0	3	BARC407L
13.	BARC414P	Introduction to Computational Design and Digital Fabrication I	0	0	4	4	BARC210P
14.	BARC415P	Building Performance and Compliance	0	0	4	4	BARC316P
15.	BARC416L	Urban and Regional Planning	3	0	0	3	BARC301P
16.	BARC417L	Road Safety and Civic Sense	3	0	0	3	BARC301P
17.	BARC418P	Advanced Building Information Management	0	0	4	4	BARC209P
18.	BARC421E	Construction Technology: Advanced and Innovative Technologies	1	0	4	5	BARC405L
19.	BARC422L	Modular Coordination	3	0	0	3	BARC405L
20.	BARC424P	Advanced Computational Design	0	0	4	4	BARC414P
21.	BARC425P	Advanced Digital Prototyping and Fabrication	0	0	4	4	BARC424P
22.	BARC496J	Travel Learning	0	0	0	2	NIL

BARC109P	Advanced Architectural Graphics	L	T	P	C
		0	0	4	4
Pre-requisite	BARC102P – Architectural Graphics	Version			
		1.0			

Course Objectives

The course is aimed at to familiarize the student with techniques of Architectural & Technical drafting & representation skills

Course Outcome

At the end of the course, the student should be able to

1. Prepare a plan, elevations and sections of a building with proper representation of the building elements.
2. Prepare different types of views such as isometric, axonometric views and 1, 2 and 3- point outdoor and indoor perspectives.
3. Draw sciography for different types of forms, vertical and horizontal surfaces.
4. Draw shadows on the plan and elevation of a building based on sun-angles.
5. Prepare a perspective view with sciography
6. Prepare schematic, technical and architectural presentation drawings.

Module: 1	Representation of building elements, terminology and abbreviation and drawing composition	4 Hours

Introduction to building material, terminology and abbreviation through a simple project

Module: 2	Preparation of plans, elevations & sections	4 Hours

Drafting plans, elevations and sections by incorporating - technical details & architectural representations including both indoor and outdoor spaces.

Module: 3	Construction of Perspective drawings – Scientific method.	12 Hours

Introduction to concepts, One Point Perspective - Perspectives of simple and complex box blocks, curved surfaces and interiors and exteriors methods to developing two-point & three-point perspectives: Developing perspectives with of anatomy, perspective for building, landscape and human figures.

Module: 4	Sciography	4 Hours

Introduction of Sciography - Simple and composite forms - shadows on horizontal, vertical planes and on the surface, Principles of shade & shadow, Shadows of lines, planes & groups of various forms Shade and shadow techniques - Sun angle, time, building height. Study and analyzing of shade & shadow

Module: 5	The implication of sciography into Architectural Presentation drawings and Perspective	6 Hours

Application of sciography on pictorial views in Architectural Presentation drawings and Perspective. Construction of sciography on a building. Rendering with various mediums such as Pen & Ink/Water colour/Poster colour/Pencil colour.

Module: 6	A time problem - Architectural representations - integration to presentation drawings	6 Hours

Introduction of a time problem to understand the skill set to deliver a complete set of an architectural drawing for an individual project: Site plan, floor plan, elevations, sections, perspectives - interiors and exteriors views and schematic drawings & technical drawings within a given time frame.		
Module: 7	**Documentation of Architectural project**	**12 Hours**
Physical & photo documentation of the architectural project using different measuring techniques. Preparing on-site scaled drawing and schematic sketches. Preparation of architectural presentation & technical drawings for the project including the indoor and outdoor spaces (including furniture & landscape)		
Module: 8	**Portfolio making & Presentation techniques**	**4 Hours**
Architectural vocabulary, storytelling skills, a narrative of the project, presentation skills, body language and communication skills and physical and digital portfolio-making skills.		
Total Lecture Hours		**60 hours**

Text Book(s)	
1.	Bhatt, N.D. and Panchal V.M. Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000
Reference Books	
1.	Claude Batley - Design Development of Indian Architecture Sage Publications 2002
2.	Thoms, E. French. Graphic Science and Design, New York: MC Graw Hill.
3.	Shah, M.G., Kale, C.M. and Patki, S.Y. Building Drawing: with an integrated approach to built environment, 7th ed. Tata McGraw Hill Pub., Delhi, 2000
4.	Ellen Lopton and Jennefer Cole Phillips, Graphic Design The New Basics, Princton Arch. Press
List of exercises (Indicative)	
1	Select a functional single room space with an attached toilet like a security cabin, servant quarter, etc. to prepare a set of architectural and technical drawings
2	Developing Architectural presentation drawings like perspective views (interior and exterior) for a duplex house and for a multistory apartment along with surrounding landscape, anatomy of perspective for building, landscape and human figures using rendering techniques.
3	Identifying an ancient/contemporary building with a plot size of 250 m^2 for documentation
Mode of assessment: Continuous assessment / FAT / Oral examination and others	

Recommended by Board of Studies	02-12-2022		
Approved by Academic Council	No. 66	Date	16-6-2022

BARC307L	Modern Architectural Thought	L	T	P	C
		3	0	0	3
Pre-requisite	**BARC107L: Architectural Design Thinking**	**Version 1.0**			

Course Objectives:

To educate students on the philosophies/ideologies of various individuals of the 19th and 20th century leading to the ideation and realization of differential-built environments and to explore the relationship between thought process and realization.

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Understand** about the association and influence of philosophy of an individual and group on architecture and architectural Ideation.

[2] **Understand** innovative architectural styles initiated by famous architects during early periods of 19^{th} century.

[3] **Understand** modern architectural philosophy originated in Europe and United States.

[4] **Understand** the architectural philosophy in the Asian and national context.

[5] **Understand** the architectural philosophy postmodern and Hi-tech architects.

Module: 1	Introduction to philosophical thought, understanding philosophyin the context of the individual, society, economic and political environment. Relationships between individual and collective philosophy and ideation.	**3 Hours**
Module: 2	Directions of turn of the century architects-Eric Mendelsohn, Peter Behrens, Gerrit Rietveld, Hans Scharoun, Antoni Gaudi and others	**6 Hours**
Module: 3	Modern western and architectural philosophy in the 20th centuryin Europe and the United States-Frank Lloyd Wright, Walter Gropius, le Corbusier, Mies van der Rohe, Alvar Aalto, Buckminster Fuller and others	**9 Hours**
Module: 4	Asian thinkers of the 20th century-Geoffrey Bawa, Kenzo Tange, Kisho Kurokawa, Toyo Ito and others	**6 Hours**
Module: 5	Contemporary Indian architectural thinking of the last five decades –Indian masters including Joseph Allen stein, Laurie Baker, Balakrishna Doshi, Charles Correa, Achyut Kanvinde among others.	**6 Hours**
Module: 6	Contemporary international practices, the digital age, creative thinkers-among them Frank Gehry, Zaha Hadid, Tadao Ando, Shigeru Ban, Norman Foster, Santiago Calatrava, Herzog and de Meuron	**6 Hours**
Module: 7	Fantasia and visionary architecture and their proponents.	**3 Hours**
Module: 8	Discussions with academics/professionals and seminars by students	**6 Hours**
Total Lecture Hours		**45 Hours**

Reference Books

1	Juhani Pallasmaa, The Embodied image: Imagination and Imagery in Architectur,John Wiley & Sons (May 16th 2011)
2	The Poetics of Space by Gaston Bachelard Publisher: Beacon Press (first published 1957; New edition April 1st1994 and reprinted 2013)
3	A Place in the Shade by Charles Correa Publisher: Penguin India (15 June 2010)
4	Laurie Baker : Truth in Architecture by Atul Deulgaonkar Publisher: Jyotsna Prakashan (May 1st 2015)
5	Le Corbusier : Ideas and Forms by William J R Curtis Publisher: Phaidon Press (April 20th 2015)
6	A Pattern Language by Christopher Alexander, Murray Silverstein, and Sara Ishikawa Publisher: Oxford University Press (August 25th 1977)…reprinted 2010
7	Architectural Reflections: Studies in the Philosophy and Practice of Architecture by Colin St.John Wilson, Manchester University Press (2000 reprinted 2010)

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC308P	Interior Design	L	T	P	C
		0	0	4	4
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

The course is aimed at
[1] Familiarise the student with key concepts and current interior design practices within the field of housing and commercial spaces
[2] To equip students with skills essential for client - designer presentation in a professional context
[3] To make students understand the importance of specification of materials, furniture layout and barrier free design with respect to context.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Analyse** an interior space through its user requirement and propose design-based solutions
[2] **Apply** elements and principles of visual design (in 2D and 3D problems) using a wide range of illustration and drawing techniques.
[3] **Understand** the principles of sustainability in interior design.

Module: 1	**History and Theory of Interior Design**	**16 Hours**

Introduction, History and Theory of Interior Design
Psychology and Perception of Interior space, Barrier Free Design.
Design Project-1Complete design, detailing, furniture layout, specification for the materials, and their application. The projects shall relate to interiors of residential, commercial, educational or other public spaces.

Module: 2	**Interior Lighting: Acoustic Design**	**6 Hours**

Architectural/Interior Lighting: Acoustic Design

Module: 3	**Systems Integration**	**6 Hours**

Indoor Air Quality/Ventilation: Systems Integration (HVAC, Plumbing, Electrical etc.)

Module: 4	**Furniture Design and fixture layout**	**4 Hours**

Furniture Design and Layout, Fixtures & Equipment:

Module: 5	**Interior Landscaping**	**3 Hours**

Materials & Finishes: Interior Landscaping

Module: 6	**Sketchup for Interior Design**	**16 Hours**

Design Project – 2 Sketchup for Interior Design

Module: 7	**Sustainability in Interior Design**	**3 Hours**
Module: 8	Introduction to LEED for ID or Green Associate	**6 Hours**
Total Lecture Hours		**60 Hours**

Reference Books	
1	Joseph D.Chiara, Julius Panero, Martin Zelnik: Time Saver Standards for Interior Design & Space Planning, 2nd Edition.2001.
2	Julius Panero, Martin Zelnik:Human Dimension & Interior Space: A source book of Design Reference Standards"1979
3	S.C.Reznikoff: Interior Graphic & Design Standards.1986.
4	Susan M.Winchip: Fundamentals of Lighting, 2nd Edition.
5	Louise Jones: Environmentally Responsible Design - Green & Sustainable Design for Interior Designers
6	Francis D.K.Ching: Interior Design Illustrated.3rdEditionV.N.R.Pub. NY 2012
7	SyanneSlesin and Stafford Ceiff- Indian Style, Clarkson N.Potter, New york, 1990.
8	Periplus Editions, Michael Freeman, India Modern, 2005

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC309L	Art Forms Appreciation	L	T	P	C
		3	0	0	3
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

The course is aimed to create an overview and understanding of various art forms that exists from Ancient to modern times and between East and West.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Appreciate** of aesthetic qualities beyond the architecture
[2] To **comprehend** the relationship between the arts and built environment
[3] **Analyse** the techniques, art forms and styles
[4] **Evaluate** the various forms of art and the works of Artists and appreciate them in the context of culture and sociological perspective

Module: 1	**An introduction to understanding of art forms**	**2 Hours**
Understanding the various art forms in the society and in different cultures.		
Module: 2	**Films / Documentaries**	**9Hours**
Understanding and Appreciating **Films / Documentaries** from past to present times to Modern times & between East and West		
Module: 3	**Music/ Poetry**	**6 Hours**
Understanding and Appreciating **Music/ Poetry** from Ancient times to Modern times & between East and West.		
Module: 4	**Dance / drama**	**6 Hours**
Understanding and Appreciating Dance / **drama** from ancient times to Modern times & between East and West.		
Module: 5	**Painting/Sculpture**	**12 Hours**
Understanding and Appreciating **Painting/Sculpture** from Ancient times to Modern times & between East and West.		
Module: 6	**Folk/ indigenous art**	**6 Hours**
Understanding and Appreciating Folk/ **indigenous art** from ancient times to Modern times & between East and West.		
Module: 7	**Sociological perspective of Art and Culture**	**2 Hours**
Art and Culture and Well-being - a sociological perspective		
Module: 8	**Interaction with contemporary artistes**	**2 Hours**
Total Lecture Hours		**45 Hours**

Reference Books			
1.	Roberts, Ian. 2004. Creative Authenticity: 16 principles to clarify and deepen your artistic vision: Atelier Saint-Luc Press.		
2.	Raymond Lansing George. 1839-1929. Writer: A Concise, Complete, and Practical Textbook of Rhetoric, Designed to Aid in the Appreciation As Well As Production of All Forms of Discourse by Correlating Them to Those of – Bog. Online Books page.		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC310P	Ideation	L	T	P	C
		0	0	4	4
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

The course is aimed at
[1] To explore the manifestation of diverse and innovative ideas into tangible, concrete reality.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Understanding** the qualities of Design problems and solutions
[2] **Evaluate** ideas in the realms of music, art, sciences into physical manifestations through a process of inspired thinking and interpretation.
[3] **Create** solutions to real world problems by thinking laterally

Module: 1	**Idea to Form**	**4 Hours**
Introduction and exercises - Idea to Form: What makes a Design - Various aspects of Design - Various areas of Design resolution methods through mini projects. Exercises that encompass the understanding of Idea to Form;		
Module: 2	**New ideas in furniture design**	**8 Hours**
Projects to understand the new ideas in furniture design and human occupation/ seating, study, etc; along with brief report.		
Module: 3	**Spatial design**	**8 Hours**
A Spatial design project that would have light and shade as major thrust area;		
Module: 4	**Impact of colour in an environment**	**4 Hours**
Projects to showcase the impact of colour in an environment;		
Module: 5	**Recycling materials**	**8 Hours**
Projects to explore recycling materials into new products		
Module: 6	**Flexible functions**	**8 Hours**
Projects to explore flexible functions and multi-functionality and versatility		
Module: 7	**Nature as a Design Inspiration**	**8 Hours**
Projects that has Nature as a Design Inspiration		
Module: 8	**Fractals and design in nature**	**4 Hours**
Projects to demonstrate Fractals and design in nature.		
Module: 9	**Design inspiration from Nature**	**8 Hours**
Projects to be facilitated with inspiration from Nature. Animals, Plants, Drawings, models along with brief report.		
Total Lecture Hours		**60 Hours**

Reference Books			
1.	Edward De Bono - Lateral Thinking- Creativity, Penguin, 2009		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC311P	Advanced Visual Communication	L	T	P	C
		0	0	6	6
Pre-requisite	BARC103P – Visual Arts and Communication	Version 1.0			

Course Objectives

1. The course deals to enhance creative expression and build aesthetic.
2. Understanding the communication, expression, aesthetic intelligence by exploring experimental and study base drawing, painting, modelling, stage design with or without digital tools.

Course Outcome

At the end of the course, the student should be able to

1. To facilitate effective visual communication and visual design aspects.
2. Obtain the skill of observation and precision.
3. Enable to interpreting the surrounding indoor and outdoor spaces in 2D & 3D format.
4. Understand the relationship of colour, scale, proportion, composition, and related attributes of visual imagery in a complex and experimental way.
5. Develop asthmatic understanding and creative impulse
6. Be competent with various digital tools and freehand artistic skills

Module: 1	Understanding visual communication by developing observation skills with study base sketching and drawing. Learning about Indian and Western and Far Eastern art.	12 hours
Module: 2	Study the Branches of Semiotics- Semantics, Syntactic & Pragmatics; Denotation, Connotation & Myth. Viewpoints, point of reference, and framing.	12 hours
Module: 3	Exploring the relationship of colour, form, space, texture. Explore visual reality and abstraction with creative aesthetics. Understanding of different visual languages for the same, (Ex. Theatre, film, video art, contemporary installation art)	6 hours
Module: 4	Experimental Perspective drawing with monochromatic and colour by pattern making with using various lines and colour. (Ex. Use multiple perspective in one composition)	12 hours
Module: 5	Explore creative design by observing aesthetical relation with nature or non-natural elements/forms, to establish a conceptual analogy between hypothetical and real observation.	12 hours
Module: 6	Form in nature, Exploration of visual images with analogies from nature. Developing natural forms as a design formation. (Ex. Develop a design by simplifying a form of flower)	12 hours
Module: 7	Applications and Implementation of text and visual images; concept writing with illustrative drawings.	12 hours

Module: 8	Introduction to various industrial technologies used in communication design and Print media (project-based).	12 hours
Total Lecture Hours		90 hours

Text Book(s)	
1.	Stinson, Wigg, Bone, Cayton, Art Fundamentals Theory & Practice by Ocvirk, Mc Graw Hill, 2012.
2.	Alan Pipes, Foundations of Art and design by Lawrence King Publishing limited. 2008.
Reference Books	
1.	Stinson, Wigg, Bone, Cayton, Art Fundamentals Theory & Practice by Ocvirk, Mc Graw Hill, 2012.
2.	Alan Pipes, Foundations of Art and design by Lawrence King Publishing limited. 2008.
3.	Sergey Mavrody, Visual Art Forms: From Traditional to Digital by Belisso Publisher. 2013.
4.	Van Verkel, B., "Architectural Model lead to Design", DAMDI, Korea. 2010
5.	Farrelly, L., "Basics Architecture – Representation Techniques", AVA Publishing, SA Switzerland. 2008
6.	Dunn, N., "Architectural Model Making", Lawrence King Publishing Ltd., London. 2010
7.	K.G Subramanyan, "The Magic of Making; Essays on art and culture", Seagull Books, Calcutta. 2007
8.	Roy C. Craven, "Indian Art; A Concise History", Thames & Hudson World of art. 2006.
9.	Herbert Read, "A Concise History of Modern Painting", Thames & Hudson World of art. 2006.
10.	Maria Jolas, "Gaston Bachelard; The Poetics of Space", Penguin Books, 2014.
11.	Michael Rush, "New Media in Art", Thames & Hudson World of art.2005.
12.	Anna Moszynska, "Sculpture Now", Thames & Hudson World of art.2010.
13.	Herbert Read, "Modern Sculpture; A Concise History", A Concise History. 2006.
14.	Goerge Lois, "Damn Good Advice", 2012.

Mode of assessment: Continuous assessment / FAT / Oral examination and others

List of exercises (Indicative)
1. Generate a story board using graphic visual imagery.
2. Choose a prominent visual element – fountain, statue etc. and develop an urban scenario around this focal point.

Recommended by Board of Studies	02-12.2022		
Approved by Academic Council	No. 68	Date	19.12.2022

BARC312L	Theory of Landscape Design	L	T	P	C
		3	0	0	3
Pre-requisite	BARC203L: Site planning and Landscape	Version 1.0			

Course Objectives:

The course is aimed at
[1] Providing an experiential understanding of practical Landscape design challenges.
[2] Design solutions which empower the students to develop a holistic perspective towards Landscape Design.

Expected Course Outcome:

At the end of the course the student should be able to
[1] Understand the evolution of gardens and Landscape design theory with examples from around the globe.
[2 apply design theory to solve practical issues along with achieving proficiency in producing conceptual designs & basic design detailing.
[3] Provide knowledge about the industry standards in the use of digital presentation means for Analysis and designing purposes.

Module: 1	Landscape design and its theoretical design	3 Hours

Introduction to understanding of landscape design and its theoretical design aspects to be considered.

Module: 2	Hard and Soft Landscape	11 Hours

Hard and Soft Landscape, Material of Construction, Types of vegetation - colour - scale - proportion - light and shade effect - and its image ability creation / user - experience factors

Module: 3	Cultural aspects of the landscape architecture	10 Hours

Cultural aspects of the landscape architecture with contextual understanding - history of landscape architecture and its theoretical aspect behind its design.

Module: 4	Scenic beauty of landscape design	4 Hours

Scenic beauty of landscape design and its various theoretical aspects.

Module: 5	Urban & regional landscape	5 Hours

Urban & regional landscape characteristics

Module: 6	landscape setting	4 Hours

The characteristics of landscape setting and its intended outdoor activities design elements contributing to different user experiences.

Module: 7	Sustainability and landscape Architecture	5 Hours

Sustainability and landscape Architecture - the indigenous aspect of landscaping

Module: 8	**Simulation technologies in landscape design**	**3 Hours**
Simulation and simulation technologies available for user experience during design stage and the latest best practices in profession to showcase landscape design.		
Total Lecture Hours		**45 Hours**
Reference Books		
	1. Theory in landscape architecture: a reader (penn studies in landscape architecture). 2. Landscape architecture theory: an evolving body of thought Feb 1, 2005 by Michael d. Murphy 3. Landscape as Urbanism: A General Theory by Charles Waldheim 4. Landscape architecture design theory and methods: Modern, Postmodern & Post-postmodern, including Landscape… Feb 14, 2014 by Tom Turner, Geoffrey and susan jellicoe, the landscape of man, Thames and Hudson,1987 5. Cliff tandy hand book of urban landscape, the architectural press, London, 1971 6. John l. motloch, introduction to landscape design, 2nd edition, John Wiley & sons, 2001	
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC408L	Architectural Photography and Journalism	L	T	P	C
		3	0	0	3
Pre-requisite	BARC305P: Architectural Design VI: Technical Drawings	Version 1.0			

Course Objectives:

1. To develop a critical appreciation of buildings, precincts, public space and settlements in the context of society and environment and architectural theory and principles, through photography and journalistic writing.

Expected Course Outcome:

At the end of the course the student should be able to

1	**Understand** how building environment could be presented and described through photography and journalism as mediums.
2	**Understand** how to critically appraise the works of renowned architectural photographers and journalists.
3	**Develop** skills on writing articles about architecture for different genre of media such as national newspapers, Television, films, architectural journals, interviews and biographies, thematics.
4	**Understand** how present social media and digital technologies could be utilized for architectural photography and journalism.

Module: 1	Introduction to architectural Photography and Journalism	2 Hours

Interactive exercises - Introducing to architectural photography and journalism as inter-related as well as distinct disciplines Nature of architectural photography - architectural photographers

Module: 2	Critical Observation in Architectural Photography and Journalism	4 Hours

Photography - Methodologies of critical observation and writing brief report.

Module: 3	Case studies of works of eminent photographers	4 Hours

Exercises and project based on evolution of architectural photography - with case studies and critical appraisal - GA, Futogawa, Dinesh Mehta, et al

Module: 4	Photography Field Visit	4 Hours

Field visit to precincts in Chennai and Bangalore

Module: 5	Techniques of writing in various architectural Journalism	4 Hours

Project report writings - based on kinds of architectural journalism – for national newspapers, Television, films, architectural journals, interviews and biographies, thematics.

Module: 6	Understanding the significance of Photo-documentation	2 Hours

Photography, Projects, Readings and discussions - interactive

Module: 7	Social media and architectural photography and journalism	4 Hours

Project - social media, Digital technology, projects - Emerging directions

Module: 8	**Guest Lecture by industry experts**		**6 Hours**
Interactions with Architectural photographers and journalists			
Total Lecture Hours			**30 Hours**
Reference Books			
4.	Adrian Schulz, Architectural Photography: Composition, Capture, and Digital Image Processing, Reilly Publications, 2009		
5.	Anthony White, Yokio Futagawa, Vance Bibliographies, university of California, Digitized 2009		
6.	MIT University Architecture Journals		
7.	The Journal of Architectural Historians		
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC409L	Sustainable Architecture	L	T	P	C
		3	0	0	3
Pre-requisite	BARC208L: Climate Responsive Architecture	Version			
		1.0			

Course Objectives:

1.	Adopt/incorporate sustainable practices in Building Design
2	Combining architectural design and planning principles with modern technology and traditional Community wisdom in order to design and manage a sustainable project.
3	Understand the concept of sustainable communities.

Expected Course Outcome: At the end of the course the student should be able to

1.	**Understand** sustainability, its types in built environment and the importance of environmentally, ecologically sensitive architecture
2.	Analyze different types of sustainable material and technologies used to design and construct sustainable buildings.
3.	**Evaluate** various approaches to achieving sustainable buildings and Communities.
4.	**Understand** different rating methods to evaluate sustainable methods.
5.	**Summarize** the concepts of sustainability through case studies of sustainable buildings

Module: 1	Concepts of Sustainability	4 Hours

Energy and Global environment, Energy use and Climate change – Its impact, Types of Energy systems, Concept of Sustainability - Principles of conservation -synergy with nature, Bio-regionalism - community basis
shelter technology within bio-regional patterns and scales, Ethical- environmental degradation. SustainableDevelopment, Agenda 21, UN Goals

Module: 2	Strategies of Sustainable Architecture	4 Hours

Definition of Sustainability, - Carrying capacity, Eco system and food chain, natural cycles – Ecological footprint, Pillars of Sustainability. Sustainability in the built environment-ideas, concepts and current practices.
Climate and built form, Sustainable practices in vernacular buildings of India. Terminologies related to sustainable buildings- carbon footprint, life cycle analysis, embodied energy etc.

Module: 3	Sustainable planning & Design	4 Hours

Sustainable approach to site planning and design - site inventories- relationships between site factors - development impacts from one area of the site on the other areas - Model ecosystem of the site, environmentalmonitoring and testing during construction- phasing of development
- limits of change - Design facility within social and environmental thresholds.
Site development strategies with Land-use zoning, Transport planning and landscape planning etc. Improvingenvironmental quality, energy eff iciency, eff icient resource management (soil, water, waste and materials)through appropriate site selection and effective neighborhood planning.

Module: 4	Sustainable Building Materials and Construction	6 Hours

Role of Materials in Sustainable architecture. Material Strategies for Sustainable Construction- traditional, modern. Properties, Uses and Examples of -Primary, secondary and Tertiary Sustainable Materials. Techniquesof sustainable construction - technologies, methods of effectiveness, and design synthesis – alternative materials and construction methods: Sustainable production, transportation, infrastructure and distribution policies.
Recycling and Reuse : Pre building, Building, Post building stages - Architectural Reuse, Waste prevention, Construction and Demolition recycling- Conservation of natural and building resources. Energy and material

savings – types of wastes - Elimination of waste and minimize pollution- various Decomposing methods –Innovative reuse of various wastes		
Module: 5	**Sustainable concepts and the design strategies**	**6 Hours**

Method of Achieving Sustainability in Buildings. Principles to improve the energy eff iciency; use of local materials and on site growth of food, fuel and building materials. Resource Management: Energy, water, andwaste audits; operations and maintenance; post occupancy surveys and reviews; building benchmarking.		
Module: 6	**Rating methods and Case studies of Sustainable Buildings**	**9 Hours**
Green architecture and various international and national rating systems for sustainability- Indian systems,Codes and compliances. Introduction to assessment tools and performance analysis software. Sustainable Development Case Studies: illustrated examples of the planning, development, and construction.strategies adopted by eminent architects at the global level and in the Indian context. Net Zero Energy and Energy Positive Buildings: concept, and case studies. Future of Sustainable Design: Biophilia, Urbiphilia, biomimicry, and High-Performance Buildings		
Module: 7	**Sustainable Community planning**	**9 Hours**
Sustainable communities –needs/challenges. Integration of sustainable and green development practices intocommunity development strategies. Public planning and policy initiatives Study of zero discharge sites and communities. Integrating renewable energy at neighborhood scale, smart grids, concept of solar cities, smartcities, eco cities.		
Module: 8	**Expert Lectures**	**3 Hours**
Sustainable Project Presentation by Architects- Philosophies and approaches adopted by the architects		
Total Lecture Hours		**45 Hours**

Reference Book (s)

1.	Dominique Gauzin – Muller “Sustainable Architecture and Urbanism: Concepts, Tech- nologies and examples”, Birkhauser, 2002.
2.	Charles J. Kibert, Sustainable Construction: Green Building Design and Delivery, 4th Edition, ISBN: 978-1-119-05517-4 May 2016
3.	Steven V. Szokolay, Introduction to Architectural Science The Basis of Sustainable Design, 3rd Edition, 2014
4.	Paola Sassi, Strategies for Sustainable Architecture, ISBN 9780415341424 June 19, 2006 by Taylor &Francis
5.	Sandra F.Mendler & William Odell, “HOK Guidebook to Sustainable Design”, John Wiley and sons, 2000.
6.	Richard Hyder, “Environmental brief: Pathways for green design”, Taylor and Francis, 2007.
7.	Bansal, N.K., Hauser, G., &Minke, G., ”Passive Building Design”, Elsevier, Amsterdam, 1994.
8.	Sodha, M.S., Bansal, N.K., Bansal, P.K., Kumar, A., & Malik, M.A.S., ”Solar Passive Building”, Pergamon Press, Oxford, England, 1986.
9.	Caring A.Langston Grace K.C.Ding, “Sustainable practices in built environment”, 2nd Edition, Publishers:Butterworth-Heinmann Linacre House Jordanhill Oxford, 2001

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC411P	Furniture Design	L	T	P	C
		0	0	4	3
Pre-requisite	**Nil**	**Version**			
		1.0			

Course Objectives:

[1] Familiarize with key contemporary concepts and current styles in furniture design in discovery format.
[2]To understand an approach to furniture design as object and design of furniture arrangements in architectural spaces.
[3] To equip students with skills essential for client - designer presentation in a professional context.
[4] To make students understand the importance of specification of materials, furniture usage and barrier free design with respect to context.
[5] To have students understand where digital design interfaces with material production and output.

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Analyse** and design furniture through its various components such as material, structure and style.
[2] **Understand** and implement sustainable concepts in furniture design.
[3] **Develop** skills to understand the process of furniture design and types of production.
[4] **Provide** a competent furniture arrangement in an architectural space.

Module: 1	**Ergonomics and Human Anthropometrics**

Exercise to understand Ergonomics and Human Anthropometrics.

Module: 2	**Furniture Design Approaches, Designers and Styles**

Introduction to Furniture Designers/Style: Antique, Traditional, Modern, Contemporary, Classical etc. Current trends in furniture design.

Module: 3	**Types of Furniture**

Types of Furniture – Built-in (cabinetry etc.), Modular, Manufactured, Systems Office furniture, Prefabricated, Custom-made, Craft or Artisanal, Seating, Storage, Children's, Sleeping, Street Furniture (outdoor).

Module: 4	**Materials in Furniture**

Materials in Furniture – Wood (hardwoods, softwoods), Plywood, Bent wood, Bamboo/Cane, Metal, Plastics, Polyurethane, Glass. Upholstery Materials – Leather, Rexin, Fabrics(naturals, synthetics). Finishes – Laminate, Veneer, Lacquer, Varnish, Stains, Polish. Adhesives. The relationship of materials to digital production method both for mass production and crafted or artisanal furniture. Consider valuation of materials in light of architecture, sustainability and environmental issues.

Module: 5	**Furniture Selection**
Selection of furniture, cost, longevity in light of architectural design requirements.	
Module: 6	**Furniture Design**
Furniture design, including technology (structure & stability, and utilizing digital production) wood and metal joinery, sections, framework, detailing and design of furniture using found object in light of ergonomic, programmatic and architectural concerns.	
Module: 7	**Furniture Layout**
Furniture layout as a design project – the relationship to and creation of architectural context in combination with design of furniture elements (Standalone or Built-in).	
Module: 8	**Guest faculty – Innovations in Furniture Design –Workshop**
Total Lecture Hours	**60 Hours**

Project Suggestions

`1. The students engage a given fixed floor plan to develop an inventive spirited program for. This is used both to drive the development of a piece of furniture and to create a layout. By engaging an existing plan, perhaps by an unknown architect it is easier to define working with furniture only, rather than with interior design.

2. Study the difference between design for mass/factory production and hand crafted furniture in the contemporary context and specifically in the Indian context.

References

1. Francis Ching - Form Space and Order, Phaidon, 2012
2. John F. Pile, Interior Design, Harry N. Abrams, Inc., Publishers.
3. Amin Jaffer, Furniture from British India and Ceylon, Peabody Essex Museum; First Ed. (2001)
4. Stuart Lawson, Furniture Design: An Introduction to Development, Materials and Manufacturing, Laurence King Publishing (October 1, 2013)
5. Scott Openshaw, Erin Taylor, Ergonomics and Design Reference Guide, Allsteel (2006)
6. Jerzy Smardzewski. Furniture Design. Switzerland: Springer (2015)
7. Debkumar Chakrabarti. Indian Anthropometric Dimensions for Ergonomic Design Practice. National Institute of Design (1997) (found on Library Genesis <libgen.rs>
8. James Krenov. Cabinetmaker's Notebook (Woodworker's Library) Craven Street Books (2000)
9. Hideo Sato, Yasua Nakahara. The Complete Japanese Joinery Trans. Koichi Palu Nil. Vancouver:Hartley and Marks. (1967)

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC412L	Architectural Conservation	L	T	P	C
		3	0	0	3
Pre-requisite	**BARC201P: Architectural Design III: Rural Environment Studies**	**Version 1.0**			

Course Objectives:

The course is aimed at
[1] To sensitise the student to heritage as an integral part of the built and social environment
[2] Equip students to propose solutions which are pragmatic in contemporary time period.
[3] Introduce to the importance of conservation in terms of sustainability and urban development
[4] Introduce to the work, rules and regulations of conservation/ planning organisations (govt/ NGO) which function at local, national and international level.

Expected Course Outcome:

At the end of the course the student should be able to
[1] **Understand** the concepts of heritage and conservation
[2] **Understand** the role of various national agencies in Architectural conservation
[3] **Analyse** the components and concepts of conservation in various national and international case examples
[4] **Apply** the skills in conserving, restoring a building; apply adaptive reuse principles to bring the structure back to life
[5] **Experiment** design solution which shall be socially relevant on the character of the city. Develop awareness and sensitivity towards heritage and value of structures.

Module: 1	**Introduction to Architectural Conservation**	**2 Hours**
Introduction to concepts of heritage and conservation, defining preservation, adaptive reuse, international and domestic agencies and their roles in conservation.		
Module: 2	**Role of National agencies in Architectural Conservation**	**4 Hours**
Museums, monument preservation, role of ASI and INTACH, central and state government policies and regulations, projects.		
Module: 3	**Architectural Conservation – National case examples**	**6 Hours**
Case studies in conservation such as Hampi and Mamallapuram		
Module: 4	**Components in Architectural Conservation:**	**4 Hours**
Listing of monuments, documentation, assessing architectural character, structural condition, techniques for preservation and adaptive reuse.		
Module: 5	**Adaptive reuse**	**4 Hours**
Case studies in adaptive reuse- museums, hospitality centres, heritage hotels, etc		
Module: 6	**Conservation planning**	**4 Hours**
Conservation planning, incentivisation, transfer of development rights, examples of developments in historic precincts.		
Module: 7	**Architectural Conservation – International case examples**	**4 Hours**

Conservation practices in the international context.		
Module: 8	Lectures by experts	**2 Hours**
Total Lecture Hours		**30 Hours**
Project:		
1.	Identify a heritage structure which is in a stage of neglect and provide strategies for rejuvenation.	
2.	Compare the effect of urbanisation on heritage site in two precincts.	
Reference Books		
6.	Conservation Manual by BemardFlelden, Intach Publication	
7.	Robert E, Stipe, A Richer Heritage: Historic Preservation in the Twenty-First Century Univ. Of North Carolina Press	
Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC413L	Building Systems Integration	L	T	P	C
		3	0	0	3
Pre-requisite	BARC407L: Building Services-II	Version			
		1.0			

Course Objectives:

1.	To refine the design process through the strategies of building systems integration
2.	To understand how various systems that constitute a building design (site, climate, structure, skin, building services, space, and finishes) are interwoven and integrated to achieve a high-performancebuilding
3.	To attain an appreciation of building systems integration in architecture through case studies with an emphasis on sustainable design and construction

Expected Course Outcome: At the end of the course the student should be able to

1.	To understand the effect of theories of building systems integration on contemporary architectural design
2.	To gain insight to the various building systems integration process and their relation to computation
3.	To identify and go in depth into specific and appropriate aspects relating to the various contexts ofintegration and its relation to sustainability
4.	To further advance creative and analytical thinking of the building systems integration

Module: 1	Introduction	3 Hours
Concept and application of building systems integration; historical context to integration; design issuesrelated to integration and its effect on functional eff iciency		
Module: 2	**Integration Systems**	**3 Hours**
Systems thinking in architecture; integrated approach in design; building management and automation systems; application and importance of BIM in systems integration		
Module: 3	**Integrated building systems: I**	**9 Hours**
Components and case studies of building systems integration: HVAC, electrical, and lighting		
Module: 4	**Integrated building systems: II**	**6 Hours**
Components and case studies of building systems integration: plumbing and sanitary, fire-fighting, and vertical transportation		
Module: 5	**Integrated building systems: III**	**9 Hours**
Components and case studies of building systems integration: security, communication, access control,acoustics, public address system, and maintenance systems		
Module: 6	**Sustainability and Energy**	**6 Hours**
Design and technological solutions that enhance sustainability in the built environment and human well-being; concept of energy management system; role of automation in energy saving; energy generation andits integration in building		
Module: 7	**Current trends in Integration**	**6 Hours**
Application of expert system in building automation; stages in development of expert system; knowledge base and decision support systems; impact of information technology; Use of IOT in systems; concept ofartificial intelligence		
Module: 8	**Guest Lecture**	**3 Hours**
Industry guest lecture by architects and allied field experts with live examples; advanced building services		

Total Lecture Hours	**45 Hours**
Text Book(s)	
1.	Vassigh, S. and Chandler J. (2011) Building Systems Integration. J. Ross Publishing

Reference Book(s)		
1.	Bachman, L. (2002) Integrated Buildings: Systems Basis of Architecture. Wiley	
2.	Moe, K. (2008) Integrated Design in Contemporary Architecture. Princeton Architectural Press	
List of Challenging Experiments (Indicative)		
1.	Preparing report for Integration of HVAC, electrical and lighting for current design studio project.	
2.	Preparing drawings for integration of plumbing and sanitary, fire-fighting, and verticaltransportation in the current design studio project.	
3.	Preparing a business pitch for integration of security, communication, and access controlof a modern residential project.	

Mode of Evaluation: Digital Assignments/ Quiz/ Continuous Assessment, Final Assessment/ Project

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC414P	Introduction to Computational Design and DigitalFabrication	L	T	P	C
		0	0	4	4
Pre-requisite	BARC210P: Advanced Digital Graphics–SkillDevelopment	Version			
		1.0			

Course Objectives:

1.	The course is aimed at introducing the students to digital fabrication and the underlying basics of computational design. All students should be able to think in 3D, to translate their ideas and designsinto digital drawings and models, and develop a clear understanding of fabrication and constructionas well as structural stability of their designs. This knowledge will be fundamental and applicable totheir design skills throughout all subsequent design studios. This will be a studio and lab-based course supported by a few introductory lectures and software tutorials.

Expected Course Outcome: At the end of the course the student should be able to

1.	To be able to design, digitally model and fabricate basic to complex geometries
2.	To analyse the differences between various fabrication techniques and their applications
3.	To understand how to operate laser cutting machine and CNC

Module: 1	Introduction	10 Hours
Introduction to computational design and parametric architecture		
Module: 2	**Analog and Digital Models**	**8 Hours**
Translation of analog aggregation models of Fractals Workshop into digital models and manipulation/evolution		
Module: 3	**Introduction to Laser Cutting**	**8 Hours**
Lab Demo: Use of laser cutter Laser cutting of preset, overlapping screen/jali patterns; laser cutting and assembly of basic units resultingin aggregation systems		
Module: 4	**Advanced Grasshopper Workshop-I**	**6 Hours**
Software Tutorial: Advanced Grasshopper Workshop Studio Exercise: Digital modelling of complex geometries in Rhino using transform tools, contour command		
Module: 5	**Advanced Grasshopper Workshop-II**	**8 Hours**
Software Tutorial: Advanced Grasshopper Workshop Studio Exercise: Digital modelling of complex geometries in Rhino using transform tools, contour command		
Module: 6	**2D forms to 3D**	**6 Hours**
Slicing and overlap of 2D patterns using laser cutter to form shikharas and domes; slicing of complex anddoubly-curved geometries using laser cutter and assembly		
Module: 7	**Introduction to Modeling with CNC Machine**	**10 Hours**
Lab Demo: Introduction of CNC machine and its use in cutting of engineered wood+Major Studio andLab Exercise: Design, 3D modeling and digital fabrication of a furniture piece in plywood using CNCcutting (group work)		

Module: 8	**Hands on workshop**	**4 Hours**
Guest Lecture /Workshop by external expert		
Total Lecture Hours		**60 Hours**
Reference Book (s)		
1.	Aranda, B., Lasch, C. "Tooling," Pamphlet Architecture 27, Princeton Architectural Press 2006	
2.	Leach, N., Menges, A., & Yuan, P. "Digital Fabrication," Tongji University Press 2018	
3.	Beorkrem, C. "Material Strategies in Digital Fabrication," Routledge 2013	
4.	Escher, M. C. "The Graphic Work," Taschen 1989	
5.	Rao, R. "Science and Golden Ratios in Mandala Architecture," Contours of Indian Art and Architecture, No. 6, D. K. PrintWorld 2011	
6.	Sutton, D. "Islamic Design: A Genius for Geometry," Wooden Books 1999	
7.	Broug, E. "Islamic Geometric Design," Thames & Hudson 2013	
8.	Nakamichi, T. "Pattern Magic," 2010	
9.	Menges, A. "Material Computation: Higher Integration in Morphogenetic Design Architectural Design", Architectural Design Series, Book 216, Wiley2012	
10.	Oxman, R. "The New Structuralism: Design, Engineering and ArchitecturalTechnologies (Architectural Design)" , Architectural Design Series, Book 80, Wiley, Edition 1 2010	
11.	Schodek, Daniel, et al. Digital Design and Manufacturing: CAD/CAM Applications in Architectureand Design. New York, NY: John Wiley & Sons, 2004. ISBN: 9780471456360.	
Mode of Evaluation: Lab Assignments, Final Assessment Test		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC415P	Building Performance and Compliance	L	T	P	C
		0	0	4	4
Pre-requisite	BARC316P – Building Environment Lab	Version			
		1.0			

Course Objectives

1. Introduce students to building performance simulation and tools to design sustainable and high-performance buildings.
2. Expose students to different types of building performance simulation such as energy, day lighting and thermal comfort and associated input parameters.
3. Introduce different standards related to building performance and how to perform compliance studies.

Course Outcome

At the end of the course, the student should be able to

1. Facilitate effective visual communication and visual design aspects.
2. Demonstrate how building performance simulation can inform in designing sustainable buildings.
3. Apply different building standards and perform a simulation for a compliance check.

Module: 1	Introduction to Building Performance Simulation (BSP)	4 Hours

Introduction to the concepts of Building Performance Simulation (BPS) and its application in design and operation of high-performance buildings, such as (nearly or net) zero-energy buildings; Weather data; Brief overview of various BPS tools available for performing, energy, daylighting and thermal comfort analyses.

Module: 2	Building Energy Modeling: Defining Loads	12 Hours

Developing building energy model from architectural plans, Input parameters: Defining weather data, envelope geometry and properties, Thermal Zones, Occupants, internal loads (lighting and equipment loads); Infiltration; schedules and shading etc; Base case model preparation; Performing building simulation, shading/ massing studies using Building Energy Simulation tools.

Module: 3	Building Energy Modeling: Defining Systems and Plant	8 Hours

Modeling different types of HVAC systems and components; System schedules; Defining Zones; Fans; Hourly reports. Plant equipment and Schedules; Reports. Energy conservation measures (ECM).

Module: 4	Daylight Modeling and Metrices	8 Hours

Daylight Model preparation; defining geometry and material properties; Sky types; Daylight metrices, Daylight autonomy, Useful Daylight Illuminance (UDI), Spatial Daylight Autonomy (SDA), Annual Sun Exposure (ASE); Visual Comfort and Glare and Glare Analysis, Glare Matrices; Daylight Glare Probability (DGP).

Module: 5	Daylight Simulation	8 Hours

Defining simulation parameters; defining sensor grid; Daylighting Simulation and Outputs, False color, contour lines; Illumination levels at sensor grid; Climate-based daylight modelling (CBDM) and simulation.

Module: 6	Indoor Environment and Comfort	8 Hours

Understanding of thermal comfort and factors affecting thermal comfort; Thermal comfort models ASHARE and Adaptive thermal comfort model. Assessing indoor thermal comfort.

Module: 7	Building Performance Compliance.	8 Hours

Introduction to ECBC, LEED and ASHRAE standards; Performance compliance as per different standards.			
Module: 8	**Guest Lectures**		**4 Hours**
Building Energy Simulation, Daylighting Simulation and Thermal Comfort.			
Total Lecture Hours			**60 hours**
Text Book(s)			
1.	Malkawi, A., & Augenbroe, G. (Eds.). (2004). Advanced building simulation. Routledge.		
Reference Books			
1.	Hensen, J. L., & Lamberts, R. (Eds.). (2012). Building performance simulation for design and operation. Routledge.		
2.	Thomas, V. C. (2011). Energy Programs and Case Studies for Teaching. International Journal of Sustainable Building Technology and Urban Development, 2(1), 13-20.		
3.	https://climatestudiodocs.com/		
4.	https://www.ladybug.tools/resource.html		
5.	https://www.ashrae.org/technical-resources/bookstore/standard-90-1		
6.	Energy Conservation Building Code User Guide, Bureau of Energy Efficiency.		
Mode of assessment: Continuous assessment / FAT / Oral examination and others			
Recommended by Board of Studies	DD-MM-YYYY		
Approved by Academic Council	No.	Date	DD-MM-YYYY

BARC416L	Urban And Regional Planning	L	T	P	C
		3	0	0	3
Pre-requisite	BARC301P – Architectural Design V: Civic Design	**Syllabus version**			
		1.0			

Course Objectives

1. The course aims to give an introductory and over all understanding of the relationship between Architecture and urban and regional planning.
2. To provide students with the opportunities to explore ideas, perspectives and debates to a considerable degree of depth in one distinct area of planning.

Course Outcome

At the end of the course the student should be able to

1. Understand how town planning evolved from ancient to industrial era.
2. Understand evolution of town planning models evolved in India and also town planning models proposed by several prominent researchers and planners.
3. To equip students with a critical awareness of the social, economic and environmental force which influences spatial requirements for land and resources from Regional to Urban level Contexts.
4. To provide students with the ability to explore and understand the ideas of how sustainable development strategies and spatial planning can enhance community lives and improve the quality of spaces.
5. Understand about planning institutional frame work, types of planning, regulatory mechanisms and laws applicable in developing urban area
6. To equip and stimulate the students to integrate and synthesize ideas from different disciplines and reflect on an array of academic and practical insights

Module:1	**Introduction- Definition and Rationale of Planning**	**4 hours**

Various definitions of town and country planning; Goals and objectives of planning; Components of planning; Benefits of planning; Arguments for and against planning.

Module:2	**Evolution of Planning**	**6 hours**

History of Cities, History of Urban and Regional Planning, Birth of a city, expansion, and decline Naturally developed city and manmade city. City for the people by the people of the people

Module:3	**Theories of Planning**	**8 hours**

Theories of urbanization including Concentric Zone Theory; Sector Theory; Multiple Nuclei Theory and other latest theories; Land Use and Land Value Theory City as an organism: a physical entity, social entity and political entity- Patrick Geddes, Doxiadis etc

Module:4	**Socio- Economic Basis for Planning**	**6 hours**

Socio-economic transformation, social problems of urban poor, slums, social planning, policies and programmes.

Module:5	**Equity and Environment**	**4 hours**

Disparity and equal opportunities in Planning, Power and hegemony, forms of marginalization, caste and religion, Planning and designing for the differently abled person, elderly, Children and pregnant women

Module:6	**Smart Cities – Introduction to Concepts**	**6 hours**

Elements and dimensions of a smart city, smart mobility, smart environment, smart society, smart living and the role of ICT Technologies

Module:7	**Planning for a Sustainable Future**	**6 hours**

Introduction to Sustainable development Goals(SDGs), How to create a happy city, 10-point agenda for sustainable cities			
Module:8	**Contemporary issues**		**5 hours**
Discussion on students presentations, Guest Lecture etc			
Total Lecture hours			**45 hours**
Text Book(s)			
1.	Happy City: Transforming Our Lives Through Urban Design,2013.		
2.	Mitlin, D., & Satterthwaite, D. (2013). Critical issues in urban inequality. Urban poverty in the global south: scale and nature (pp. 213-277). Routledge.		
3.	Roberto Lenton, Albert Wright, and Kristen Lewis. "Achieving the Millennium Development		
4.	Goals." In Health, Dignity, and Development: What Will it Take? UN Millennium Project Task Force on Water and Sanitation, 2005. London: Earthscan 2005.		
5.	McLoughlin Brian,(1969), Urban and Regional Planning: A Systems Approach, London.		
6.	Andreas Faludi, (1973), A reader in Planning Theory, Elsevier Science & Technology Books.		
7.	Susan S. Fainstein , James DeFilippis (2015), Readings in Planning Theory, 4th Edition, Wiley Blaclwell.		
Reference Books			
1.	Portney, K. E. (2014). Developing sustainable cities indicators. In D. A. Manzmanian & H. Blanco (Eds.), Elgar Companion to Sustainable Cities: Strategies, Methods and Outlook (pp. 283-301). Edward Elgar Publishing.		
2.	Huchzermeyer, M. (2014). Troubling continuities: Use and utility of the term 'slum'. In S. Parnell & S. Oldfield (Eds.) The Routledge handbook on cities of the Global South (pp. 86-96). Routledge.		
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Recommended by Board of Studies	02.12.2022		
Approved by Academic Council	No. xx	Date	19-12-2022

BARC417L	Road Safety and Civic Sense	L	T	P	C
		3	0	0	3
Pre-requisite	BARC301P – Architectural Design V: Civic Design	Version			
		1.0			

Course Objectives

The objective of this course is to introduce the concepts, principles, tools and aids of Road Safety and Civic Sense. The course also intends to acquaint them with the design and safety standards for roads along with inculcating the practice of safe road behavior and civic sense among them.

Course Outcome

At the end of the course the student should be able to

1. Understand the concepts and principles of Road Safety.
2. To apply the tools and aids of road safety in design
3. To design traffic intersection with sensitivity to pedestrian and barrier free accessibility.
4. To evaluate and intervene re design of spots pertaining to traffic accidents.

Module: 1	Introduction to Road Safety	6 Hours

Road as an active space, Types of Users, User Behaviour, Sensory Factors like Vision and Hearing in User Behaviour. Types of Vehicles: Heavy Vehicles, Light Motor Vehicle, Two Wheelers, Auto-Rickshaw, Bicycles and Cycle Rickshaw, Non-Motorised Vehicles.
Vehicle Characteristics: Dimensions, Weight, Turning Radii, Braking Distance, Lighting System, Tyres, etc. Type of Hazards: Conflicts and Accidents. Case studies related to the module

Module: 2	Typology of Roads – Components and Design	6 Hours

Road Classification: National Highways, State Highways, District Roads (MDR and ODR), Village Roads Urban Road Classification: Expressways, Arterial, Sub-Arterial, Collector, Local, Service Roads, One-Way, Two-Way etc. Mountainous Roads. Speed Limits of the Road types.
Design of Roads: Cross-Sectional Elements- Right of Way, Carriageway, Median, Shoulders, Sidewalk, Lanes, Cycling Track, Green Strip, Curbs, Camber, etc. Spatial Standards for the Cross-Section Design. Relationship between Road Design and Road Safety., Smart highways etc Case studies related to the module

Module: 3	Intersections	4 Hours

Types of Road Intersections: Basic Forms of at-grade Junctions (T, Y, Staggered, Skewed, Cross, Scissors, Rotary, etc. Grade Separated Junctions (with or without interchange): Three-Leg, Four-Leg, Multi-Leg, etc.
Design of Intersections: Design and Spatial Standards for Traffic Islands, Turns, Turning Radii, Directional Lanes, Pedestrian Crossings, Median Openings, and Traffic Calming Components like Speed Breakers and Table-Top Crossings, Rail – road crossing etc.
Design Considerations for Diverging, Merging, and Weaving Traffic. Location and Design for Traffic Signals, Integration of urban services, smart roads etc. Case studies related to the module

Module: 4	Pedestrian circulations and barrier free design	5 Hours

Requirement of Pedestrian Infrastructure: Sidewalks and Footpaths, Recommended Sidewalk Widths, Pedestrian Crossings, Pedestrian Bridges, Subways, Cycle Tracks, 20 min city, new theories etc.
Barrier Free Design: Location and Design Standards for Ramps for Wheel Chair Access, Other Provisions like Tactile for Visually Challenged etc.
Safety Provisions: Pedestrian Railings, Anti-skid Flooring, Pedestrian Signal, Walk Button, etc.

Module: 5	Traffic Signs and Road Markings	6 Hours

Type for Traffic Signs: Principles and Types of Traffic Signs, Danger Signs, Prohibitory Signs, Mandatory Signs, Informatory Signs, Indication Signs, Direction Signs, Place Identification Signs, Route Marker Signs, etc. Reflective Signs, LED Signs. Static and Dynamic Signs. Standards for Traffic Signs: Location, Height and Maintenance of Traffic Signs Types of Road Markings: Centre Lines, Traffic Lane Lines, Pavement Edge Lines, No Overtaking Zone Markings, Speed Markings, Hazard Markings, Stop Lines, Pedestrian Crossings, Cyclist Crossings, Route Direction Arrows, Word Messages, Marking at Inter6eCtions, etc. Material, Colour and Typography of the Markings. ; Case studies related to the module.		
Module: 6	**Traffic Signals, Traffic Controls, Street Lighting**	**6 Hours**
Traffic Signals: Introduction, Advantages, and Disadvantages, Intelligent Transport Systems, IoT in traffic managements etc Signal Indications: Vehicular, Pedestrian and Location of the Signals. Signal Face, Illustration of the Signals. Red, Amber, Green Signals and its Significance, Flashing Signals, Warrant of Signals, Co-ordinated control of signals. Traffic Control Aids: Roadway Delineators (Curved and Straight Sections), Hazard Markers, Object Markers, Speed Breakers, Table Top Crossings, Rumble Strips, Guard Rails, Crash Barriers etc. Street Lighting: Need for Street Lighting, Type of Lighting, Illumination Standard, Location and Intermediate Distance. Case studies related to the module		
Module: 7	**Road Accident, Road Safety and Civic Sense**	**6 Hours**
Nature and Types of Road Accidents (Grievously Injured, Slightly Injured, Minor Injury, Non-injury, etc.) The situation of Road Accidents in India (Yearly), Fatality Rates, etc. Factors (and Violations) that cause accidents, Prevention and First Aid to Victims Collision Diagrams and Condition Diagrams exercises. Traffic Management Measures and their influence in Accident Prevention. Need for Road Safety, Category of Road Users and Road Safety Suggestions. Precautions for Driving in Difficult Conditions (Night, Rain, Fog, Skidding Conditions, Non-Functional Traffic Lights, etc.) Types of Breakdowns and Mechanical Failures. Accident Sign (Warning Light, Warning Triangle, etc.) Introduction to Concept of Civic Sense and its relationship to Road Safety: Importance of Civic Sense, Road Etiquettes and Road User Behaviour, Rules of Road, Right of the Way. Providing Assistance to Accident Victim. Sensitisation against Road Rage. Case studies related to the module		
Module: 8	**Traffic Regulations, Laws and Legislations**	**6 Hours**
Indian Motor Vehicles Act (Chapter VIII: Control of Traffic to be discussed in detail) Regulations Concerning Traffic: Cycles, Motor Cycles and Scooters, Rules for Pedestrian Traffic, Keep to the Left Rule, Overtaking Rules, Turning Rules, Priority Rules, Hand Signals, elc. Speed and Hazard Management. Penal Provisions. National Road Safety Policy, Central Motor Vehicle Rules, State Motor Vehicle Rules Introduction to Good Practices. Public private partnership in traffic management, contribution of NGOs such as ITDPI, WRI, etc in road design and safety. Case studies related to the module Guest lectures		
Total Lecture hours		**45 hours**
Text Book(s)		
1.	Traffic Engineering and Transport Planning, LR Kadiyali	
Reference Books		
1.	Introduction to Traffic Engineering, R Srinivasa Kumar	

2.	Book on Road Safety Signage and Signs, Ministry of Road Transport and Highways, Government of India			
3	MORT&H Pocketbook for Highway Engineers, 2019 (Third Revision)			
4	Publications by UTTIPEC namely, Street Design Guidelines, UTTIPEC Guideline for Road Markings, UTTIPEC Guideline and Specification for Crash Barriers, Pedestrian Railing and dividers, UTTIPEC Standard Typical Crossing Design			
5	Street Design Standards as provided in Times Savers, Neuferts etc			
6	Publications by Indian Road Congress.			
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar				
List of exercises (Indicative)				
1	Define different types of traffic intersections and explain its suitability.			
2	Identify different types of roads and its effect on urban development.			
3	Study the effect of light and colours along the highway on users.			
Recommended by Board of Studies		02-12.2022		
Approved by Academic Council		No. 68	Date	19-12.2022

BARC418P	Advanced Building Information Management	L	T	P	C
		0	0	4	4
Pre-requisite	Introduction to Building Information Management	Version			
		1.0			

Course Objectives

1. Building Information Modelling (BIM) will provide you with the skills and knowledge required to manage the detailed activity of a building construction or engineering project using BIM compatible software to achieve the best possible project workflow from start to finish
2. Understanding of various components of software-based interfaces of Building information management (BIM)
3. Adopt/incorporate Building information management (BIM) tools to optimize design and construction process with understanding of specific uses like zero building, sustainability

At the end of the course, the student should be able to do

1. Effective project management skills in applying BIM
2. Effective BIM contract management and cost control
3. BIM related projects are planned, executed and completed collaboratively

Module: 1	Introduction to Building Information Management and its components	5 Hours

Introduction to the concepts of Building Information Management and its significance, risk reduction in design and construction process and its optimization

Module: 2	Sustainable design principles and practices on Building Information Management (BIM)	10 Hours

Description of the skills and knowledge required to use BIM applications to achieve sustainable design outcomes. It includes the ability to determine methods and principles of sustainable practices to develop and manage BIM project outcomes

Module: 3	Use Building Information Management (BIM) technologies for the project	20 Hours

Practical overview of the technology, explores the applications of the technology and its use for a given project in terms of selection of BIM components, low embodied energy materials and reduction in material/resource wastage

Module: 4	Manage cost control, Planning, analysis and control processes	15 Hours

Skills and knowledge to manage Building Information Modelling (BIM) cost control measures associated with the project. The unit also covers the monitoring of project costs and expenditure to consider how estimates interact with actual project acquittals and Life cycle assessment (LCA) of entire building process

Module: 5	Building Information Management (BIM) based management of project as a collaborative team approach	7 Hours

Skills and knowledge to manage a Building Information Modelling (BIM) project using relevant technologies, including planning and integrating BIM workflow. The unit covers a collaborative team approach to achieve project outcomes and applying effective communication and collaborative processes for a given project among concerned stakeholders/service providers

Module: 6	Guest Lecture by industry experts	3 Hours

A guest lecture by industry expert on Building Information Management (BIM), its significance, its application and as a tool for collaborative team approach

Total Lecture Hours	60 hours

Text Book(s)

1.	Holzer, Dominik. 2016. The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction. Wiley Press.
2.	Crotty,Ray. 2016. The Impact of Building Information Modelling: Transforming Construction. Routledge.
Reference Books	
1.	Briscoe, Danelle. 2016. Beyond BIM: Architecture Information Modelling. Routledge
2.	Kumar, Bimal. 2016. A Practical Guide to Adopting BIM in Construction Projects. Whittles Publishing.
3.	Hardin, Brad. 2015. BIM and Construction Management: Proven Tools, Methods, and Workflows. Wiley.
4.	Garber, Richard. 2014. BIM Design: Realising the Creative Potential of Building Information Modelling, Wiley.
5.	Klaschka, Robert. 2014. BIM in Small Practices: Illustrated Case Studies. RIBA Publishing.
List of exercises (Indicative)	
1	Simulate a case project for understanding and visualization of the Building Information Management (BIM)
Mode of assessment: Continuous assessment / FAT / Oral examination and others	

Recommended by Board of Studies	02-12.2022		
Approved by Academic Council	No. 68	Date	19-12.2022

BARC105E	Construction technology – Advanced and Innovative Technologies	L	T	P	C
		1	0	4	5
Pre-requisite	BARC405L - Construction Technology: Prefab Products and Manufacture	Version 1.0			

Course Objectives

1. To enhance the knowledge of ground-breaking technologies, their applications and processes in building design and construction.
2. To understand technicalities behind the design and erection of specialized construction materials in architectural practice.

Course Outcome

At the end of the course the student should be able to

1. Understand different typologies of special construction techniques employed in buildings and built environments.
2. Understand several types of high-performance building envelope systems in response to environment.
3. Familiarize with new building materials for smart solutions
4. Assess the potential of robotics and artificial intelligence in construction.
5. Comprehend advance construction techniques using concrete and steel.
6. Understand different aspects and technologies involved in the construction of High-rise buildings, impact of construction on environment and cost-effective strategies adopted.
7. Interpret alternative construction techniques pertaining to disasters and resilience.
8. Demonstrate the construction techniques of complex building components using drawings or models (Apply)
9. Produce technically correct architectural details of building components in construction of resilient buildings (Create)

Module: 1	Hi-tech roofing structures	2 Hours
Concepts and applications of tensile construction systems and metal lattice structures, hyperbolic paraboloid roof systems, retractable roof systems		
Module: 2	**Kinetic Facades**	**2 Hours**
Building kinetics and facade engineering, sensor glasses for thermal efficiency, digital building facades, adaptive solar facade		
Module: 3	**Smart Materials**	**2 Hours**
Thermal Expansion Materials, Shape Memory Alloys, Thermochromic Materials, Thermoelectric Generators, Photoluminescent and Electroluminescent Smart Materials, Phase-Change Materials, Super-absorbent Polymers, etc.		
Module: 4	**Robotics and Artificial Intelligence**	**2 Hours**
Robotics in construction industry – types and applications, flight-assembled architecture, introduction to Artificial Intelligence, application of AI in construction planning and management.		
Module: 5	**Developments in Concrete Technology**	**2 Hours**
High ductility engineered cementitious composites (HSHD-ECC), supports for long span structures, multistoried buildings, marine structures, tunneling technologies		
Module: 6	**High-rise structures**	**2 Hours**
Structural implications, effects of wind and climate, services integration, safety, typical floor construction cycle, National Building Code references.		
Module: 7	**Disaster Resilience**	**2 Hours**
Environmental issues in construction, disaster management technologies, emergency structures, cost		

reduction technologies for mass construction.		
Module: 8	**Industry Perspectives**	**1 Hour**
Guest Lecture/interaction session with industry expert(s) on current trends in construction		
Total Lecture hours		**15 hours**

Text Book(s)

1.	Michael Seidel. 2009. Tensile Surface Structures - A Practical Guide to Cable and Membrane Construction. Earnst & Sohn: A Wiley Company

Reference Books

1.	Bungale S. Taranath. 2017. Tall Building Design – Steel, Concrete and Composite Systems. CRC Press Taylor & Francis Group
2.	R. Chudley, Pearson. 2005. Construction Technology.
3.	Gurcharan Singh. 2009. Building, Planning and scheduling. Standard Publication
4.	Andreas Muller. 2007. Smart Materials in Architecture, Interior Architecture and Design. Birkhauser Publishers
5.	Wit, Andrew & Daas, Mahesh. 2018. Towards a Robotic Architecture.

Mode of evaluation: Internal Assessments (CAT I and CAT II), Assignments, Final Assessment Test

List of Experiments (Indicative)

Module: 1	Linear space frames, geodesic domes, tensile structures and its types	12 Hours
Module: 2	Mechanisms of wind and thermal kinetic façades	12 Hours
Module: 3	Concrete shell structures, support systems for linear and curved long-span spaces	16 Hours
Module: 4	Earthquake resistance strategies such as base isolation, infill shear truss	12 Hours
Module: 5	Field visits and discussions on creative detailing	8 Hours
	Total Laboratory Hours	**60 hours**

Reference Books

1.	Michael Seidel. 2009. Tensile Surface Structures - A Practical Guide to Cable and Membrane Construction. Earnst & Sohn: A Wiley Company
2.	Faculty of Civil Engineering and Geosciences. Analysis of Thin Concrete Shells Revisited: Opportunities due to Innovations in Materials and Analysis Methods. Delft University of Technology
3.	Ajla Aksamija and Perkins+Will. 2013. Sustainable Facades for high-performance building envelopes. John Wiley & Sons, Inc.

Mode of assessment: Continuous assessment / FAT / Oral examination and others

Recommended by Board of Studies	02-12.2022		
Approved by Academic Council	No. 68	Date	19-12.2022

BARC422L	Modular Coordination	L	T	P	C
		3	0	0	3
Pre-requisite	BARC405L – Construction Technology: Prefab Products and Manufacture	Version 1.0			

Course Objectives

To introduce the concept of modular coordination and its aspects and its importance, application in architecture and building construction.

Course Outcomes

At the end of the course the student should be able to
1. Understand modular coordination and its basic principles.
2. Differentiate different types of modular systems and elements of modular construction.
3. Application of different types of materials in the modular construction.
4. Apply of Modular construction techniques in building systems.
5. Understand the benefits and limitations of Modular Construction.
6. Comprehend application of modular construction in different buildings and how modular construction is managed.

Module: 1	Introduction	4 Hours

Introduction to modular principles and practices, Corbusier approach, modular number patterns, Notations of modular design, terminologies in modular co-ordination, dimensioning modular components, modular grids, conventional modular principles and practices in the West in the early, medieval, industrial and post-industrial phases.

Module: 2	Types of Modular Systems	6 Hours

Modular building elements, non-volumetric components, volumetric units. Non-volumetric elements: Structural elements such as frames, beams and columns; Sections of building façade and cladding; Wall panels and interior partitions; Floor cassettes and planks; Roof trusses; Volumetric elements: patient rooms, bathroom pods, and sections of elevator or stair cores.

Module: 3	Materials & Modular Construction	6 Hours

Modular construction using steel, concrete, and wood, Frame Systems: Steel, timber and concrete frame systems. Panel Systems: Steel, timber, concrete and masonry panels and brick work.

Module: 4	Application of Modular Construction	6 Hours

Modules in interior design, space utilization in an interior envelope, modular applications in commercial spaces, furniture design, relationship between utility zones and circulation, Study Modular philosophy in electrical systems, air-conditioning, electronic systems, industrial products and applications, Study Industry examples in modular coordination –prefabrication, production systems, etc.

Module: 5	Benefits of Modular Construction and Limitation	6 Hours

Quality; Productivity; Safety; Schedule; Cost and value; Sustainability; Limitations of Modular construction.

Module: 6	Modular Coordination in Building Typologies	8 Hours

Modular co-ordination in housing, commercial, Institutional and Industrial buildings; Discussion using case studies. Room Module Systems-Steel, timber, concrete systems Building envelopes: Structural facades, non-structural facades, glass façade system, metal façade system, timber façade systems, concrete façade system

Module: 7	Management of Modular Construction	5 Hours

Basic management policies in modular co-ordination. Assembly and strategies, sequencing, Transportation, setting

Module: 8	Industry Perspectives	4 Hours

Guest Lecture/interaction session with industry expert(s) on current trends in Modular construction			
Total Lecture hours			**45 hours**
Text Book(s)			
1.	W. Minich, J. Pekała, Modular Coordination in Industrial Building: Standard Regulations; Preliminary Scheme; ISO/TC 59		
Reference Books			
1.	National Building Code of India, 1983		
2.	IS: Recommendations for modular coordination in building industry applications. https://law.resource.org/pub/in/bis/S03/is.6820.1987.pdf		
3.	Prefab architecture: a guide to modular design and construction: Author(s): Ryan E Smith, Publisher: John Wiley & Sons, Year: 2010		
4.	Staib, G., Rosenthal, M., Dörrhöfer, A. (2013). Components and Systems: Modular Construction – Design, Structure, New Technologies. Germany: De Gruyter.		
Mode of evaluation: Continuous Assessment Tests, Assignments, Quizzes, Final Assessment Test			
Recommended by Board of Studies	02-12.2022		
Approved by Academic Council	No. 68	Date	19-12.2022

BARC424P	Advanced Computational Design	L	T	P	C
		0	0	4	4
Pre-requisite	BARC414P	Version			
		1.0			

Course Objectives

1. To learn how to use generative design & generative system architecture and their relation to computation.
2. To highlight the importance of using computers as a generative tool in the design process depending on scripting and algorithmic architecture approach of designing.
3. To have an investigative approach towards the intersection of architecture, computation and digital technologies

Course Outcome

At the end of the course, the student will be able to

1. Familiarize a variety of computational design techniques, and appreciate both the challenges and limits of using such techniques in real-world scenarios.
2. To understand the effect of advanced computational methods on contemporary architectural design.
3. Apply the various contemporary design techniques and their relation to computation
4. Understand Algorithmic thinking, by breaking down complex routines into smaller pieces.

Module:1	Introduction To Generative Design and Architecture	12 hours

Introduction, definitions, and Properties of Generative design. Difference between traditional method of design and generative design. Algorithmic generative systems, Parametric systems and Formalisms- L-systems, Cellular automata systems, Fractal systems, and Shape grammars. Categories of Generative Model.

Module:2	Techniques And Technologies in Morphogenetic Design	12 hours

Digital Morphogenesis/Computational Architecture and its classification- Topological architecture, Isomorphic architecture, Animate architecture, Metamorphic architecture, Parametric architecture and Evolutionary architecture. Digital Morphogenesis and its implication- emergence, self-organization and form-finding.

Module:3	Applied Computational Design	12 hours

Computational thinking, Exploring Algorithms, parametrizing geometry, scripting, interoperability, and cloud computing, Algorithmic problems classification, and problem-solving. Algorithms in Computational Design. Introduction to programming. Coding, Scripting, and Modeling Methods in Architecture.

Module:4	Artificial Intelligence in the Design Process	12 hours

Artificial Intelligence tools, ARCHITEChTURES, DALL-E 2, Autodesk Forma. The computational design process, Digital design representations, Procedural modeling, and Geometric deformation methods.

Module:5	**Computational Design methods using AI**	**12 hours**
AI methods for computational design, Machine learning methods for computational design, and Advanced AI tools (deep neural networks, convolutional neural networks, transformers, large language models.		
Total Lab hours		**60 hours**

Text Book(s)	
1.	Arturo Tedeschi, AAD_ Algorithms-Aided Design. (2020) Le Penseur Publisher, Italy.
2.	Emergent technologies and design: towards a biological paradigm for architecture. London: (2010) Routledge. Hensel, M., Menges, A., &Weinstock, M.
3.	Carlo Aiello eVolo 6: Digital And Parametric Architecture (2014) eVolo; English edition
4.	Computational Design, Tongji University Press, 2018 Neil Leach, Philip F. Yuan.
Reference Books	
1.	Koichi Takada and Philip Jodidio Koichi Takada: Architecture, Nature, and Design, (2021) Rizzoli
2.	Min-Gyu Seol and Mu-Jung Kang, Evolution – Architectural design using Grasshopper. (2016) Kyong – Won Suh Publisher, Seoul.
3.	Techniques and Technologies in Morphogenetic Design, Architectural Design Journal, 2006, Michael Hensel, AchimMenges + Michael Weinstock
4.	Computation Design Thinking. New Jersey: John Wiley and Sons Ltd. (2011). Ahlquist, S., &Menges, A.
Mode of Evaluation**:** Continuous assessment and Viva Voce/FAT	

Recommended by the Board of Studies	**13.02.2024**		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC425P	Advanced Digital Prototyping and Fabrication	L	T	P	C
		0	0	4	4
Pre-requisite	BARC424P	Version			
		1.0			

Course Objectives

1. To give knowledge about the fabrication process in Digital Architecture as a way to bring software models into reality.
2. To give knowledge about utilizing prototyping and modeling as a design medium that supports the full spectrum of digital design as a paperless process
3. To allow students to develop an innovative problem-solving character to respond to hands-on problems and challenges that arise in robotic labs.

Course Outcome

At the end of the course, the student will be able to

4. Ability to process 3D models using tools and coding to the required formats in order to transfer them for production
5. Demonstrate a broad understanding of the key technologies and concepts of additive and subtractive digital fabrication technologies
6. Demonstrate an understanding of the use of this technology in relation to the design, fabrication and assembly process
7. An understanding of additive manufacturing design process and wide scope of application

Module:1	Introduction to Advanced manufacturing types and processes	12 hours

Emergence of 3D printing and AM, additive manufacturing. Differences between AM, additive manufacturing design process vs. conventional DTM, design theory, and methodology, for life-cycle objectives. Additive manufacturing applications for rapid prototyping to the end-of-use product manufacturing process. Additive Manufacturing Applications in various Domains

Module:2	Transformative Fabrication Process	12 hours

Advanced Digital Fabrication technologies and materials, fabrication tools, dynamic tools to create new forms, complex shapes, and digital fabrication for their execution, integration of intelligent technologies into the building fabric, latest fabrication technology

Module:3	Additive & Subtractive Fabrication Process	12 hours

Additive Fabrication Process, Fused Deposition Processes - Injection Molding, Roto-Molding - Casting Technologies - 3D Printing (SLA, SLS, FDM) Subtractive Fabrication Processes Case Studies - Laser Cutting [vaporization cutting and industrial manufacturing] - Water Jet Processes - CNC 3, 5, & 7 Axis Milling, Cutting, Planning, Drilling.

Module:4	Automation in Architecture	12 hours

Parametric Design and modeling, Algorithmic thinking and Digital Fabrication, introduction to Robotic Digital Fabrication, robotic in digital fabrication, application of Robotic fabrication.

Module:5	**Prototyping Modelling and Fabrication Workshop**	**12 hours**
Creating prototype models using various design processes, converting the files to the printing formats, fabrication process, and final output.		
Total Lab hours		**60 hours**

Text Book(s)			
Prototyping for Architects Real Building for the Next Generation of Digital Designers, 2016 by Jane Burry, Mark Burry.			
Digital Fabrication in Architecture, Engineering and Construction, 2014, Luca Caneparo			
Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, 2014 Brent Stucker			
Robert Francis Woodbury Elements of Parametric Design, (2010) Routledge; 1st edition.			
Beyond Digital: Design and Automation at the End of Modernity, by Mario Carpo, 2023			
Reference Books			
Manufacturing Material Effects: Rethinking Design and Making in Architecture, 2014, BrankoKolarevic and Kevin Klinger			
Digital Fabrications: Architectural and Material Techniques, Princeton: Princeton Architectural Press, 2009, Lisa Iwamoto.			
Robotic Fabrication in Architecture, Art and Design 2018: Foreword by Sigrid Brell-Çokcan and Johannes Braumann, Association for Robots in Architecture			
Digital Fabrication, Paul Andersen, David Salomon, Sanford Kwinter, David Carson, Architecture of Patterns, W. W. Norton & Co, 2010			
Mode of Evaluation**:** Continuous assessment and Viva Voce/FAT			
Recommended by the Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.08.2024

BARC496J	Travel Learning	L	T	P	C
		0	0	0	2
Pre-requisite	**Nil**	**Version 1.0**			

Course Objectives:

The course is aimed at

- To travel to a site of historic/social or cultural significance in order to observe, evolve drawing skills appreciate the place and undertake basic documentation.
- To complement the on-campus architecture subjects by providing direct personal experiences of built environments, which is an integral part of architectural education
- To experience buildings in their context, meet architectural practitioners, visit other architecture programs, and engage in other off-campus activities both nationally and internationally in orderto support the undergraduate architecture curriculum and inspire design excellence

Expected Course Outcome:

At the end of the course the student should be able to

[1] **Develop** knowledge, awareness and understanding of contexts of architectural developmentfrom a theoretical and historical standpoint.

[2] **Develop** the ability to critically evaluate and contribute to any discussion on architectural theory/history.

[3] **Develop** knowledge, understanding and awareness of historical development of structures, construction systems and elements leading to contemporary concerns.

[4] Ability to **apply** understanding of historical precedent toward contemporary issue.

[5] **Display** an ability to analyse built form in respect of historic context and display an understanding of research methodologies and the ability to communicate/display findings.

Module: 1	Discussion of experience of observations	**6 Hours**
Module: 2	Basic documentation of way of life.	**18 Hours**
Module: 3	Basic documentation of proportion and elements (Drawing and or photography)	**18 Hours**
Module: 4	Record of materials and technology	**12 Hours**
Module: 5	Interviews with community.	**12 Hours**
Module: 6	To prepare a set of basic drawings and project reports with photographs recording the social, cultural, historic context.	**54 Hours**
Total Lecture Hours		120 **Hours**

Reference Books

1.	Morris, I.H. Geometrical Drawing for Art Students.
2.	Bhatt, N.D. and Panchal V.M. Engineering Drawing: Plane and Solid Geometry, 42nd ed. Charotar Pub., Anand, 2000

Recommended by Board of Studies	21/2/2022

Approved by Academic Council	**No. 66**	Date	16-6-2022

Ability Enhancement Courses (AEC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC113L	Life Skills for Architects I	2	0	0	2	NIL
2.	BARC206L	Life Skills for Architects II	2	0	0	2	BARC113L
3.	BARC313L	Life Skills for Architects III	2	0	0	2	BARC206L
4.	BARC314L	Professional Practice and Advanced Construction Management	3	0	0	3	BARC305P
5.	BARC497J	Architectural Dissertation	0	0	0	2	NIL
6.	BARC498J	Architectural Internship	0	0	0	12	BARC305P
7.	BHUM101L	Ethics and Values	2	0	0	2	NIL

BARC113L	Life Skills for Architects I	L	T	P	C
		2	0	0	2
Pre-requisite	Nil	Version			
		1.0			

Course Objectives:

- To provide an orientation to life skills
- To instill leadership and professional skills in students
- To inculcate skills for social adaptability and emotional intelligence

Expected Course Outcome:

1. Understand the concept of life skills
2. Communicate effectively in professional and social contexts
3. Identify the nuances involved in negotiations
4. Acquire creativity, critical thinking and problem solving skills
5. Demonstrate team spirit, leadership abilities and emotional intelligence

Student Learning Outcomes(SLO): 9, 12, 18

9. Having problem-solving ability- solving social issues and engineering problems
12. Having adaptive thinking and adaptability
18. Having critical thinking and innovative skills

Module 1	Introduction to Life Skills	3 hours

Meaning and significance of life skills, social learning theory, life skills identified by WHO
Need for life skills in social and professional situations

Module 2	Team Spirit & Leadership Qualities	7 hours

Module content: Importance of Team Work; Understanding Team Behaviour; Team Work as an employability skill; Team formation & development; Pooling competencies in a Team; Significance of Team spirit
Qualities of a leader; Different strategies of leadership; Types and characters of leaders

Module 3	Emotional Intelligence and stress management	7 hours

What is Emotional Intelligence? Enhancing your emotional self-awareness; Emotional intelligence and change management; Unfreezing the old, re-freezing the new; Change & stress; Emotional intelligence & crisis management
Identifying & Understanding Stress, Stress and its effects, organizational factors, Managing stress in the workplace, Personal coping strategies, Environmental & Physical Relaxation Techniques

Module 4	Communication and Negotiation Skills	5 hours

Introduction to communication, process of communication, barriers to communication, nonverbal communication, body language, presentation skills, technology-based communication skills, cross-cultural communication, Communication in times of Crisis and Conflict.
Definition, fundamentals, types or styles of negotiation skills, negotiation concepts-BATNA, WATNA and ZOPA, key factors in negotiations, improving negotiation skills, preparing for negotiation, workplace challenges

Module 5 Critical Thinking and Problem Solving	5 hours

Creativity, lateral thinking, problem solving, analytical thinking, decision making, crisis management, case analysis

Module 6	Contemporary issues related psychology and workplace behaviour	3 hours

Guest Lecture

Total lecture hours	**30 hours**
Text Book(s)	
1.	Pillai, Sabina & Fernandez Agna, Soft Skills & Employbility Skills; Cambridge University Press, New Delhi,2018
Reference Books	
1.	Wanchoo, I. L. Neelam Bajaj, Learning Life Skills with Attitude and Values: CCE. Goyal Brothers Prakashan, New Delhi, 2010
2.	Pestalozzi, de Tina, Life Skills 101: A Practical Guide to Leaving Home and Living on Your Own, 4th Edition, Cambridge Publishers, New York,2019
3.	Wadkar, Alka, Life Skills for Success, Sage Publications, New Delhi, 2019
4.	Dudhade, Bhagyashree A., Life Skills Education, Sage Publications, New Delhi,2018
5.	Gideon Mellenbergh, A Conceptual Introduction to Psychometrics: Development, Analysis and Application of Psychological and Educational Tests, 2011, Boom Eleven International.
6.	Phil Lapworth, An Introduction to Transactional Analysis, 2011, Sage Publications (CA)
Mode of Evaluation: FAT, Assignments, Projects, Case studies, Role plays,3 Assessments with Term End FAT (Computer Based Test)	

BARC206L	Life Skills for Architects II	L	T	P	C
		2	0	0	2
Pre-requisite	Life Skills for Architects I	Version			
		1.0			

Course Objectives:

- To orient students towards research methods and research writing
- To familiarize students with academic and professional tools in the digital space
- To cultivate an understanding of corporate communication and its goals

Expected Course Outcome:

1. Think innovatively to develop business plans and networking skills
2. Learn to manage deadlines and create healthy working environments
3. Cultivate discipline-specific research skills
4. Develop a basic understanding of qualitative methods for data collection and reporting
5. Use interactive digital platforms to communicate ideas

Student Learning Outcomes (SLO): 10,,15,18

10. Having a clear understanding of professional and ethical responsibility
15.Having an ability to use social media effectively for productive use
18. Having critical thinking and innovative skills

Module 1	Time Management and Project Management	5 hours

Planning, organising, Time management - auditing, identifying time wasters, managing distractions, Prioritizing - goal setting, SMART goals, Preparing and presenting a project

Module 2	Corporate Communication	6 hours

Different perspectives on Corporate Communication, Corporate Identity, Communication Strategy, Media Relations, Corporate Social Responsibility, Communication in times of Crisis and Conflict, Employee Communication, Presentation of Communication Strategies, Business / Technical Vocabulary

Module 3	Research writing:	6 hours

Elements of writing style, Drafting original research papers & proposals, Selecting Journal for publication, Plagiarism & other ethical issues – authorship, ghostwriting etc., Tools for reference management.

Module 4	Digital literacy	5 hours

Concepts of ICT, Using databases, Web browsing & Communication, Web Development & Design, Creating online account / profile in social networking / academic platforms
Using social media for data collection
Research dissemination: reaching out to experts, policy makers and lay people
Ethical issues in the use of social media for research

Module 5	Workplace Etiquette	5 hours

Etiquette in the modern workplace, workplace etiquette- global and local, culture sensitivity, gender sensitivity, importance of grooming, etiquette in interaction

Module 6	Contemporary Issues in research and digital media	3 hours

Guest Lecture

Total lecture hours	30 hours

Text Book(s)

1. Newman, Amy. (2016). Business Communication: In Person, In Print, Online. Tenth Edition. Cengage Learning: Boston, MA.

Reference Books	
1.	Storoni, Mithu. (2017). Stress-Proof. TarcherPerigee: New York.
2.	Bhatt, Arvind Kumar. (2016). Innovation and Entrepreneurship. First Edition. Laxmi Publications (P) Ltd.: New Delhi.
3.	**Kaul, Asha & Vidhi Chaudhri. (2017). Corporate Communication through Social Media: Strategies for Managing Reputation. Sage Texts: LA.**
4.	**Jones H. Rodney & Christoph A. Hafner. (2012). Understanding Digital Literacies: A Practical Introduction. Routledge: NewYork.**
5.	**Chaubey, Varanya. (2017). Research Writing. Create Space Independent Publishing Platform: US.**
6.	**Taylor, Steven J. Robert Bogdan and Majorie L. De Vault. Qualitative Research Methods. New Jersey: Wiley, 2016.**
7.	Day, Robert. A. & Barbara Gastel. (2012). How to Write and Publish a Scientific Paper. Seventh Edition. Cambridge University Press: United Kingdom.
Mode of Evaluation: FAT, Assignments, Projects, Case studies, Role plays, 3 Assessments with Term End FAT (Computer Based Test)	

BARC313L	Life Skills for Architects III	L	T	P	C
		2	0	0	2
Pre-requisite	**Life Skills for Architects II**	**Version**			
		1.0			

Course Objectives:

- To challenge students to explore their problem-solving skills
- To develop essential skills to tackle advance quantitative and Qualitative ability

Expected Course Outcome:

At the end of program course the students will be able to
[1] Demonstrate Quantitative Aptitude, Logical reasoning and Verbal ability
[2] Develop and apply effective problem-solving skills
[3] Demonstrate human relationship & inter personal skills,
[4] Effectively document & archive architectural project work.

Student Learning Outcomes (SLO): 11,14,15, 20

[11] Having problem solving ability- solving social issues and Architectural problems
[14] Having an ability to analyse and interpret data, create simulations and provide design solutions
[15] Having an ability to use social media effectively
[20] Having a good digital footprint

Module:1	**Case Study Analysis & process**	**4 Hours**	**SLO:11**

Photography Documentation for Architects, live sketches, Case studies-live , Literature & Internet research, Interpretation, User profile base, need & justification of study. Research Aptitude Analysis & understanding.

Module:2	**Archival Methods & Recordings**	**4 Hours**	**SLO:14**

Data collection, Archival Methods in Architects offices, Photography Documentations, Setting (SOPs)standard operating procedures , Information categorization or organizing reports.

Module:3	**Interview , meeting & negotiating skills**	**4 Hours**	**SLO:11**

Professional conduct in academic juries, competition & Interview.
Communication & Negotiating skills with Observers, potential employers, Team members, Multinational stake holders. Business professional & leaders.

Module:4	**Portfolio making**	**4 Hours**	**SLO:14,20**

Preparing resume, Abstracts, Design portfolio for Academics, Project portfolio for Competition, Various types of Compilation of documents.

Module:5	Legal Knowledge & Regulations Research Aptitude	**4 Hours**	**SLO:14**

Importance of Regulations & building By-laws in design & constructions. Study research on NBC, DCR, Bylaws, Airport authority regulations, Environmental regulations Etc.

Module 6	Outreach, Social media use	**4 Hours**	**SLO:15,20**

Skills outreach, Social media use, Webpage design, Publications, Using social media for data collection, Research dissemination: reaching out to experts, policy makers and potential people, Ethical issues in the use of social media for research, Sponsors outreach.

Module 7	**Situational computational skills.**	**4 Hours**	**SLO:11**

Vedic mathematics, speed sketching, instant ideation skills. situational communication , spot visual communication

Module 8	**Interaction**	**2 Hours**	**SLO:11,14,15,20**

Guest Lecture of professionals

Total Lecture hours:			**30 Hours**
Reference books			
1	alex hogrefe , “Visualising architecture “2016		
2.	jim legit ,drawing shortcut by, 2009		
3. Adrian Schulz, Architectural Photography: Composition, Capture, and Digital Image Processing, Reilly Publications, 2009			
4.	Prasad, L.M “Principles of Management”, Sultan Chand & sons, New Delhi, 2012		
5.	National building Code (2016), BIS india		
6.	Karen Hough, The Improvisation Edge: Secrets to Building Trust and Radical Collaboration at Work, 2011, Berrett-Koehler Publishers		
7.	Phil Lapworth, An Introduction to Transactional Analysis, 2011, Sage Publications (CA)		
8.	M. Tyra(2013) Magical Book On Quicker Maths. New Delhi. BSC Publishing		
9.	aditi singal ,”How to become human calculator “ 2012		
Mode of Evaluation:, Assignments, Projects, Case studies, Final Assessment Test			
Recommended by Board of Studies	27-06-2020		
Approved by Academic Council	**No. 59**	Date	

BARC314L	Professional Practice and Advanced ConstructionManagement	L	T	P	C
		3	0	0	3
Pre-requisite	BARC305P: Architectural Design VI: Technical Drawings	Version 1.0			

Course Objectives:

1.	The course is aimed at: To create awareness regarding the various activities involved in the practiceof architecture and the role of professional and statutory bodies including legalities, interdisciplinaryrelationships and the implications of globalization.

Expected Course Outcome: At the end of the course the student should be able to

1.	**Understand** the uniqueness of architectural profession, ethics and associated services
2.	Get **familiarized** with the various roles and responsibilities of COA and IIA and various Architectural Design competitions
3.	**Understand** the fee structure and legal legislation that are associated with architectural practice
4	To **demonstrate** understanding of legal and documentation practices as applicable to thearchitectural profession.
5	To provide **understanding** of globalization and relationship with allied professionals.

Module: 1	Introduction to Architectural Profession	3 Hours

Role of Architects in Society, Registration as an Architect, Role of the Council of Architecture and the Indian Institute of Architects and salient features of their roles and responsibilities. Introduction to TheArchitects Act and rules thereof.

Module: 2	Professional & Regulatory Bodies for Architectural Practice In India, Code of Conduct and Ethics	6 Hours

Introducing Architects (Professional Conduct) Regulations, Various stages in the execution of a projectand scope of architect's services, fee structures, terms and conditions of engagement as defined by
Council of Architecture (COA) and Indian Institute of Architects (IIA)

Module: 3	Architectural Competitions	3 Hours

Types of Architectural Competitions- As specified by the COA and other international bodies.

Module: 4	Tenders and Contracts	9 Hours

Introduction to tenders, Types of tenders, conditions, preparation of tender documents, tender analysis andbid evaluations recommendations. Introduction to e-tendering and procurement through government, quasi- government and Private entities. Understanding contracts, Articles of Agreement, Terms and Conditions, Bills of Quantities, Specifications, Special conditions.

Module: 5	Project formulation and management	9 Hours

Introduction of different types of execution (build operate transfer (BOT), Design build operate transfer (DBOT) , Public Private Partnership project (PPP) etc.). Process of execution-expression of interest (EOI),
Request for proposal (RFP). Importance of planning, scheduling and controlling projects, Plan development process, time planning process, work scheduling process, Workflow diagram's structure(WBS) to track project progress, PERT chart and Critical path method.

Module: 6	**Legal Aspects, Important Legislations**	**6 Hours**
Legal Aspects of Practice, Arbitration-definition, advantages, conduct of arbitration proceedings, arbitration clause in contract agreements. Easements, copyrights and patenting, Consumer Protection Act,Liabilities of Architects under different statutes, professional Indemnity (PI) and other related legal codes.Important legislations and current trends, role of administrative bodies, salient legislation such as Person with Disabilities Act, Coastal Regulation Zone, Heritage conservation and preservation regulations, significance of National building Code		
Module: 7	**Globalization & Architectural Profession**	**6 Hours**
Globalization and its impact on the profession, international collaborations, Information Technology andits impact on architectural practice, emerging specializations. Knowledge sharing by practicing architectsand allied professionals from both India and abroad. Procedure for setting up Office for independent practice and other legal formalities		
Module: 8	**Architects and allied professionals.**	**3 Hours**
Knowledge sharing by practicing architects and allied professionals from both India and abroad.		
Total Lecture Hours		**45 Hours**

Reference Book (s)

1..	Architects Act, 1972
2.	Architects (Professional Conduct) Regulations 1989
3.	National Building Code 2016
4.	Handbook on Professional Practice by IIA
5.	Publications of Council of Architecture (COA)
6.	Architectural Practice and Procedure by V.S.Apte, 2008
7.	Consumer Protection Act, 2011.
8.	Factories Act, 1948
9.	Persons with Disabilities Act, 1995
10.	The Arbitration and Conciliation Act, 1996
11.	Environment Protection Act, 1986
12.	The Ancient Monuments and Archaeological sites and Remain Act,1958 (amended In 2010)
13.	Coastal Regulation Zone Notification 2019
14.	P. S. Gehlot, Construction Planning and Management, New Age International Publishers; Secondedition (1 January 2018)
15.	Srinath, L.S., PERT and CPM Principles and Applications, 3rd ed. Affiliated East-West Press, NewDelhi, 2003.

Mode of Evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC497J	Architectural Dissertation	L	T	P	C
		-	-	-	2
Pre-requisite	Nil	**Version 1.0**			

Course Objectives:

1.	Understand the role of research within the profession of architecture
2.	To create a thriving research environment where the students are more conscious of the currentresearch methods / process through multiple experiences of reading, discussing ad writing.
3.	To understand the need of the systematic process of abstraction, with a rigor of scientific andqualitative analysis.
4.	To increase the student ability to collect, interpret and disseminate data for research.
5.	To develop students ability in writing a report
6.	To recognize inter-disciplinary research methods and develop a foundation for thesis and futureresearch

Expected Course Outcome: At the end of the course the student should be able to

1.	Students should be able to **understand** the overall process of designing a research study from itsinception to its report.
2.	Students should be **familiar** with ethical issues in educational research, including those issues thatarise in using quantitative and qualitative research
3.	**Appreciate** the components of scholarly writing and evaluate its quality.
4	Present the **analysis** and the outcomes of the research study through a short report exhibitingstandards of technical writing

Overview of Dissertation

Architectural Dissertation will be part of the course work for 8th semester (Winter semester). This courseshould be seen as a precursor to the architectural thesis project to be executed in semester 10 and ideally directed toward enriching its output.

As a result of the global corona outbreak, the department has suspended the internship program and shiftedit to 9th-semester program from the 8th semester to mitigate this challenge.

Supervisory Structure:

From the available faculty pool of 10, each faculty will be guiding approximately 4 students. Theallotment can vary based on the available strength of faculty and students.

Class Contact Hours

The study program shall be based on a mutually agreeable schedule between the students and supervisors.

Mode of Delivery

Discussion between student and assigned supervisor, either in person or virtually.

Module: 1	**Introduction to Research**

Overview to the nature and purpose of the research process, different types of research, identifying a research topic and setting research objectives; developing a research strategy; characteristics of a goodresearch project; ethical issues in conducting research.

Module: 2	**Research Formulation and Design**

Philosophies and the language of research theory building –the meaning of methodology, defining andidentifying the research problem, purpose of the research, formulation of the research hypotheses, choosing the research strategy and methods.

Module: 3	**Reviewing the Literature**
Searching, evaluating, organizing and synthesizing the relevant literature; and, writing a literature reviewand managing bibliographic records. In addition, developing research questions for qualitative and quantitative research; and identifying characteristics/attributes	
Module: 4	**Researching and Data Collection**
Methods of data collection – Form primary sources: observation and recording, interviews, Field research,and Survey research, questionnaire design; populations, samples, and sampling method	
Module: 5	**Processing and analysis of data**
Analysing and interpreting the data and identifying the issues and summarizing and visualizing data sets;finding trends in data and formulating a research hypothesis.	
Module: 6	**Interpretation and Tabulation**
Re-writing a research proposal, discussing findings, formulating conclusions, making recommendations.	
Module: 7	**Report Writing**
Research writing in general – Layout of a research paper, Components: referencing – writing thebibliography – developing the outline – presentation; Ethical issues related to Plagiarism	
Module: 8	**Viva -Voce**
Presentation of students work to the Panel members	
Total Lecture Hours	**30 hours**

Text Book(s)	
1.	David Wang, Groat Linda (2002), Architectural research Methods, Wiley Publication.
2.	Niezabitowska, E.D (2018), Research Methods and Techniques in Architecture, Taylor and Francis,RIBA Books
3.	Anthony, M., Graziano, A.M. and Raulin, M.L., 2009. Research Methods: A Process of Inquiry,Allyn and Bacon.
Reference Book (s)	
1.	Clark, Roy Peter. Writing Tools: 50 Essential Strategies for Every Writer (2006)
2.	MLA Handbook for Writers of Research Papers (7th ed.; 2009)
3.	Fink, A., 2009. Conducting Research Literature Reviews: From the Internet to Paper. SagePublications
4.	Garg, B.L., Karadia, R., Agarwal, F. and Agarwal, U.K., 2002. An introduction to Re- searchMethodology, RBSA Publishers.

Mode of Evaluation: Intermediate reviews with final manuscript and presentation / Seminar

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC498J	Architectural Internship	L	T	P	C
		0	0	0	12
Pre-requisite	**BARC305P: Architectural Design VI: Technical Drawings**	**Version 1.0**			

Course Objectives:

To expose students to the management of execution of projects in a real-time professional working environment from conceptualization to realization through a process of involvement with concept processes, working drawings, documentation of works and realization of construction goals.

Expected Course Outcome:

Students will be able

1. **Apply** the nomenclature, graphics symbols, formats, conventions and compositional clarity associated with architectural drawings, models and reports.
2. **Understanding** statutory documentation pertinent to architectural projects
3. **Understand** office administrative practices and protocols.
4. **Develop** collaborative working skills.
5. **Understand** the relationships between architectural design and site execution.

Module: 1	**Office Management Practices**
Adhere to regulated office management practices.	
Module: 2	**Drawing Preparation**
Carry out instructions related to drawing preparation	
Module: 3	**Team Work**
Contribute to team activities.	
Module: 4	**Project Meetings and Discussion**
Participate in client and vendor meetings and discussions.	
Module: 5	**Site Visits and Supervision**
Understand site activities and contribute in supervisory exercises.	
Module: 6	**Report Preparation**
Learn to prepare minutes of meetings and reports.	

Total Lecture days	**100**

Mode of evaluation: Continuous Assessment, Final Assessment Test

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

Skill Enhancement Courses (SEC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC110P	Introduction to Digital Graphics	0	0	4	4	NIL
2.	BARC209P	Introduction to Building Information Management	0	0	4	4	BARC110P
3.	BARC210P	Advanced Digital Graphics: Skill Development	0	0	4	4	BARC110P
4.	BARC423L	Architectural Entrepreneurship	2	0	0	2	NIL
5.	BENG103P	Technical English	0	0	2	2	NIL

BARC110P	Introduction to Digital Graphics	L	T	P	C
		0	0	4	4
Pre-requisite	Nil	Version 1.0			

Course Objectives:

1.	The course is aimed at equipping students with significant understanding of relevant digitalsoftware. Instill the role and importance of digital technologies in architectural design process. Developing familiarity of interface of different software program and their applications.

Expected Course Outcome: At the end of the course the student should be able to

1.	Convert architectural ideas into drawings using digital software
2.	Understand and evaluate the spatial quality of a building using digital simulation tools
3.	Compose and present architectural ideas in an effective format.

Module: 1	**Introduction to architectural simulation**	**4 Hours**
Introduction to computers - getting hands on familiarity with software's related to architecturalsimulation - the need and scope of using computers in architectural simulation.		
Module: 2	**Digital Software**	**16 Hours**
Digital Software like AUTOCAD - understanding various aspects of drawing tools, edit tools,dimensioning, scaling, layers, color codes, printing etc.		
Module: 3	**Visualization software**	**12 Hours**
Visualization software like SketchUp - Understanding 3d creation, editing tools, materials, basicrendering using sketch up. Converting files into various rendering software formats.		
Module: 4	**Presentation software**	**12 Hours**
Presentation software like PHOTOSHOP AND RENDERING PLUGINS -		
Module: 5	**Options in visualization software**	**12 Hours**
Exploring various other visualization software's for 3d creation and presentation.		
Module: 6	**Best practices in computer graphics.**	**4 Hours**
Total Lecture Hours		**60 Hours**

Reference Book (s)

1.	Bark, S.. An Introduction to Adobe Photoshop. Ventus Publishing ApS, Sheff ield. (2012)
2.	Gindis, E. Up and Running with AutoCAD 2015: 2D & 3D Drawing and Modelling. Oxford :Elsevier. (2014)
3.	Seidler, D. R. Digital Drawing for Designers: A Visual Guide to AutoCAD 2012. London
4.	Smith, B. L. 3ds Max Architectural Visualization Beginner to Intermediate. Sarasota : 3DATS. (2007)

List of Challenging Experiments (Indicative)

1.	Design and draft the technical drawings of a 3 BHK house for a plot area of240sqm with proper line weights and standards.	**24 Hours**
2.	Design a restaurant a plot area of 450 sqm, prepare 3D views, walk throughs andmarketing drawings.	**24 Hours**

Mode of Evaluation: Continuous Assessment , Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC209P	Introduction to Building Information Management	L	T	P	C
		0	0	4	4
Pre-requisite	Nil	**Version 1.0**			

Course Objectives:

1. Understanding of theories and significance of Building Information Management (BIM) in building design and construction.
2. Understanding of phases of the building design and construction process; and software-based interfaces of BIM.
3. Adopt/incorporate BIM tools to optimize design and construction process.

Expected Course Outcome: At the end of the course the student should be able to

1.	Understand significance of BIM
2.	Demonstrate interface between BIM and various related softwares (eg. Revit/ArchiCAD)
3.	Application of BIM

Module: 1	**Introduction to BIM**	**6 Hours**
Introduction to concepts of BIM and its significance, risk reduction in design and construction process and its optimization.		
Module: 2	**Introduction to BIM platforms**	**6 Hours**
Introduction to the concepts of BIM and various related softwares (eg. Revit/ArchiCAD). An overview of BIM dimensions explanation and benefits (2D, 3D, 4D, 5D and 6D BIM)		
Module: 3	**BIM in Design**	**10 Hours**
Understanding of traditional design process and BIM based design process, their advantages and disadvantages, understand applications of BIM, such as cost estimation, architectural renderings, interference checking, and modeling of energy consumption		
Module: 4	**BIM in Project Planning and Control**	**8 Hours**
Building Information Management (BIM) based coordination, scheduling, estimating and analysis		
Module: 5	**BIM in Facilities Management**	**8 Hours**
BIM based facilities management focuses on leveraging the model information to reduce owners' cost over the life cycle of the building or structure		
Module: 6	**BIM Adoption and Execution Plans in Organizations**	**8 Hours**
Planning of the construction phases, understanding of the phasing schedule for stakeholders, Identification of schedule, Conveying the spatial complexities of the project, planning information, and support conducting additional analyses.		
Module: 7	**Best practices in computer graphics.**	**10 Hours**
A case simulation on BIM softwares (e.g.,Revit/ArchiCAD) to understand its appl visualization of project		
Module 8	**| Contemporary Issues**	**4 Hours**
Total Lecture Hours		**60 Hours**

Text Book (s)

1.	Crotty, Ray. 2016. The Impact of Building Information Modelling: Transforming Construction. Routledge.

2.	Holzer, Dominik. 2016. The BIM Manager's Handbook: Guidance for Professionals in Architecture, Engineering, and Construction. Wiley Press.
Reference Book (s)	
1.	Briscoe, Danelle. 2016. Beyond BIM: Architecture Information Modelling. Routledge
2.	Kumar, Bimal. 2016. A Practical Guide to Adopting BIM in Construction Projects. Whittles Publishing.
3.	Hardin, Brad. 2015. BIM and Construction Management: Proven Tools, Methods, and Workflows. Wiley.
4.	Garber, Richard. 2014. BIM Design: Realising the Creative Potential of Building Information Modelling. Wiley.
5.	Klaschka, Robert. 2014. BIM in Small Practices: Illustrated Case Studies. RIBA Publishing.
List of Exercises (Indicative)	
1.	Simulate a case project for understanding and visualization of the Building Information Management (BIM)

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	02-12-2022		
Approved by Academic Council	**No. 68**	Date	19-12-2022

BARC210P	Advanced Digital Graphics: Skill Development	L	T	P	C
		0	0	4	4
Pre-requisite	BARC110P: Introduction to Digital Graphics	Version 1.0			

Course Objectives:

1.	The course is aimed to familiarize students with building modelling and visualization softwareapplied to architectural design solutions

Expected Course Outcome: At the end of the course the student should be able to

1.	**Examine** Conceptual and basic Massing studies using 3D computer applications.
2.	**Develop** drawings with application software relevant to architectural design studio and investigation of gaming exercises in the digital domain to realize optimal outputs in appliedsituations.
3.	To **create** integrated design documents by taking full advantage of the building model. Integration of practical exercises along with the design studio projects.

Module: 1	Introduction to Revit Architecture	12 Hours

Starting an Architectural Project, Navigation Tools, Creating Architectural Walls, Basic BuildingComponents, Editing Tools, Planes and Creating Standard Views, floors, roofs, staircases.

Module: 2	Revit Architecture Tools	12 Hours

Site Features, Understanding Massing Concepts, Creating Massing Geometry, Annotations and Dimensions, Rendering to Walkthroughs, Creating Drawing Sheets and Plotting.

Module: 3	Introduction to Rhino	8 Hours

Introduction to Rhino, interface and creating Lines, curves, 3d modelling with Nurbs and surfaces, nurbs typologies, surface continuity, solids and meshes, editing Geometry, point editing.

Module: 4	Advanced tools in Rhino	12 Hours

Lofting and editing, create deformable shapes, Split surfaces with curves and surfaces, Blend between two surfaces, Lighting and rendering, create solid primitives and solids text, Extruding, Booleans, Lofting, Revolving, and Sweeping.

Module: 5	Introduction to Grasshopper	8 Hours

Introduction to Grasshopper, parametric modelling using grasshopper, parameters, and components,
imputing parameters, using of math and expressions, Meshes and their use in architecture,generative surfaces

Module: 6	Advanced tools in Grasshopper	8 Hours

Advanced object array, transformation basics, Algorithmic transformations, using morphing in Grasshopper, Data Tree, Curves and Surfaces - Analyzing curve and surface data, working withsurface spheres, representing 3D geometry with polygon meshes, etc

Module: 7	Professional inputs on Project Presentation using advancedsoftware.	4 Hours
Total Lecture Hours		60 Hours

Text Book(s)

1.	Revit 2020 for Architecture: No Experience Required by Eric Wing, January 2020
2.	The Aubin Academy Revit Architecture by Paul F Aubin Foreword by Ms Lynn Allen Edited by Stafford Steve, G3B Press. 2015
3.	Rhinoceros Visualisation & Rendering: A guide to using Rhino 6 & Grasshopper for 3Drendering by Sim Pern Chong, 2018

4.	Grasshopper: Visual Scripting for Rhinoceros 3D (Volume 1) First Edition by Prof. David Bachman, 2017	
List of Challenging Experiments (Indicative)		
1.	Design a 3BHK residence using Revit architecture – Plans, Elevations, Sections,Detailing etc.	8 Hours
2.	Designing a pavilion using Rhino and use the editing tools in the Rhino.	8 Hours
3.	Using grasshopper, a plugin tool to rhino – use parametric approach in the pavilion design.	8 Hours
4.	Design a façade using the rhino and grasshopper software.	8 Hours
Mode of Evaluation: Continuous Assessment, Final Assessment		

Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

BARC423L	Architectural Entrepreneurship	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	**Nil**	**Version 1.0**				

Course Objectives:

2. To provide guidance to students pursuing entrepreneurship opportunities in the architectural and allied professions.
3. The coursework will entail sessions with experts in the respective domains besides academic overviews.

Expected Course Outcome:

At the end of the course the student should be able to
[1] Differentiate between entrepreneurship versus paid employment and types of companies.
[2] Understand components involved in the starting an architectural entrepreneurship in Indian
[3] Understand components associated with architectural entrepreneurship ecosystem.

Module: 1	**4 Hours**

An introduction to entrepreneurship versus paid employment. The directions ahead for young professionals. Basic concepts of partnerships, proprietorships, private and public limited companies.

Module: 2	**4 Hours**

Legal aspects of becoming an architectural entrepreneur in the Indian environment. Statutory requirements and formalities, Insurance, taxation, documentation and records. Special statutes pertaining to the architectural profession.

Module: 3	**4 Hours**

The concept of workspace-shared workspace. Outreach-the use of social media and marketing platforms.

Module: 4	**4 Hours**

Setting up an establishment-capital and revenue studies, planning for business, review of strategy, tapping of lateral opportunities, SWOC studies.

Module: 5	**4 Hours**

Time management-the role of clients, contractors and service providers

Module: 6	**4 Hours**

The skills of architectural presentation and the management of project delivery.

Module: 7	**4 Hours**

Scaling up and planning for the future

Module: 8		**2 Hours**
Discussions on contemporary professional trends.		
Total Lecture Hours		**45 Hours**
Reference Books		
8.	H.Nandan, Fundamentals of Entrepreneurship,PHI, 3rd Edition 2013	
9.	Rajeev Roy, Entrepreneurship, Oxford, 2nd edition 2011	

Mode of evaluation: Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by Board of Studies	21/2/2022		
Approved by Academic Council	**No. 66**	Date	16-6-2022

Open Electives (OC)

S. No.	Course Code	Course Title	L	T	P	C	Prerequisite
1.	BARC426P	Contemporary Architectural Products and Services	0	0	4	4	BARC498J
2.	BARC427J	Professional Skill Enhancement I	0	0	0	2	NIL
3.	BARC428J	Professional Skill Enhancement II	0	0	0	2	NIL
4.	BARC429P	Python for Architects	0	0	4	4	NIL
5.	BARC430E	Virtual Reality for Architects	1	0	4	5	NIL
6.	BARC431J	Architectural Travel Learning I	0	0	0	2	NIL
7.	BARC432J	Architectural Travel Learning II	0	0	0	2	NIL
8.	BARC433L	Construction Project Management	3	0	0	3	NIL
9.	BARC434P	Geographical Information Systems (GIS) for ARCHITECTS	0	0	4	4	NIL
10.	BARC435P	Architectural Model Making	0	0	4	4	NIL

BARC426P	Contemporary Architectural Products and Services	L	T	P	C
		0	0	4	4
Pre-requisite	BARC498J	Version			
		1.0			

Course Objectives

To provide sufficient hands-on learning experience related to contemporary professional practice and to inculcate additional learning of subject matter relating to products and services in a professional environment of the building industry so as to enhance the technical skill sets in the architectural or allied fields.

Course Outcome

At the conclusion of the coursework, the student will be able to:

1. Identify products and specifications and understand the context of their usage.
2. Compare and evaluate different building products and services and use them appropriately.
3. Communicate effectively with contracting agencies and consultants regarding their products and services.

Module Content

The Module content will be industry driven and will comprise a combination of the following components:

Module 1	Workshops on contemporary building products and services engaging vendors and practitioners on construction processes and latest trends in the industry	8 hours
Module 2	Guest lectures in a product demonstration/ studio mode by representatives of industry demonstrating their products or consultancy services	24 hours
Module 3	Field visits to manufacturing industries to study specifications and production processes	16 hours
Module 4	Two seminars by students on research topics in the building industry	12 hours
Total hours		**60 hours**

Mode of conduct and Evaluation:

1. Submission and evaluation of report/other deliverables as required by different modules of the course.
2. Final assessment test

Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No. **73**	Date	14.03.2024

BARC427P	Professional Skill Enhancement - I	L	T	P	C
		0	0	0	2
Pre-requisite	Nil	Version			
		1.0			

Course Objectives:

To provide sufficient hands-on learning experience related to design and professional practice and to inculcate additional learning of subject matter in a professional working environment so as to enhance the technical skill sets in the architectural or allied fields

Course Outcome:

At the conclusion of the coursework, the student will be able to:

1. Collaborate and work in teams towards achievement of specific goals.
2. Apply academic skills to specific architectural problems and arrive at appropriate solutions.
3. Conduct experiments, analyse and document results
4. Engage with diverse social situations and technological environments and adopt appropriate thought processes to evolve solutions.

Module Content

The Professional Enhancement Skills may be any one of the following:

1. Participation in two or more camps/workshops of minimum cumulative duration of 30 working days over one academic year of engagement.
2. Engaging in vacation internships in architectural offices/construction organisations/other allied industries over a minimum period of 30 working days.
3. In case of group projects, the individual project report of each student should specify the individual's contribution to the group project.
4. Carried out inside or outside the university, in any relevant industry or research institution.
5. Publications in peer reviewed journals / International Conferences will be an added advantage.

Mode of Conduct and Evaluation:

1. Project/s Proposal Approval by guiding committee.
2. Periodic review of progress
3. Submission and evaluation of report/other deliverables as required by the project.

Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC428P	Professional Skill Enhancement - II	L	T	P	C
		0	0	0	2
Pre-requisite	Nil	Version			
		1.0			

Course Objectives:

To provide sufficient hands-on learning experience related to design and professional practice and to inculcate additional learning of subject matter in a professional working environment so as to enhance the technical skill sets in the architectural or allied fields

Course Outcome:

At the conclusion of the coursework, the student will be able to:

1. Collaborate and work in teams towards achievement of specific goals.
2. Apply academic skills to specific architectural problems and arrive at appropriate solutions.
3. Conduct experiments, analyse and document results
4. Engage with diverse social situations and technological environments and adopt appropriate thought processes to evolve solutions.

Module Content

The Professional Enhancement Skills may be any one of the following:

1. Participation individually or as a team member in one or more publicly advertised competitions cumulatively including a minimum of 120 hours of self-directed engagement.
2. In case of group projects, the individual project report of each student should specify the individual's contribution to the group project.
3. Carried out inside or outside the university, in any relevant industry or researchinstitution.
4. Publications in peer reviewed journals / International Conferences will be an added advantage.

Mode of Conduct and Evaluation:

1. Project/s Proposal Approval by guiding committee.
2. Periodic review of progress
3. Submission and evaluation of report/other deliverables as required by the project.

Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC429P	Python for Architects	L	T	P	C
		0	0	4	4
Pre-requisite	Nil	Version			
		1.0			

Course Objectives

4. To provide exposure to basic problem-solving techniques through programming
5. To implant the art of logical thinking for problem solving and arriving solutions for real world problems using Python Programming constructs

Course Outcome

8. Apply the algorithm design techniques to analyze, design and solve problems.
9. Explore the basic programming constructs and the types of functions in Python programming language.
10. Develop solutions using decision making and looping constructs in Python programming.
11. Epitomize compound data using various Python collections such as Lists, Tuples, Sets and Dictionaries.
12. Identify and abstract the programming skills in solving computational problems.
13. Implement Python programs for bio-inspired geometric simulations.

Module:1	Introduction to Computer Problem Solving	8 hours

Problem Solving: Definition and Steps - Problem Analysis Chart - Developing Algorithms: Sequential, Conditional and Iteration Algorithms (Samples: Exchange the values, Counting, Summation, Factorial Computation, Fibonacci Sequence, Reverse, Base Conversion, Character to Number Conversion) - Pseudocode and Flowchart

Module:2	Python Programming Fundamentals	12 hours

Basics: Interactive and Script Mode – Indentation – Comments – Variables – Keywords – Datatypes – Operators and precedence - Expressions – Buil-in Functions – Used-defined Functions – Types of Arguments - Importing from Packages

Module:3	Python Control Structures	12 hours

Decision Making and Branching: if, if-else, nested if, if-elif statements – Looping: while, for, nested loops – break – continue – pass

Module:4	Collections in Python	12 hours

Lists: Create, Access, Slicing/Indexing, List Methods, List Comprehensions – Tuples: Create, Access, Slicing/Indexing, Tuple Methods – Sets: Create, Access, Set Methods – Dictionaries: Create, Access, Dictionary Methods, Iterating through Dictionaries

Module:5	Architectural Design, Modeling and Visualization with Python	16 hours

Computational Design: Introduction - Generating Geometric Shapes and Patterns - Algorithmic Modeling Techniques – Simulating Bio-inspired Geometric in Python - Parametric Modeling:

Introduction - Python Libraries for Parametric design - Data Analysis and Visualization: Pandas, Matplotlib, Seaborn for Architectural Data - Overview of architectural software APIs - Interfacing Python with CAD and BIM software	
Total Lecture Hours:	**60 hours**

Text Book(s)	
1.	Dromey R G, "How to Solve it by Computer", Prentice-Hall international, 2007
2.	"Introduction to Computer Science Using PYTHON: A Computational Problem-Solving Focus", 1/e, Wiley, 2015. ISBN 978-0470555156.
3.	"Python for Architects: A practical guide to computational design, parametric modelling and data analysis", Emily Smith
4.	"Python Scripting for ArcGIS", Paul A. Zandbergen
Reference Books	
1.	G. Brassard and P. Bratley - Fundamentals of Algorithmics - PHI – 2001
2.	Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd, Pearson, 2011
3.	Allen B. Downey, Think Python: How to Think Like a Computer Scientist (2 ed.), O'Reilly, 2015. ISBN 978-9352134755.
4.	Martin C. Brown, Python: The Complete Reference (1 ed.), McGraw-Hill, 2001. ISBN 978-9387572942.

Mode of Evaluation**:** Continuous Assessments and Viva Voce/FAT			
Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC430P	Virtual Reality for Architects	L	T	P	C
		1	0	4	5
Pre-requisite	Nil	Version			
		1.0			

Course Objectives

1. To enable students to understand the concepts of Virtual Reality
2. To educate the students on Virtual Reality technology and its application in the field of architecture
3. To create Virtual environments and applications

Course Outcome

By the end of this course, students will:

1. Understand the hardware technology and development tools used in Virtual Reality
2. Be able to adopt virtual reality technologies to improve architectural visualization
3. Create immersive virtual reality tours

Module:1	Introduction to Virtual Reality	1 hours

Definitions – History of VR – Key VR terminologies – VR and its relations to human perception – The science and theory of human sensory and cognitive systems - multi-sensory interactions with virtual environments – Output Devices – Input devices – Immersive and Non-immersive VR – Immersion and Presence – VR Software - Glossary of VR hardware – Tracking – Rendering - Visual Displays - CAVE

Module:2	360-Degree Virtual Tours	2 hours

Panoramas - Google Street view – Immersive and interactive virtual tours – 3D virtual tours – 360 Degree cameras and software – Key terminologies – 360 Degree camera rigs/mounts - Case studies

Module:3	Pre-Production	2 hours

Scope definition – Content planning – Requirement analysis – Location scouting - Shot list – Storyboarding

Module:4	Production	4 hours

Camera handling techniques – Accessories – Lighting – Camera software – Remote Capturing techniques – Spot editing – 3D models

Module:5	Post-Prodcution	4 hours

Stitching – Retouching – Editing – Panorama editing – 360 Degree video editing – Interactivity – Navigation – Guided tour – Narration – Music

Module:6	Deployment and Testing	2 hours

Hosting virtual tours – Optimization of virtual tours – Compatibility testing – Mobile – Desktop – Head Mounted Display – Google cardboard – User testing – Improvisation

Total Lecture hours	15 hours

Text Book	
1.	Doerner, R., Broll, W., Grimm, P., & Jung, B. (Eds.). (2022). Virtual and Augmented Reality (VR/AR). Springer International Publishing.
Reference Books	
1.	Badotra, S., Tanwar, S., Rana, A., Sindhwani, N. & Kannan, R. (2023). Handbook of Augmented and Virtual Reality. Berlin, Boston: De Gruyter.
2.	Fink, C., Fine, R. and Rosedale, P. (2018) Charlie Fink's metaverse: An AR enabled guide to AR & VR. United States, LA: Cool Blue Media.
Indicative Experiments	
1.	Case study on types of VR devices
2.	Creating Virtual Environment
3.	Pre-Production for a Virtual 360-Degree Tour
4.	Documenting a site using VR: Production
5.	Creating an interactive virtual tour: Post-Production
6.	Compatibility testing
Mode of Evaluation: CAT, Written assignment, Digital assignment, Quiz, Case Study, and FAT	

Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No. **73**	Date	14.03.2024

BARC431J	Architectural Travel Learning I	L	T	P	C
		0	0	0	2
Pre-requisite	Nil	Version			
		1.0			

Course Objectives:

The course is aimed at

- To visit sites of historic, social or cultural significance
- To learn thought engagement with the other school of architecture/alleged fields
- To provide direct personal experiences of built environment
- To explore building with their context

Course Outcome:

At the end of the course the student should be able to

1. **Develop** knowledge, awareness and understanding of architectural development form a theoretical and historical standpoint
2. Critically **evaluate** and contribute to discussions on architectural theory and history
3. Acquire knowledge and awareness of the historical development of structures, construction systems and architectural elements relevant to contemporary concerns
4. Analyze built forms in relation to historical context
5. Demonstrate proficiency in research methodologies and effective communication of findings

Module: 1	Engaging in thoughtful discussions about the observation, to deepen understanding and gain valuable insights	**8 Hours**
Module: 2	Systematically recording the daily rhythms, customs and cultural practices of communities provides valuable insights into way of inhabitants	**16 Hours**
Module: 3	Capturing architectural proportions and elements through drawings or /and photography.	**16 Hours**
Module: 4	Chronicle material and technological aspects	**16 Hours**
Module: 5	Actively discussing functional utilization of architectural spaces through informed dialogues.	**8 Hours**
Module: 6	Participating in global architectural events, collaborating with peers and learning through workshops and seminars. Visiting Industries.	**32 Hours**
Module: 7	Creating a comprehensive set of architectural drawings, details and project reports, accompanied by well-captured photographs, to document the social, cultural and historical context.	**24 Hours**
Total Hours		**120 Hours**

Mode of Evaluation:

1. Active participation: Demonstrated engagement in workshops and seminars
2. Quality and Quantity: Consistent production of quality technical details, sketches and photo documentation
3. Submission of report & Travelogue

4. Viva voce.			
Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC432J	Architectural Travel Learning II	L	T	P	C
		0	0	0	2
Pre-requisite	Nil	Version			
		1.0			

Course Objectives:

The course is aimed at

- To visit sites of historic, social or cultural significance
- To learn thought engagement with the other school of architecture/alleged fields
- To provide direct personal experiences of built environment
- To explore building with their context

Course Outcome:

At the end of the course the student should be able to

1. **Develop** knowledge, awareness and understanding of architectural development form a theoretical and historical standpoint
2. Critically **evaluate** and contribute to discussions on architectural theory and history
3. Acquire knowledge and awareness of the historical development of structures, construction systems and architectural elements relevant to contemporary concerns
4. Analyze built forms in relation to historical context
5. Demonstrate proficiency in research methodologies and effective communication of findings

Module: 1	Discussing observations for insights, to deepen understanding and gain valuable insights	**8 Hours**
Module: 2	Recording community practices reveals valuable insights into inhabitants' way of life.	**16 Hours**
Module: 3	Documenting architectural features via sketches or photography.	**16 Hours**
Module: 4	Chronicle material and technological aspects	**16 Hours**
Module: 5	Engaging in informed dialogues about functional architectural space utilization	**8 Hours**
Module: 6	Participating in international architectural events, collaborating with colleagues, and acquiring knowledge through workshops and seminars. Additionally, explore local specialized manufacturing industries.	**32 Hours**
Module: 7	Producing a comprehensive collection of architectural drawings, detailed documentation, and project reports, complemented by meticulously captured photographs, to chronicle the social, cultural, and historical context.	**24 Hours**
Total Hours		**120 Hours**

Mode of Evaluation:

1. Active participation: Demonstrated engagement in workshops and seminars
2. Quality and Quantity: Consistent production of quality technical details, sketches and photo documentation
3. Submission of report & Travelogue

4. Viva voce.			
Recommended by Board of Studies	13.02.2024		
Approved by Academic Council	No: **73**	Date	14.03.2024

BARC433L	Construction Project Management	L	T	P	C
		3	0	0	3
Pre-requisite	Nil	Version			
		1.0			

Course Objectives

6. To impart a holistic understanding of project management principles, practices, and techniques to manage projects effectively.
7. To provide a comprehensive knowledge of project formulation, procurement, time management, cost management, quality management, and health, safety, and environment management.
8. To develop expertise in project management scheduling software and information systems to plan, execute, and deliver projects successfully.

Course Outcome

At the end of the course, the student will be able to

14. Understand the various processes involved in a project from initiation to closure.
15. Create time schedules for a project with time and resource allocation.
16. Develop a cost, quality, health, safety, and environment management plan.

Module 1	Introduction to Project Management	4 Hours

Introduction: Project, Project Management, Construction Projects, Project Stakeholders in Construction, Stakeholder Roles and Responsibilities, Project Management Process Groups, Project Management Knowledge Areas.

Module 2	Project Procurement and Contract Management	4 Hours

Procurement of Consultants in Construction Projects: Expression of Interest (EOI), Pre-Qualification (PQ), Request for proposal (RFP), Request for Information (RFI)
Procurement of Construction Contractors: Notice Inviting Tender (NIT), Tender Documents, Tender Submission, Pe-bid and Post-bid meetings, Tender Evaluation, Award of Work.
Contract Management: Types of Contracts and their Suitability, understanding Conditions of Contract
Procurement of Materials and Machinery: Procurement time of various materials, Supply chain, Storage of Materials, Procurement and handling of equipment's.

Module 3	Project Formulation and Execution	6 Hours

Construction Projects and Feasibility Studies: Technical, Operational, economic, Legal Requirement, and Scheduling Requirements;
Understanding of Statutory Approval for Construction Projects: Development/Master Plan, Urban and Regional Development Plans Formulation and Implementation (URDPFI) guidelines, Eco-sensitive Zone Regulations, Coastal Zone Regulations, Heritage Areas, etc.
Types of Project Formulation: Design-Build (DB), Design Bid Build (DBB), Build Operate Transfer (BOT), Build Own Operate Transfer (BOOT), etc.

Module 4	Project Time Management in Construction	12 Hours

Activity Definition: Work Breakdown Structure, Listing of Activities; Activity Sequencing: Activity Dependencies, Logical Relationships, Lag and Lead; Activity Duration Estimation: Quantity of Work and Resources, Productivity Data; Schedule Development: Methods of Project Scheduling, Bar Charts, Milestone Charts, Precedence Diagramming Method (PDM), Program Evaluation and

Review Technique (PERT); Project Monitoring and Control: Baseline Schedule, Actual Schedule, Review of Construction Project Progress.		
Module 5	**Cost and Quality Management**	**5 Hours**
Construction Project Cost: Direct Cost, Indirect Cost, Total Cost, Cost-Duration Curves, Normal Time, Crash Time, Normal Cost, Crash Cost; Introduction to the Concept of Quality: Deming's Principles, Concepts by Juran, Ishikawa, Crosby, Taguchi; Quality System Standards: BS 5750/QS 9000 Series; Quality Tools: SWOT Analysis, Ishikawa Diagram, Pareto Analysis, etc. Value Engineering		
Module 6	**Health Safety & Environment Management in Construction**	**5 Hours**
Safety and Environment Management: Principles, Systems and Practices of Safety Management, Safety Regulations, Occupational Health and Hygiene in Construction, Safety Training, Laws for Labour Wellness. Project Environment Management: Environmental Management System Standards, ISO 14000 Standards, Environmental Impact Assessment.		
Module 7	**Project Management Information System**	**5 Hours**
Scheduling Software: Time Scheduling, Resource Scheduling, Global Calendars, Resource Calendar; Asset Management: Management of Facilities		
Module 8	**Case Studies and Examples**	**4 Hours**
Small Scale Construction Projects; Large Scale Construction Projects; Case studies on Project Organogram, Project Phasing, Site logistics, Project Risks and management, Lectures by Experts		
	Total Lecture Hours:	**45 Hours**

Text Book(s)	
1.	B. C. Punmia, Ashok K. Jain and Arun K. Jain. Building Construction. Lakshmi Publications (P) Ltd. Eleventh Edition. 2008
2.	Project Management Institute. A Guide to the Project Management Body of Knowledge (PMBOK®). Seventh Edition. 2021
3.	Bureau of Indian Standards. SP 70 (2001): Handbook on Construction Safety Practices
Reference Books	
1.	Peter Fewings, Christian Henjewele. Construction Project Management: An Integrated Approach. Routledge. 2019.
2.	Christian Brockmann. Advanced Construction Project Management: The Complexity of Megaprojects. John Wiley & Sons Ltd. 2021.
3.	Daniel L. Williams, Elain Britt Krazer. Oracle Primavera P6 Version 8: Project and Portfolio Management. Packt Publishing. 2012
4.	P. Vinayagam, A. Vimala. Planning and Managing Projects with Primavera (P6) Project Planner. I. K. International Publishing House Pvt. Ltd. 2017.
Software	
1.	Scheduling Software (Primavera, MS Project, SYNCHRO etc.)

Mode of Evaluation**:** Continuous Assessment Test, Quizzes, Assignments, Final Assessment Test			
Recommended by the Board of Studies	29.10. 2024		
Approved by Academic Council	76	Date	24.11. 2024

BARC434P	Geographical Information Systems (GIS) for ARCHITECTS	L	T	P	C
		0	0	4	4
Pre-requisite	**Nil**				

Course Objectives

1. **To Understand the Role and Applications of GIS:** Explore how GIS contributes to Sustainable Development Goals (SDGs) and its wide adoption across various fields, including its integration into architectural and planning practices.
2. **To Develop Practical GIS Skills for Architects:** Gain hands-on experience with GIS tools and techniques, focusing on their use in urban design, community planning, site selection, and the digital representation of real-world objects by architects.

Course Outcomes

1. Understand how GIS supports Sustainable Development Goals and why it is an important analysis tool.
2. Demonstrate proficiency in applying GIS across various fields, particularly in architecture and planning.
3. Able to utilize GIS for urban design, community planning, and site selection, enhancing their research and planning capabilities.
4. Students will be skilled in using GIS to digitally represent real-world objects and integrate ancillary datasets into architectural projects.

Module 1	Introduction to GIS & Data Types	4 hours

Introduction to GIS: Definition, history, and importance, **Components of GIS**: Hardware, software, data, people, and methods, **Data Types**: Spatial data (vector and raster), attribute data, **Data Sources**: Satellite imagery, aerial photography, GPS data, and field surveys.

Module 2	Software Installation and Projection	4 hours

GIS Software Installation: Step-by-step installation of popular GIS software (example: QGIS, ArcGIS), **Introduction to Projections**: Understanding map projections and coordinate systems, **Common Projections**: UTM (Universal Transverse Mercator), WGS84, and others, **Reprojecting Data**: The projection of spatial data

Module 3	Georeferencing & Digitization	6 hours

Georeferencing: Definition, importance, and methods, **Control Points**: Selecting and using control points for georeferencing, **Digitization**: Manual and automated digitization techniques, **Editing Vector Data**: Creating and editing points, lines, and polygons.

Module 4	Queries and Attribute Tables	6 hours

Attribute Tables: Structure and components, **Basic Queries**: SQL basics, attribute queries, **Spatial Queries**: Selecting features based on location, **Data Management**: Joining and relating tables.

Module 5	Geoprocessing Tools and Map Making	8 hours

Geoprocessing Tools: Buffer, clip, intersect, union, and dissolve, **Spatial Analysis**: Overlay analysis, proximity analysis, **Map Design**: Principles of cartography, map elements, **Map Production**: Creating and exporting maps.

Module 6	Introduction to Remote Sensing	4 hours

Remote Sensing Basics: Definition, history, and applications, **Types of Remote Sensing**: Passive vs. active remote sensing, **Remote Sensing Platforms**: Satellites, drones, and aircraft, **Data Acquisition**: Types of sensors and data collection methods.		
Module 7	**Image Interpretation, DEM** (Digital Elevation Model) **& Data Conversion**	**6 hours**
Image Interpretation: Visual interpretation, spectral signatures, **DEM**: Definition, creation, applications and contour mapping **Data Conversion**: Converting between different data formats, **Practical Exercises**: Hands-on practice with image interpretation and DEM creation.		
Module 8	**Site Suitability Analysis & Case study**	**8 hours**
Site Suitability Analysis: Definition and importance, **Criteria Selection**: Identifying and weighting criteria, **Overlay Analysis**: Combining multiple layers for analysis, **Case Studies**: Real-world examples of site suitability analysis.		
Total Hours		**60 hours**

Text Book(s)	
1	Lillesand,T.M., Kiefer, R.W. and J.W.Chipman. Remote Sensing and Image Interpretation 5th Edition., John Willey and Sons Asia Pvt. Ltd., New Delhi, 2004.
2	Tor Bernhardsen Geographic Information Systems: An Introduction New ed of 2 Revised edition, John Wiley & Sons; 1999
3	Shiv Mohan, Navneet Munoth, Neha Sharma. Smart Buildings and Cities with Remote Sensing and GIS, 1st Edition., Routledge, 2024
Reference Books	
1	John A.Richards, Springer – Verlag, Remote Sensing Digital Image Analysis, 2005, ISBN:3540251286
2	Chandra P. Giri, Remote Sensing of Land Use and Land Cover: Principles and Applications, Boca Raton, London, New York, 2012
List of Exercises (Indicative)	
1	Introduction to GIS Software Interface
2	Vector and Raster Data Management
3	Map Preparation
4	Performing site analysis using slope and elevation maps
5	LULC map preparation from satellite imagery
6	Image interpretation
Software	
1	ArcGIS
2	QGIS
3	CAD Fusion
4	LIDAR

Mode of Evaluation: **Exercises, Experiments, FAT**			
Recommended by the Board of Studies	29.10. 2024		
Approved by Academic Council	76	Date	**24_ .11. 2024**

BARC435P	Architectural Model Making	L	T	P	C
		0	0	4	3
Pre-requisite	Nil	Version			
		1.0			

Course Objectives

1. Develop skills in architectural model making through hands-on studio workshops.
2. Foster creativity and innovation by encouraging experimentation and speculation, in model design and construction.
3. To prepare the students for better eye- mind- hand coordination and equip them with various model making techniques.
4. Material Knowledge - deciphering appropriate model making materials and sustainable practice.

Course Outcome

At the end of the course, the student will be able to:

17. Master essential techniques and methodologies for constructing architectural models.
18. Gain comprehensive knowledge of diverse model types and their applications in architectural practice and presentation.
19. Apply acquired skills to create accurate and visually compelling architectural models.
20. Understand the role of physical models in the design process and client communication.

Module:1	Introduction to Material, Tools & Techniques	9 hours

An overview of model building and its necessity.
Role of scale-models in design.
Fundamentals of model building, including knowledge of the different equipment and instruments used.
Material Properties and Applications- examination of the range of materials accessible for creating models, including investigating their potential for use in model-making using materials such as papers, mount boards, Balsa wood, plastics, films, plaster of Paris, acrylic, Styrofoam, wax, metals, glass, etc. Types of Models. Material Processing and construction methods- Assembly Methods, Cutting, joining, and finishing techniques.
Introduction to Texture and surface treatments. Design and construct a simple geometric form that demonstrates five different joining techniques.

Module:2	Sketch and Make	9 hours

Introduction to an array of core skills in concept development and representation, through sketching, model making, diagramming, etc.
Analyze the spatial organization and structural composition of an existing architectural element or product through systematic deconstruction, documenting its core components, materiality, and spatial relationships to understand fundamental design principles and construction methodologies.
Develop advanced sketching and technical documentation skills by creating detailed drawings of the analyzed architectural element's components, assembly sequences, and spatial relationships, while simultaneously producing exploded axonometric views that illustrate both assembly and disassembly procedures with emphasis on material connections and structural logic.

Module:3	Ideate and Create	9 hours

This unit familiarizes with fundamental concepts of representation as a vital discipline, and key

principles governing the conception and building of models in three-dimensional tangible form. Model Making in Design Process- Iterative Design Method, Design Development Tools, Process Documentation, Design Evolution Stages. Architectural Elements Study- Roof Systems and Forms, Facade Treatment, Fenestration Design and Detail Development.		
Module:4	**Advanced technological techniques and presentation**	**9 hours**
Exploration of contemporary model-making techniques encompasses several interconnected topics that blend traditional craftsmanship with modern technology. Digital Fabrication Methods such as 3D printing and laser cutting techniques for precise material processing and creating intricate architectural details. Model Illumination Techniques. Capturing and Showcasing Professional Portfolio Work Through Strategic Photography and Dynamic Presentation Techniques.		
Module:5	**Site Realities and Context making**	**6 hours**
This module focuses on the creation of accurate topographical site models and representation of existing context, enabling students to develop a comprehensive understanding of site conditions for architectural projects. Topographic Model Construction- Contour interpretation and mapping, Layering techniques, Material selection for terrain representation and Scale considerations. Existing Context Representation and Landscape Elements -Vegetation representation.		
Module:6	**Major Project**	**18 hours**
This module emphasizes creating detailed architectural models based on students' previous or current semester design projects, focusing on translating 2D drawings into refined 3D representations while accurately expressing contextual relationships.		
Total Lecture Hours:		**60 hours**
Text Book(s)		
1.	Dunn, N. (2014). Architectural model making (No. 2nd ed). Laurence King.	
Reference Books		
1.	Arjan Karssen, Bernard Otte, “Model Making: Conceive, Create, Convince”, Thames and Hudson, 2014.	
2.	Wolfgang Knoll and Martin Hechinger, “Architectural models, Construction techniques”, second edition, Ross Publishing, 2007	
Mode of Evaluation: Exercises & FAT Review		
Recommended Exercises: 1. Create identical 10cm cubic structures using five different materials to compare their workability, strength, and finish qualities. 2. Transform a single architectural concept into three different types of models - massing model, detail model, and presentation model - using appropriate materials for each type. 3. Select a historical building facade and represent its key elements through four different mediums: freehand sketches, physical models, digital diagrams, and analytical drawings, focusing on how each medium reveals different aspects of the design. Document and compare how each representation technique highlights unique architectural qualities such as scale, proportion, rhythm, and hierarchy. 4. Document and analyze a complex architectural connection through detailed photography and measured drawings, then demonstrate your understanding of its		

structural logic by systematically deconstructing, documenting, and reconstructing it using an alternative material while maintaining its fundamental principles. 5. Design a small pavilion, Kiosk, etc. through an iterative process, producing four progressive study models at a scale, where each iteration responds to a different design parameter 6. Develop a detailed sectional model at 1:20 scale of a building fragment that integrates and demonstrates the understanding of elements and construction of the building. 7. Create a detailed scale site model of a given terrain featuring multiple contour levels, existing structures, and landscape elements, demonstrating the understanding of topographic interpretation and context representation.

Recommended by Board of Studies	29.10. 2024		
Approved by Academic Council	76	Date	24.11. 2024