

**BACHELOR OF ARCHITECTURE PROGRAMME**

**AT**

**NED UNIVERSITY OF ENGINEERING  
AND TECHNOLOGY, KARACHI**

**REVISED COURSES OF STUDIES**  
**Detailed Syllabi**  
**(2008-2009)**

**DEPARTMENT OF ARCHITECTURE AND PLANNING  
NED UNIVERSITY OF ENGINEERING AND TECHNOLOGY,  
CITY CAMPUS, MAULANA DIN MOHAMMAD WAFAI ROAD,  
KARACHI-74200.**

## FIRST YEAR ARCHITECTURE

S. No.	Course No.	Course Title	Marks		
			Theory	Practical/ Studio	Total
1.	AR 101	Basic Design	50	300	350
2.	AR 102	Visual Communications	--	200	200
3.	AR 121	Introduction to Environmental Studies	100	--	100
4.	AR 131	Basic Construction	100	50	150
5.	HS 101	English	100	--	100
6.	HS 105	Pakistan Studies*	100	--	100
7.	MS 112	Mathematics for Architects	100	--	100
8.	MS 125	Basic Sciences	100	50	150
9.	CE 102	Engineering Mechanics	100	50	150
<b>TOTAL</b>			<b>750</b>	<b>650</b>	<b>1400</b>

## SECOND YEAR ARCHITECTURE

S. No.	Course No.	Course Title	Marks		
			Theory	Practical/ Studio	Total
1.	AR 201	Architectural Design – I	50	300	350
2.	AR 211	History of Civilizations – I	100	--	100
3.	AR 221	Development Studies	100	--	100
4.	AR 231	Building Construction and Materials – I	50	100	150
5.	AR 241	Introduction to Computer Applications	100	100	200
6.	CE 251	Structures for Architects – I	100	--	100
7.	AR 261	Model Making Workshop	--	150	150
8.	HS 205	Islamic Studies OR Ethical Behaviour	100	--	100
9.	CE-103	Surveying – I	100	50	150
<b>TOTAL</b>			<b>700</b>	<b>700</b>	<b>1400</b>

\* Whenever the admission policy for Bachelor of Architecture will include seats for foreigners, 'HS-127: Pakistan Studies' (for foreigners) will be include as an option.

**THIRD YEAR ARCHITECTURE (INTER ARCHITECTURE)**

S. No.	Course No.	Course Title	Marks		
			Theory	Practical/ Studio	Total
1.	AR 301	Architectural Design – II	50	350	400
2.	AR 311	History of Civilizations – II	100	--	100
3.	AR 321	Housing & Community Development	100		100
4.	AR 331	Building Construction & Materials – II	50	100	150
5.	AR 341	Computer Graphics – I	50	100	150
6.	CE 351	Structures for Architects – II	100	--	100
7.	AR 371	Climatology	100	50	150
8.	AR 381	Landscape Architecture	50	100	150
9.	AR 391	Introduction to Architectural Conservation	100	--	100
<b>TOTAL</b>			<b>700</b>	<b>700</b>	<b>1400</b>

**FOURTH YEAR ARCHITECTURE (PRE FINAL YEAR)**

S. No.	Course No.	Course Title	Marks		
			Theory	Practical/ Studio	Total
1.	AR 401	Architectural Design – III	50	350	400
2.	AR 411	History of Civilizations – III	100	--	100
3.	AR 421	Urban Planning and Design	100	--	100
4.	AR 431	Building Construction and Detailing	50	100	150
5.	AR 441	Computer Graphics – II	50	100	150
6.	CE 451	Structures for Architects – III	100	--	100
7.	AR 461	Building Science	100	50	150
8.	AR 481	Research Methodologies	100	--	100
9.	AR 491	Introduction to Interior Design	50	100	150
<b>TOTAL</b>			<b>700</b>	<b>700</b>	<b>1400</b>

**FIFTH YEAR ARCHITECTURE (B. ARCHITECTURE)**

S. No.	Course No.	Course Title	Marks		
			Theory	Practical/ Studio	Total
1.	AR 501	Architectural Design – IV	100	550	650
2.	AR 521	Design Project	--	200	200
3.	AR 531	Professional Practice	150	100	250
4.	AR 551	Advanced Technologies in Architectural Practice	150	150	300
<b>TOTAL</b>			<b>400</b>	<b>1000</b>	<b>1400</b>

## FIRST YEAR ARCHITECTURE

### AR 101

#### Basic Design

- Principles of Design:** Recognition and understanding of the basic principles and tools of design (such as line, form, shape, pattern, texture, volume, spaces, etc); concepts of design organisation (such as symmetry, balance, hierarchy, repetition, dominance, solids and voids, etc. are introduced).
- Graphic:** Expression (to develop an ability in students to express the ideas and concepts in graphic form); mediums of graphic expression.
- Basic Skills:** Exercises in this section are designed to improve the basic skills of freehand sketching/drawing in various mediums. Concept of perspectives and the play of light and shadow through exercises in sciagraphy.
- Drafting:** Concept of scaled drawings is developed in the exercises of drafting. Architectural scales and architectural drafting techniques also introduced.

### AR 102

#### Visual Communications

- Perspective Drawing:** Types of perspectives (one-point, two-point, three-point), drawing methods, accuracy, selection decisions, controlling distortions.
- Rendering Techniques:** Available media (lead-pencil, pen and ink, pastels, markers, water/poster/acrylic colours, air-brush, collage, mix-media), sciagraphy, effective methods of showing/textures/materials/reflections, over-lapping of drawings.
- Modern Formats:** Photography, multi-media animations (application only), holographic/laser presentations, internet/web uploading, experiential techniques, co-ordination with audio formats.
- Quality/Impact Control:** Psychological aspects of presentation schemes (data-transfer, attraction points, climax/anti-climax), retaining attentiveness of viewers, types of strategies (serial, holistic, corporate-image, informal, inter-active).

### AR 121

#### Introduction to Environmental Studies

- Concepts and Terminology:** Environment; types of environment (physical, social, economic, cultural, religious, natural, man made/built); classification of

environment on the basis of scale (macro and micro) geography (land and aquatic), geopolitical (local, national, regional and global), social (human societies organized on the basis of culture, economy, ethnicity, religion) and settlements/habitat; urban and rural; cities; towns; villages; resources; services; inputs and outputs to the environment; state; state institutions; Pakistani state; organization of state.

## **Environmental Profile of Pakistan –**

### **An Introduction:**

Basic facts and figures; state organization, operation and working; Resources; Population; Introduction to settlement pattern; Major issues of environment (deforestation/forest degradation, water logging and salinity, erosion/sedimentation, desertification, species extinction, urbanization); some key issues in Pakistani environment (water management, aquatic eco-system, health related issues, food related issues, tourism, energy related issues).

### **Karachi – A Profile:**

Basic facts (related to growth, population, economy and urban geography); History and development; Dominant issues (housing, transport, water supply, sewerage, solid waste management, law and order); state response to issues.

### **Case Studies of People's Initiatives:**

Concept of self help; case studies of related organisations.

## **AR 131 Basic Construction**

**Concepts and Terminology:** Basic definitions; philosophy and background of construction; elementary techniques and materials; nomenclature and conventions.

### **Introduction to Basic Materials:**

Stone; timber; cement and concrete; lime; steel (and other common metals used in)

**Aesthetics in Construction:** Introduction to aesthetics; usage of materials in relation to aesthetics; case examples.

### **Communication in Construction:**

Measured drawings; geometry in construction; basic applications of graphical language in construction.

**HS 101  
English**

<b>Report Writing:</b>	Technical report writing.
<b>Speeches:</b>	Preparation of short speeches for various occasions.
<b>Written Communication:</b>	Writing of formal letters and applications; Drafting of memorandums, contracts, Advertisements and tender notices; Preparation of minutes of the meeting; Writing short papers on technical subjects; Note taking.
<b>Oral Communication:</b>	Oral reporting; Conference leading; dictation; Interviewing.
<b>Precis Writing:</b>	Precis Writing.
<b>Essays:</b>	Writing Essays on technical and non-technical subjects.
<b>Applied Grammar:</b>	General rules for writing correct English; Punctuation; Study of words (morphology); Construction and improvement of sentences; Vocabulary building and use of dictionary.

**HS 105  
Pakistan Studies**

<b>An Out line of Emergence of Pakistan:</b>	A brief history survey of Muslim community in the sub-continent; War of Independence 1857 and aftermath. Sir Syed Ahmed Khan; Development of Two Nation Theory; Formation of Muslim League; Lucknow Pact; Khilafat and Non-Cooperation Movement; Political Events from 1924 to 1937; Pakistan Resolution; Struggle for Pakistan from 1940 to 1947; Emergence of Pakistan.
<b>Land of Pakistan:</b>	Geophysical Conditions; Territorial Situation and its Importance; Natural Resources – Mineral and Water.
<b>Constitutional Process:</b>	Early Efforts to make Constitution Problems and Issues; Constitution of 1956 and its abrogation; The constitution of 1962 and its annulment; Constitutional and Political Crisis of 1971; The Constitution of 1973; Recent Constitutional Developments.
<b>Post Independence Developments:</b>	Education in Pakistan, Planning and Development in the Field of Education; Development of Science and Technology with special reference to Engineering and Architecture; Brief Survey of Pakistan Economy, Industrial and Agricultural Development; Internal and External Trade; Economic Planning and Prospects; Cultural Development in Pakistan; Definition, Contents and

Contributing Factors in Culture; Development of Art, Philosophy and Literature.

**Foreign Policy:** Relations with neighbours, super powers and the Muslim World.

**MS 104  
Applied Physics**

**Vectors:** Basic concept; scalar and vector product of two vectors and their physical meanings; application to geometry and Mechanics; algebra of vectors; scalar and vector triple products and their applications.

**Pressure and Energy:** Stress and strain; pressure and gauge pressure; archemiedies principle; surface tension and capillary; bernollis' equation; viscosity; poisevelle law.

**Optics and Waves:** Osillation and waves; wave motion; principle of superposition; electromagnetic waves; reflection and refraction; inteference; diffraction and polarization; waves in elastic media; sound waves; waves in more than one direction.

**Lasers and their Application:** Fundamentals of lasers; solid state lasers; gas laser; semi-conductor laser; liquid laser; laser spectroscopy; laser communications.

**Electronics:** Introduction; temperature measurement; thermocouple; thermistors; IC temperature sensors; strain and displacement LVDT; strain gauge capacitance transducers; pressure force and velocity transducers; vacumm gauges.

**Modern Physics:** Atomic structure; mass – energy conversion relation; radioactivity; alpha, beta and gamma particles and their properties; X-Rays, characteristics and application of X-Rays.

**MS 105  
Applied Chemistry**

**Basic Chemistry:** Definitions; the expression of concentration; Iona; molecules and bonding; balancing reactions; oxidation reduction reactions; equilibrium; conductivity and Ionic strength chemical kinetics; gas laws; gas solubility (Henry's law); solubility product complexes; Nuclear Chemistry.

**Thermodynamics Basis for Equilibrium:** Thermodynamic relations; redox potentials corrosion.

**Acid Base Chemistry:** PH. acids and bases; equivalents and normality; solution of multiequilibria systems; buffers; acid base titrations; natural buffering waters from carbon dioxide and related compounds.

**Organic and Biochemistry:** Carbon; properties of organic compounds; functional groups; aliphatic compounds; nitrogen – containing compounds; aromatic compounds; compounds of sulfur; naturally occurring organic compounds; glycolysis; the tricarboxylic acid cycle; enzyme kinetics.

**Chemistry of Engineering Materials:** Cement; concrete; additives; asphalts; fibre (geo fibre); glass fibre; steel and other metals (Al, Cu, etc.); polymers.

**MS 106  
Applied Mathematics**

**Complex Numbers:** Basic operations; graphical representations; polar and exponential form of the complex number; De ‘Moivre’s Theorem with applications.

**Functions:** Hyperbolic functions and their graphical representation; Hyperbolic and trigonometric identities and their relationship; Exponential functions.

**Differentiation:** Differentiation and successive differentiation and its application to rate; Speed and acceleration; Leibnitz’s theorem and its applications; Equations of tangents and normals; Curvature; Radius and centre of curvature; Maxima and minima of function of one variable and its applications; Convexity and concavity; Points of inflexion; Concept of infinite series; Taylor’s and Maclaurin’s series and expansion of functions; Errors and approximations and limiting values of functions.

**Partial Differentiation:** Partial differential coefficient and chain rule; Partial differentiation of an implicit function; Total differential; Euler’s theorem; Applications to small errors and approximations; Statement of Taylor’s theorem of two independent variable and its applications.

**Integral Calculus:** Standard Integrals; Function of a linear function; Integration by substitution by partial fractions and by parts; Integration of trigonometric functions; Definite integrals and its properties and reduction formulae; Curve tracing in rectangular and polar coordinates.

**Integration Applications:** Volumes of solids of revolution; Centroid of a plane figure; Centre of gravity of a solid of revolution; lengths of curves; Surface revolution; Rules of Pappus; Moment of inertia; Radius of

gyration; Parallel axes theorem, perpendicular axes theorem; Second moment of area; composite figures; Centres of pressure and depth of centre of pressure.

**Analytical Solid Geometry:** Rectangular co-ordinate systems in three dimensions; Direction cosines; Plane (straight line) and sphere.

## **CE 102 Engineering Mechanics**

**Statics of Particles:** Forces in a plane; Newton's first law; free body diagram; forces in space (rectangular components); equilibrium of a particle in space.

**Kinematics of Particles:** Rectilinear and curvilinear motion of particles; components of velocity and acceleration, motion relative to a frame in translation.

**Kinetics of Particles:** Newton's second law; dynamic equilibrium; rectilinear and curvilinear motion; work and energy; kinetic energy of a particle; principle of work and energy; conservation of energy; impulse and momentum; impulsive forces and conservation of momentum; impact; direct and oblique; conservation of angular momentum.

**Rigid Bodies:** Equivalent systems of forces, principle of transmissibility, moment of a force; couple; varignon's theorem; centre of gravity of a three dimensional body and centroid of a volume; moments of inertia; radius of gyration; parallel axis theorem.

**Equilibrium of Rigid Bodies:** Free-body diagram; equilibrium in two and three dimensions; reaction at supports and connections; equilibrium of two-force and three-force bodies.

**Kinematics of Rigid Bodies:** General plane motion; absolute and relative velocity and acceleration.

**Plane Motion of Rigid Bodies:** Forces and acceleration; energy and momentum; conservation of linear and angular momentum.

**Friction:** Basic principles relating to friction between solid bodies; friction angle; wedges.

**Analysis of Structures:** Internal forces and Newton's third law; planar and space trusses, methods of joints and sections; forces in cables; introduction of shear force and bending moment in simply supported beams and cantilever beams.

## **SECOND YEAR ARCHITECTURE**

### **AR 201**

#### **Architectural Design-I**

**Studio Exercises:** Studio exercises include new buildings of small scale such as residences, single person's residence small restaurants, etc.

**Design Principles:** Introduction to design and planning considerations of small scale buildings; concepts of design considerations (such as solar orientation, wind directions, thermal insulation materials, climatic factors, appropriate use of materials and finishes).

### **AR 211**

#### **History of Civilisations-I**

**Primitive Periods:** Stone-age; bronze-age; iron-age; cave-dwelling; the first signs of building activity; inter-relationship of social development and shelter needs/solutions.

**Early Settlements:** Mesopotamia; Indus Valley civilization; Persia; Egypt; Ancient America-Indian civilisations; inter-relationship of power-system and corresponding emergence of structures.

**Classical Periods:** Greece; Macedonia; Rome; the Early Christian and Byzantine periods; the Buddhist and Hindu influence in Asia; inter-relationship of advancements/complexities in art, technology, culture, religion, and the resulting built-environment practices.

### **AR 221**

#### **Development Studies**

**Concepts in Development:** Terminology used in development; systems approach in development; research; extension and development approach; self help approach; partnership approach; hybrid approaches.

#### **Basic Understanding of Economics:**

Definitions; macro economics; micro economics; land economics; urban economics; economic policy; relationship of economic policy and development.

#### **Actors in Development:**

State; state organisations; civil society institutions (such as non governmental organisations and community based organisations); professional groups; voluntary organisations; private sector; informal sector; inter-relationships.

**Development Practice:** Definition of development practice; state procedures of development practice; development and under development; physical development; development practice in Pakistan.

### **AR 231**

#### **Building Construction and Materials-I**

**Anatomy of Buildings:** Nomenclature of building; parts and components; sizes and dimensions; proportions; volumes; relevance of placement; principles of organisation; building and site.

**Components of Building:** Foundations and its types; sub structure and super structure; dimensional relevance with respect to design; slabs; columns; beams; walls; openings.

#### **Combination of Materials in Construction:**

Combination of construction materials; choice and application criteria; finishing materials; surface and sub-surface materials.

### **AR 241**

#### **Computer Applications in Design**

**Understanding:** Basic understanding of computer; importance; usage and applications; introduction to hardware and software; varieties and respective characteristics.

**Applications:** Introduction to programming languages and various software packages their applications in architectural and structural designing.

### **AR 261**

#### **Model Making Workshop**

**Workshop Environment:** Introduction to workshop environment; tools; equipment; methods modes of using tools (wood working, metal working, plastics); application and limitations in tools and equipment.

**Carpentry:** Basic principles of carpentry; tools and equipment; safety measures and precautions; use of sketches and drawings.

**Model Making:** Characteristics of models; scales and dimensions in model making; model making materials; partial models; life sized models; sectional models; blow up models; detailed model.

**CE 103  
Surveying**

<b>Introduction:</b>	Scales, R.F. of scale, conventional signs, principles and objectives of surveying.
<b>Chain Surveying:</b>	Different kinds of chains, principles of chain surveying, instruments used in chain surveying, recording of field book and plotting, obstacles in chain surveying, correction of lengths and areas, Computation of area of regular and irregular figures, plane meter.
<b>Compass Surveying:</b>	Prismatic compass, its use, whole circle bearing and reduced bearing, Magnetic variation, local attraction, Traversing and plotting, closing error and adjustments.
<b>Plane Table Surveying:</b>	Theory and use of simple plane table. Different methods of plane tabling. Two point and three point problems.
<b>Levelling:</b>	Theory of levelling, computing R.L. by Collimation methods and rise and fall methods, curvature and refraction, Contours and their uses. Cross-sections and longitudinal sections of land to understand levels, slopes, cutting and filling, mensuration, calculation of areas and volumes for cutting and filling etc.
<b>Theodolite:</b>	Use of theodolite in taking horizontal and vertical angles. Interpretation of plans from architectural view point. Layout of buildings and demarcation of sites.
<b>Practicals:</b>	To be based on the above studies.

**CE 251  
Structure for Architects – I**

<b>Stress and Strain:</b>	Stress and strain in two and the three dimensions; Elastic constants; Stresses in elastic/working range; Stresses in materials subject to external constraints and stress transformation.
<b>Principal Stress and Strain:</b>	Concept regarding normal, shear and principal stress and strains.
<b>Elastic Constants:</b>	Relationship between elastic constants; Allowable and ultimate loads; Factor of safety.
<b>Determinacy:</b>	Reactions for complex plan structures; Redundancies; Determinacy and indeterminacy.

<b>Bending, Combined and Direct Stress:</b>	Simple theory of bending; Combined and direct stress; Stress due to bending in composite beams; Area and stress transformation.
<b>Bending Moment and Shear Forces:</b>	Conceptual extension of bending moments and shear forces for continuous beams and frames.
<b>Properties of Materials:</b>	Mechanical properties of reinforcing steel and concrete.

**HS 205  
Islamic Studies OR Ethical Behaviour**

<b>Nature, Scope and Method of Ethics:</b>	Ethics and Religion; Ethical teachings of World Religions.
<b>Basic Moral Concepts:</b>	Right and Wrong; Good and Evil.
<b>Ethical Systems in Philosophy:</b>	Hedonism, Utilitarianism, Rationalism & Kant; Self-Realisation Theories; Intuitionism.
<b>Islamic Moral Theory:</b>	Ethics of Quran and its philosophical basis; Ethical precepts from Quran and Hadith and promotion of moral values in society.

**THIRD YEAR ARCHITECTURE (INTER ARCHITECTURE)**

**AR 301  
Architectural Design-II**

<b>Design Process:</b>	Development of a proper ‘design brief’, derivation of design concepts from within the project/context and/or requirements (including necessary ‘research’), zoning, multi-level organisational planning, use of modular planning, variations of a central theme.
<b>Detailing:</b>	Introduction to construction co-ordination, standardisation, evolving appropriate construction details (space-sizes, doors, windows, any other elevation/plan motifs such as grills, hand-rails, partitions, ornamentation).
<b>Range of Projects:</b>	Medium sized residence, hospital, recreation facility/resort, study of the philosophies/methodologies practiced by the Great Masters (Frank Lloyd Wright, Walter Gropius, Le Corbursier, Mies van der Rohe, Louis Kahn), religious buildings, housing complex, re-modelling project, office building.

## **AR 311**

### **History of Civilisations-II**

**Renaissance and Baroque:** Shift of ‘power’ from the clergy to the merchants; accompanying innovations in painting and sculpture; new concepts in architecture; the inter-relationship between the visual arts and the designing of built-environment.

**Industrial Revolution:** The influence of the concept of ‘mass production’ on all the assets as well as Architecture; the beginning of ‘town planning’; the development of the ‘profession’ of architecture in relation to the socio-economic changes resulting from the industrial revolution.

### **19<sup>th</sup> and 20<sup>th</sup> Century Movements:**

Expressionism; futurism; cubism; purism; brutalism; art nouveau; post-modernism; high-tech; populism; conservation; and the influence of all such movements on the profession of architecture; the emergence of the concept of ‘relevance’ in Architectural Design.

**Great Masters:** ‘Walter Gropius’, ‘Mies vander Rohe’, ‘Frank Lloyd Wright’, ‘Le Corbusier’, ‘Louis Kahn’, their philosophies and important works.

## **AR 321**

### **Housing and Community Development**

**Basics in Housing:** Definitions; concepts; terminology

**Housing Typologies:** Single unit housing; row housing; high density housing; low density housing; medium density housing; detached housing.

**Housing Approaches, Dynamics and Options:** Built unit development; actors in housing; land allocation/plot provision; owner built housing; commercially developed housing; cooperative housing; social housing; public housing; mass housing; self help housing; dynamics of squatter settlements; community development issues; incremental housing development.

**Planning & Design Inputs:** Upgrading; low cost approaches; consolidating; appropriate design options of building components; sociology and economics of housing approaches.

## **AR 331**

### **Building Construction and Materials-II**

#### **Typology of Spaces/**

**Buildings & Construction:** Materials and construction options for residential, commercial, public use, administrative and industrial buildings.

<b>Building Exteriors:</b>	External floor and roof finishes/floor components/factors of floor finish; sub-floors; screeds; flooring materials and laying techniques; wall surfaces.
<b>External Finishes:</b>	Weather effects on external finishes; functional and aesthetical considerations; durability and maintenance factors; fair faced finishes; plain surfaces and their treatments; weather proofing of external finishes; water proofing + damp proofing.
<b>Building Interiors:</b>	Cladding elements; complimentary elements; bare finishes; spread on materials; plasters; square cut materials; sheet materials.
<b>Floors:</b>	Floor construction; finishes, components; sub floors/screeds flooring materials and laying techniques.
<b>Walls:</b>	Wall construction in the interiors; finishes; types of walls.
<b>Ceiling:</b>	Types of ceilings; ceiling treatments; false ceiling.
<b>Building Maintenance and Protection:</b>	Paints and polish criteria; systems for internal and external maintenance; protection of building components.

### **AR 341 Computer Graphics**

<b>Graphic Design Package:</b>	Introduction to the various state of the art graphic design packages and their usage or application in architecture.
<b>CAD Drawings:</b>	Use of CAD as a tool for developing architectural drawings. Starting with two dimensional drawings and later developing them into three dimensional views; other up-to-date softwares for three dimensional views.

### **AR 371 Climatology**

- Introduction to climatology
- Importance of climatology
- Application in Architecture

<b>Climate:</b>	Types, Temperature, Cool, Hot Humid, Hot arid, data and analysis, insulation and wind.
<b>Site:</b>	Topography, Landscape/Sun Wind Control, Water, Building Form.
<b>Thermal Comfort:</b>	Psychometric chart, comfort.

**Solar Control:** Shading, Orientation, Use of tables, insulation, fenestration.

## **AR 381**

### **Landscape Architecture**

#### **Introduction to Landscape Design:**

Introduction to the basic concepts and historical developments in landscape design; alteration of the basic land forms through urbanization and rural development is studied.

**Approaches and Principles:** Various planning considerations for conducting an exercise in landscaping are briefed upon in reference with the projects of various scales and magnitudes.

#### **Familiarisation with Plant Species:**

Students are made to develop an understanding and knowledge of the various plant species and varieties. Common varieties of plants and trees are introduced and their forms, profiles, shapes, propagation techniques, suitable soil conditions, desired solar orientation, etc. are discussed. The tips for maintenance and care of plants and trees are also briefed upon.

#### **Landscape Detailing:**

Elements of landscape design such as pergolas gazebos, kiosks pavements, trylises, etc. are introduced outdoor furniture such as light, benches, trash cans, fountains, etc. are also introduced as supportive landscape design elements.

## **AR 391**

### **Introduction to Architectural Conservation**

#### **Introduction and Background:**

Historical development and background of conservation activities within international and national framework; an introduction to the various terminologies related to conservation and historic preservation.

**Theories and Approaches:** Students are introduced to various theories and approaches for conservation in the light of international charters, conference and conventions. Discussions on the legislative framework as well as institutions and organisations involved in conservation work is also made part of the course.

#### **Documentation and Familiarisation with Historic Buildings:**

Introduction to structural system, construction techniques and building materials (as well as common defects and problems of old buildings); documentation techniques and survey or analysis of historic moments.

## **CE 351**

### **Structure for Architects – II**

**Loads and its Implication:** Loads on buildings; Implication of different loads on different structural material and elements.

**Structural Response:** Response of simple structural members to different loads and their combination; Basic structural requirements e.g. equilibrium, stability, strength, functionality, robustness, serviceability, ductility aesthetics and economy; Essential properties of structures materials.

#### **Analysis of Simple Structure:**

Introduction to analysis of simple structure with simplified idealization with emphasis on qualitative analysis, including beams, frames, trusses arches and cables for static and moving loads; Deflection of simple beams with double integration method.

#### **Design of RCC Section/Member:**

Design of RCC sections for flexure, shear, compression and compression plus bending.

#### **Pre-Stressing:**

Introduction to pre-stressing; Underlying principles and losses.

#### **Soil and Foundation:**

Soil properties and foundation; Structural principles for foundation, behavior and detailing.

#### **Structural Drawings and Detailing:**

Symbolic representation, notations, conventions and signs commonly used; Concrete and reinforcement drawings; Steel connections.

## **FOURTH YEAR ARCHITECTURE (PRE FINAL YEAR)**

### **AR 401**

#### **Architectural Design-III**

#### **Studio Exercises:**

Design exercises in this studio include large scale projects involving site planning considerations in addition to architectural design. Projects involving expansion of existing buildings and/or rehabilitation of complexes or urban areas would also be made part of the design exercises. In addition to several sketch problems at least two major project are to be done (university campus, bus terminal, airport, railways stations, seaport).

**Design Principles and Considerations:**

In addition to considerations of orientation and climatic factors exercised in earlier studios, more technical aspects such as mechanical, electrical, plumbing, lighting acoustics, will be focused upon.

**Technological Co-ordination:**

Selection of appropriate structural systems, introduction to the integration of systems and services, including mechanical systems (acoustic, lighting, HVAC).

**AR 411  
History of Civilisations-III**

**Roots of ‘Islamic’ Architecture:**

Beginning of the distinct culture of Islam; the geographical boundaries of the victorious period of Islamic Civilisation; socio-economic order; ideological inspirations; the affect of Islamic intellectual thought on the emergence of Muslim architecture.

**‘Islamic’ vs. ‘Muslim’ Architecture:**

Various point of views in this international debate, prominent definitions, a rational criteria for classification.

**Classical Muslim Architecture:**

The great monuments; types of buildings/spaces; mosques; madrasa; mausoleums; places; forts; bridges; markets; caravanserais; baths; bimaristans; gardens; gate-ways, towers; type of architectural elements/used; arches/domes/vents; structural forms; use of materials; water; light; acoustics; climatic control; ornamentation; levels; tile-work; patterns; calligraphy; regional variations/identities.

**Vernacular Traditions:**

Regional varieties in relation to culture and climate (Yemen, Sub-continent/Mughal; Egypt, Turkey, Persia, Bosnia/Yugoslavia; Africa, the Far-East); geographical/topographical influences past and present.

**50 Years of Architecture in Pakistan:**

Pioneers; foreign influences; institutions; trends; progress; affect of political instability; prominent contemporary professionals (Ideas and works).

**International Quality Today:**

The eminent Muslim architects of the world at present (Hasan Fathy; Cengiz Bektash; Wahid Abdul Wakil, Vedat Dalokaye, and others); their philosophies and works.

## **AR 421**

### **Urban Planning and Design**

**Historical Background:** Early human settlements; human settlements in Egypt, Mesopotamia, Greece and Italy; towns of Indus Valley Civilisation; developments in pre-industrial city.

**Industrial City:** Cities in Renaissance, Baroque and Victorian period; industrial revolution and implications on the city development.

**Urbanisation:** Birth of urbanisation; causes of urbanisation; effects; case examples in urbanisation from developed and developing world.

### **Evolution and Development**

**Urban Planning:** Evolution of the profession; town planning in UK; town planning in the Indo Pakistan Sub-continent.

### **Types and Approaches of**

**Urban Planning:** Planning profession; role in development; approaches and types in planning.

**Evolution of Urban Design:** Evolution of urban design; theories in urban design; case studies.

### **Professional**

**Inter-Relationships:** Professional domains of architecture; urban design; urban planning; regional planning.

## **AR 431**

### **Building Construction and Detailing**

**Working Drawings:** Complete set including architectural working drawing and details (floor plans, sections, elevations, foundation plans, details of roof plan with finishes, details of bathroom layout, details of doors and windows, constructional details, kitchen layout and details, built-in wardrobe and fitting details); introduction to structural working details; introduction of electrical working drawings; layout to plumbing and sanitation.

### **Quantity**

### **Surveying/Rate Analysis**

**BoQ/Specifications:** Preparation of the BoQ; rate analysis; preparation of comparative statement.

## **AR 441**

### **Computer Graphics-II**

The aim of this course is to enable students to practically use the knowledge gained in AR-241 and AR-341 (compulsory pre-requisites to this course).

**Applications:** Utilisation of graphic softwares in preparation of studio presentations and architectural drawings. Application of computer graphic skills to AR-401 and AR-461.

**AR 461  
Building Science**

**Air-Conditioning and  
Ventilation:**

Mechanical and static methods of humidity and temperature control. Natural and artificial ventilation of buildings, air cooling, central air-conditioning and fan coil units. Ducts and pipe sizing and insulation, grills, diffusers, returns, filters, dampers.

**Heating:**

Study of various types of heating systems and their equipments, Heat insulation.

**Mechanical Circulation  
System:**

Study of elevators, escalators, etc. Calculation of lift sizes and capacity. Space requirements of machine rooms, lift-wells and pits.

**Acoustics:**

Study of sound, effect of noise on people, methods of acoustical treatment of spaces, reverberation time, echo etc. Study of acoustic materials. Acoustical design of a small auditorium.

**Lighting and Electricity:**

Electrical distribution system, circuit. Single phase and three phase wiring. Lighting, electrical fittings, lighting levels, lumen calculations, daylight factors.

**Water Supply and  
Drainage:**

Storage and distribution systems in buildings; hot and cold water supply; underground and overhead tanks; pipe sizing; fire fighting systems; waste water disposal systems; fixtures and fittings; pumping systems septic tanks; soak pits; manholes.

**AR 481  
Research Methodologies**

**Introduction to  
Architectural Research:  
Fact Finding Methods:**

Definitions; applied research; scientific research; design research. Observations and documentation; surveys; interviews; forum discussions; photographic documentation.

**Research in Applied  
Architectural Disciplines:**

Urban and regional planning; urban design; urban conservation building restoration; building sciences; building construction.

**Principles of Scientific Writing:**

Bibliographical referencing; types of referring; writing manuals; types of research materials; refereed journals; monographs; treatises; handbooks; understanding and interpretation of architectural texts.

**Presentation:**

Report layouts and formats; port folios; exhibits; presentation folders; fact sheets and summaries; graphical modes and media.

**AR 491**

**Introduction to Interior Design**

Space planning, design, layouts and details of internal spaces of different categories of the built environment will be dealt in this course.

**Concepts:**

Concepts and theories in interior design.

**Design Principles:**

Dominant considerations in interior design including the pre-requisites.

**Design Formats:**

Choice of design themes, interrelationship of materials; furniture and fixture pieces.

**Communication:**

Design, drawing and scheduling modes in interior design.

**Case Study:**

Study of specific interior spaces.

**CE 451**

**Structure for Architects – III**

**Structural Drawings and Detailing:**

Horizontal span structural system; floor and roof structures; Single story enclosure system; Vertical building structure systems, such as walls, columns, frames and cores etc; Structural system in residential construction, industrial construction and multi-storied building.

**Roof Floor Framing Systems:**

One way and two way slabs; Waffles, flat slabs and flat plates, grids and inter connected beams, ribbed slabs; Steel and composite decks.

**Lateral Load Resisting Systems:**

Resistive mechanism for load bearing structures, moment frames, shear walls, cores, tubes and tubular structures; Earthquake loads and its distribution and resistance through structural systems; Diaphragm action of horizontal building planes; Stability of vertical structural building units, story drift and over tuning.

**Structural Planning:** Basic structural components and their structural integrity; Mechanism of load distribution and resistance; Distribution of stiffness of structural elements; Continuity, symmetry, height, mass and geometry; Importance of different structural elements to resist various types of loading in reinforced concrete, wood and steel construction.

**Non Planar and Large Span Roofing:** Structural behavior of pitched roofs, domes, shells, folded plates, cable suspended roofs, dishes and cable-stayed roofs; Verendial girders, and trusses; Stability consideration and materials.

**Water and Earth Pressure Loads:** Structural behaviour of basement walls, retaining walls, underground water tanks, reservoirs and swimming pools; Resistive mechanism and structural stability of elements; Earth sheltered building.

## **FIFTH YEAR ARCHITECTURE (B. ARCHITECTURE)**

### **AR 501 Architectural Design – IV**

In this studio, the student undertake a thesis project of their own choice in any domain of architectural studies. The develop thesis statement, work out a study methodology and undertake research towards a design solution. Series of visual presentations and a thesis report on the prescribed format is done in the conclusion.

### **AR 521 Comprehensive Environmental Design**

This course is based on focused study of micro environments. Under the guidance of course incharge, the students will study the following aspects of the chosen micro environment:

**Societal Understanding:** Historical background; cultural denominations; sociological characteristics, economic status, physical aspects of the settlement.

**Design Tools:** Documentation and survey procedures; modes of data collection; analysis; synthesis; preparation of planning and design briefs; proposal development; presentation modes.

### **AR 531 Professional Practice**

The objective of this course is to allow a familiarisation with all the practical aspects of setting up a practice in the profession of Architecture:

- Legal Modalities:** Legislations/documents/licenses, (Sindh Building Control Ordinance (Amended) of 1983; byelaws; penalties; arbitration; professional ethics; professional organisations/membership; future challenges.
- Office Management:** Pre-requisites; space requirements; administrative setup; financial control/feasibility; dealing with staff/employees; growth/progress selection/dealing with contractors/consultants.
- Client Dealing:** Etiquettes; types of meetings (initial introduction, preparing the design brief; schematic proposals; final approval; presentation/delivery; submission drawings/N.O.C.; construction/supervision agreements); co-ordination with contractors/consultants.
- Site/Project Management:** Clearing/leveling; demarcation; excavation; field staff; security/storage; supply of materials; cash-flow schedules; purchasing; quality-checks; sub-contracts; structure; wood-work; finishes; CPM (critical-path-method); building systems (proto-typical; individual; supply-line techniques; 'turn-key' system); progress-reports; related computer software; handing/taking-over; documentation and portfolio entries; retention of field-staff.

## **AR 551**

### **Advanced Technologies in Architectural Practice**

#### **Constructional Technologies:**

Advanced techniques in excavation, boring, shoring, bracing and casting of reinforced concrete foundations; techniques of building deep water-proof basements; erection of super structure in reinforced concrete, pre-cast concrete and steel; specialised form work e.g. slip forming; form work for large span roofing and stack like structures such as, soils, chimneys etc.

#### **Construction and Materials Technologies for Special Structures:**

Cable suspended structures; tensile and membrane structures; space frames; geodesic domes; various shell forms, dishes and catenary forms with emphasis on constructional details and materials.

#### **Material Technologies:**

Recycling of conventional construction materials; cement replacement materials; new reinforced concrete e.g. Ferrocement, fiber reinforced concrete, natural fibers; sulphur and sulphur impregnated concrete, aggregate replacement; plastics as structural material.

**Strengthening and  
Re-Strengthening of  
Structures:**

Techniques of strengthening and re-strengthening from conventional to newer techniques; repair of structurally damaged buildings; live problems in building structures such as cracks, dampness, settlement, their causes and remedies.