ASC 101 Mathematics for Architecture (3 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	Total
3	2	0	50	0	50	0	100

Course Description
Mathematics for Architecture course is designed to develop analytical, problem solving, logical and computational skills of students so that they can apply the skills in their professional courses.

Course Objectives
After successful completion of this course, students will able to use their knowledge of Matrices and Determinants, Derivatives, Integration, Idea of sketching curves, Vector Algebra, and First Order Differential Equation in their professional courses.

Course Contents

1. Matrices and Determinants (7 hours)
- 1.1 Review of matrices, Product of two matrices, Inverse of matrices
- 1.2 Solution of system of equations by Gauss elimination method
- 1.3 Evaluation of determinant of order three using properties of determinants

2. Differential Calculus (10 hours)
- 2.1 Review of Limit, Continuity and Derivatives of function of single variable
- 2.2 Application of L'Hospital's rule in evaluating problems on limit.
- 2.3 Maxima and minima of single variable
- 2.4 Equation of tangent and normal at a given point of a given curve.
- 2.5 Sketching the curves like Parabola, Ellipse and Hyperbola with their axes parallel to X-axis and Y- axes.

3. Integration and its Application (12 hours)
- 3.1 Basic Integration
- 3.2 Standard Integral and their Usage
- 3.3 Definite Integral and usages of its properties
- 3.4 Approximate area by Simpson's and Trapezoidal Rule
- 3.5 Area between two given curves.
- 3.6 Volume formed by the revolution of a given area about horizontal and vertical lines.
- 3.7 Introduction to double integration

4. First Order Differential Equation (8 hours)
- 4.1 Definition, order and degree of Differential Equation
- 4.2 Solution by separating the variables.
- 4.3 Solution of homogeneous differential equation
- 4.4 Condition for exactness of a differential equation and its solution.
- 4.5 First Order Linear Differential Equation

5. Vector Algebra (8 hours)

5.3 Vector and scalar Product of two, three and four vectors
5.4 Geometrical meaning of scalar product of three vectors
5.5 Condition for co-planarity and related problems

Text Books

1. Wair, Maurice; Hass, Joel and Giordano, Frank R. Thomas' Calculus (Eleventh edition); Pearson Education.
2. Jain, R.K. and Iyengar, S.R.K.; Advanced Engineering Mathematics; Narosa Publishing House.

Reference Books

1. Stewart, James; Calculus – Early Transcendentals (Seventh Edition); Cengage Learning.
2. Sharma, Dharanidhar (Regmi); Toya Narayan Paudel and Hari Prasad Adhikari; Engineering Mathematics I (Sixth edition); Sukunda Publication; Nepal.
3. Sharma, Dharanidhar (Regmi); Toya Narayan Paudel and Hari Prasad Adhikari; Engineering Mathematics II (Fourth edition); Sukunda Publication; Nepal.
4. Pradhananga, S.P. and Khatakho, N.B.; Engineering Mathematics Volume-III (Revised edition); Vidhyarthi Pustak Bhandar; Nepal.
5. Pant, G.D. and Shrestha, G.S.; Integral Calculus and Differential Equations; Nabin Prakashan; Nepal.

HIS 171 Introduction to Architecture (2 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	Total
2	1	0	50	0	50	0	100

Course Description
Introduce the field of architecture and its relation with society, culture, religion, technology and built environment, as well as the profession of architecture and its relation with allied professions, and the role of the architect in Nepal and career opportunities.

Course Objectives
After successful completion of this course, the students will be able to:

- Develop an appreciation of the scope of the discipline of architecture and the different subject areas
- Determine the various factors influencing the built environment
- Relate architecture to different societies, cultures, and religions
- Transformation of architecture due to innovation in building technologies and materials
- Identify and relate the profession of architecture to various allied professionals
- Situate the profession of architecture in a historical context, global & national
- Identify the advantages and disadvantages of working in public and private sectors
- Recognize and relate famous architects, their works and ideas

Course Contents

1. Study of Architecture (3 hours)
- 1.1 Introduction to course and degree
- 1.2 Different subject areas
- 1.3 Introduction to Design Philosophies of 4 master Architects

2. Built Environment and Society (6 hours)
- 2.1 Factors influencing built environment
- 2.2 Local materials and resources, climate, geology
- 2.3 Different scales of built environment from rural to urban, local level to city level
- 2.4 Architecture as outside space, inside space, and both volume and interior

3. Social, Cultural & Religious Context (6 hours)
- 3.1 Prehistoric settlement and rise of early cities
- 3.2 Development of different civilization & religious practices
- 3.3 Examples of vernacular architecture of Nepal.
- 3.4 Socio-cultural Practices influencing hierarchy of streets, squares & open spaces of Malla towns.

4. Technology and Material Context (4 hours)

4.1 Development trend in the west

4.2 Traditional building material and technology of Nepal in various ecological zones.

5. The Profession and Interactive Relationship with Allied Professionals (4 hours)

5.1 Engineers: structural, site, sanitation, electrical, mechanical, etc.

5.2 Planners, Interior Designers, Landscape Architects, urban designers, conservationist, etc.

5.3 Architect's role as a project team leader

6. Profession of Architecture in Nepal (5 hours)

6.1 Historical and contemporary developments of the profession of architecture in Nepal

6.2 Working as an architect: career opportunities, advantages and disadvantages in public and private sectors, role of SONA, NEC, NEA, SCAEF, RUPSON, etc.

6.3 Introduction to building bye-laws and building code

6.4 Relation between client, consultant & contractor

7. Introduction to Famous Architects, their Works and Ideas (2 hours)

7.1 Historical: Renaissance to Neo-Classical

7.2 Modern: Modern and contemporary

Reference Books

1. Glancey, Jonathan. *The Story of Architecture*. Dorling Kindersley, 2003.
2. Kostof, Spiro. *A History of Architecture: Settings and Rituals*. Oxford University Press, 1995.
3. Ong-Yan, Grace and Ruth Peltason, eds. *Architect: The Work of the Pritzker Prize Laureates in Their Own Words*. Black Dog & Leventhal, 2010.
4. Ching, Francis D. *A Visual Dictionary of Architecture*. Van Nostrand Reinhold, New York, 1997.
5. Fletcher, Sir Banister. *A History of Architecture*. 19th edition, Butterworth Heinemann, London, 1987.
6. Nuttgens, Patrick. *The Story of Architecture*. 2nd Edition. Phaidon Press Ltd, London, 1997.

BLT 151 Building Materials (2 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		Total
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	
2	2	1	50	0	30	20	100

Course Description
It gives a broad knowledge on building construction materials and their qualities. This course will allow student to predict the properties and behavior of engineering materials which helps to respond to climate, topography and built environment.

Course Objectives
After successful completion of this course, the students will be able to:

- Acquire knowledge of different building materials & its selection in building construction
- Test building materials and its handling/ storage & procurement

Course Contents

1. Introduction (1 hour)
- 1.1 Building materials as an important architectural component
- 1.2 Types of building materials

2. Stones (3 hours)
- 2.1 Introduction
- 2.2 Source of stone
- 2.3 General classification of rocks
  - 2.3.1 Geological classification
  - 2.3.2 Physical classification
  - 2.3.3 Chemical classification
  - 2.3.4 Base on hardness
- 2.4 Quarrying of Stone, Seasoning and preservation of stone
- 2.5 Dressing of Stone
  - 2.5.1 Methods
  - 2.5.2 Tools and equipments
- 2.6 Selection and use of stones in Architecture and Engineering works; Granite, Sandstone, Limestone, Marble, Slate, Sand and aggregates

3. Clay (2 hours)
- 3.1 Introduction
- 3.2 Constituents of Clay
- 3.3 Types of clay
- 3.4 Use of clay (mud plaster, mortar- clay and surkhi, punning, pointing)

4. Brick (3 hours)
- 4.1 Introduction
- 4.2 Types of brick (Sundried and Kiln)

4.3 Constituents of Brick
4.4 Characteristics of good bricks & classification in Nepal
4.5 Brick manufacturing – manual process and mechanical process
4.6 Traditional bricks of Nepal (Decorative/ patterned)
4.7 Site visit to Brick Factory

5. Lime **(1 hour)**

5.1 Introduction
5.2 Constituents of lime
5.3 Types of lime
5.4 Use of lime- Lime plaster, lime punning, lime painting

6. Cement **(3 hours)**

6.1 Introduction
6.2 Constituents of OP cement
6.3 Basic manufacturing process of cement
6.4 Types of cement
6.5 Storage of cement
6.6 Properties of cement and cement mortar
6.7 Use of Cement- Cement plaster, Cement paints

7. Sand **(1 hour)**

7.1 Introduction
7.2 Classification and uses of sand
7.3 Bulking of sand
7.4 Characteristics of good sand

8. Cement Concrete **(4 hours)**

8.1 Introduction
8.2 Constituent and their qualities
8.3 Workability- Slump Test
8.4 Factors influencing strength
8.5 Mixing, transportation, pouring and curing of concrete
8.6 Concrete admixtures & water proofing

9. Timber and Wood **(3 hours)**

9.1 Introduction
9.2 Types of timber
9.3 Natural structure and defects found in timber (after felling and before felling)
9.4 Seasoning of timber, preservation of timber
9.5 Timber treatment and various timber products available in Nepal
9.6 Different types of boards, plywood, laminated boards and other contextual products

10. Paints and Varnishes **(2 hours)**

10.1 Introduction
10.2 Characteristic of good paints & varnishes
10.3 Constituents of paints & varnishes
10.4 Types of paints-primer, distemper, emulsion and enamel

11. Steel & Alloys (2 hours)

Steel

11.1 Introduction
11.2 Their types
11.3 Properties and Usages.

Alloys

11.4 Introduction
11.5 Their types
11.6 Properties and Usages

12. Insulators and Fire Resistance Material (2 hours)

12.1 Their types
12.2 Properties and Usages

13. Miscellaneous Materials (Introduction, Characteristic, Typology) (3 hours)

13.1 Bamboo and its uses
13.2 Different types of blocks available in Nepal
13.3 Asphalt and bitumen,
13.4 Asbestos
13.5 Glass and Fiberglass,
13.6 Caulking and adhesive,
13.7 Stucco and plaster,
13.8 Plastics, PVC
13.9 Tiles
13.10 Aluminum, ACP, etc. (Should be updated according to availability of new materials)

Laboratory

The purposes of laboratory works are to determine:

1. Compressive strength test of various materials (PCC, Brick, Timber, Rammed earth, etc.).
2. Workability of fresh concrete by slump test
3. Properties of cement: Specific gravity, setting time.
4. Water absorption value of bricks.
5. Grains size distribution of sand by sieve analysis.
6. Grains size distribution of coarse aggregate by sieve analysis

Market Survey & Field Visits (minimum 3 days)

1. Detail market survey on chapter 9 to 13 (Group work)
2. Field Visit to different building material factories

Text books

Singh, Gurcharan, *Building Materials, Standard Publications*, New Delhi, 1996.

Reference Books

1. Harold B. Olin, *Construction Principles, Materials & Method*, Interstate, Printers & Pub. Inc., Danville, Illinois, USA, 1983.
2. Bindra and Arora, *Building Construction*
3. Christine, Beally, *Masonry Design and Detailing for Architects, Engineers and Contractors.*

4. Neville, A.M., *Properties of Concrete*, Pitman Publishing Ltd.
5. Karki S.K. and Bhandary N.P., *Manual on Civil Engineering Materials*, nec Publication
6. Bhattarai, D., *Course Manual on Concrete Technology*, nec Publication

Lab Books

1. Karki S.K. and Bhandary N.P., *Manual on Civil Engineering Materials*, nec Publication.
2. Karki S.K, *Lab Manual on Concrete Technology*, nec Publication

PRS 112 Basic Drafting (2 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	Total
0	0	4	0	0	0	100	100

Course Description
Exploratory course as a tool of technical communication for solving graphical problems. Emphasized on development of visualization & drafting skills.

Course Objectives
After successful completion of this course, the students will be able to:

- Use drafting instruments with an ease for drafting acceptable standard of work in the industry.
- Use range of drafting methods & techniques to enhance basic drafting skills to impart presentable drawings.
- Visualize drawings by various projection principles.

Course Contents

1. Preliminary Drawing Skill (10 hours)

1.2 Introduction to drafting equipments & their use, drawing sheet formats & layout of drawing sheets, etc.
1.3 Skill development in drafting: types of line, line weight & illustration of techniques used to demonstrate material's texture, etc.
1.4 Architectural Lettering
1.5 Scale and Dimensioning styles
1.6 Geometric construction: line bisection, perpendicular line, parallel line, trisection of line, bisection and trisection of angle, construction of polygon, ellipse, etc.

2. Theory of Projections (12 hours)

2.1 Orthographic projection (2D Drawings)
2.1.1 Introduction
2.1.2 System of three planes
2.1.3 Principle of orthographic projection.
2.1.4 Projection of point line, plane, solids in different planes.

2.2 Pictorial Projection
2.2.1 Introduction
2.2.2 Isometric projection
2.2.3 Conversion of orthographic views to isometric projection and drawings.

3. Drafting of Set Architectural drawings (1 & ½ Storied Building) (8 hours)

3.1 Medium: Pencil
3.2 Medium: Pen & Ink

Exercises

Exercise I

1.1 Different types of line practices like Horizontal Lines, Vertical Lines, Inclined Lines, Section Lines, Hidden Lines, etc.

1.2 Practice of different types of materials and texture like building materials, trees, human figures, vehicles, furniture, etc.

1.3 Different types of architectural lettering

1.4 Different scale and dimensioning system of geometrical figures and building drawings

1.5 Geometrical construction: division of lines, bisection and trisection of angle, construction of polygon, ellipse, etc.

Exercise II

2.1 Practice of orthographic projection of point, line, plane, simple geometrical objects

2.2 Practice of pictorial projection of point, line, plane, simple geometrical objects

2.3 Practice of isometric projection of simple geometrical objects

2.4 Practice of isometric projection of complex objects like Steps, Composite objects, etc.

Exercise III

Practice of drafting of Architectural Drawing through different mediums like Pencil, Pen and Ink

Reference Books

1. D.K. Ching, *Architectural Graphics*
2. Paul Wallach, *Drafting*
3. Robert W. Gill *Rendering with pen & ink*

PRS 114 Basic Design I (4 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	Total
1	0	8	0	0	0	100	100

Course Description
Basic Design I and II works together as one integrated program for training in the basics of architectural design, providing the basis for further development in the architectural design studios. The aim of both Basic Design studios is to engage in exploration of two-dimensional & three-dimensional forms and space. Various methods of working will be developed in which the theme of space is primary and to be explored in relation to the other parallel subjects of Year I. Drawing, modeling, and graphic presentation skills will be developed concurrently with the Design studios.

Course Objectives
After successful completion of this course, the students will be able to:

- Understand the significance of design basics
- Develop fundamental vocabulary of design principles, elements and their application in designing of two-dimensional & three-dimensional objects
- Develop imagination & interpretation skills through various means (sketch, model, etc.)
- Explore space through ideas of mass & void

Course Contents

1. Two-Dimensional Elements of Design (15 hours)

1.1 Point, line & plane
1.2 Compositional principles, rhythm symmetry, harmony, balance, unity, contrast, hierarchy, symbolism, dynamics & transformation

2. Three-Dimensional Elements of Design (15 hours)

Interpretation of Point, line, plane & space, solid in 3D

3. Explorations of Space in terms of Mass & Void (30 hours)

Light, patterns, textures, colors & shades, proportion, scale in terms of space

Exercises

Exercise I

1.1 Exercise with geometrical & organic forms to obtain static & dynamic compositions
1.2 Exercise with different composition principles like balance, Harmony, Symmetry, contrast, etc. with various different mediums like pencil, color paper, etc.

Exercise II

Three-dimensional external massing/compositional exercise to introduce various methods (e.g. addition & subtraction, interpenetration, interlocking, etc.)

Exercise III

Conceptualization exercise considering above mentioned parameters to develop understanding of space (e.g. using a component from Design project II.)

Reference Books

1. Simon Unwin. *Analysing Architecture*. Psychology Press, 1997.
2. Ching, Francis D. *Architecture: Form, Space and Order*.
3. Deasy, C. M.: *Designing Places for People*
4. Gibson, James: *The Senses Considered as Perceptual Systems*
5. Hall, Edward: *The Hidden Dimension*
6. Laseau, Paul: *Graphic Thinking for Architects and Designers*
7. Saarinen, Thomas: *Environmental Planning: Perception Systems*
8. Sommer, Robert: *Personal Space*

PRS 111 Free Hand Sketching (2 credits)
B. Arch., First Year, First Semester

Weekly Contact Hours			Student Evaluation Scheme				
			Final		Internal		Total
Lecture	Tutorial	Practical	Theory	Practical	Theory	Practical	
0	0	4	0	0	0	100	100

Course Description
It helps to strengthen and assist in documentation of design ideas.

Course Objectives
After successful completion of this course, the students will be able to:

- Emphasize the importance of free hand sketching in the field of architecture
- Know the different materials and rendering techniques of sketching
- Generate innovative and creative thoughts
- Improve presentation skills

Course Contents

1. Introduction (1 hour)
2. Materials and Equipment (Paper, pencils, brush, colors, erasure etc.) (1 hour)
3. Sketching & Techniques (6 hours)
   a. Hatching and cross hatching.
   b. Tonal sketching
   c. Blending
   d. Accent lines
4. Composition and View Point (4 hours)
   a. Still life
   b. Portraits
   c. Shade and Shadow
   d. Scale and proportion
5. Sketching from Memory (2 hours)
6. Coloring Techniques (4 hours)
   a. Pencil color
   b. Water color
7. Outdoor Sketching with Relation to Architecture Design and Details (10 hours)
   a. Indoor (Interior sketches)
   b. Outdoor (Traditional architecture, Modern Architecture & Landscape)
   c. (Minimum two sketches of each)
8. Framing and Presentation (2 hours)

Exercises

1. Practice in sketching of different types of lines and geometrical forms
2. Practice in sketching of geometrical forms with combination of multiple objects
3. Practice in sketching of different parts of human figures of gypsum (Eye and Nose) and (Ear and Lips)
4. Practice in sketching of gypsum Head
5. Freehand sketching on still life and portraits with shade and shadows
6. Freehand sketching of still life and portraits using coloring techniques
7. Freehand sketching of landscape using water color
8. Freehand sketching of some buildings
9. Freehand sketch of exterior (Modern) place at COLLEGE
10. Freehand sketch of exterior of Historic places
11. Freehand sketch of interior of Modern places

Reference Books

1. Thomas C. Wank; Pencil Sketching
2. Robert B. Gill; Rendering with Pen and Ink
3. Ching D.K; Architecture Graphics