**Department of Architecture**

**School of Architecture and planning**

**University of Management and technology**

**Course Outline (on OBE)**

## UMT’s Vision

## ***Our Vision is... Learning***

It defines our existence, inspires all stakeholders associated with us, creates a powerful momentum inside, and responds to the challenges outside. It continues to evolve as present captures new realities and foresight to unfold new possibilities. All in an incessant attempt to help individuals and organizations discover their God-given potentials to achieve Ultimate Success actualizing the highest standards of efficiency, effectiveness, excellence, equity, trusteeship and sustainable development of global human society.

## UMT Mission

Our Mission is.... Leading

We aspire to become a learning institution and evolve as the LEADING COMMUNITY for the purpose of integrated development of the society by actualizing strategic partnership with stakeholders, harnessing leadership, generating useful knowledge, fostering enduring values, and projecting sustainable technologies and practices.

### Mission of the School

The mission of the School is to provide the best leadership in the fields of the built environment; particularly in the development, management and innovation in the fields of architecture, urban planning and related specializations and sub-specializations

### Mission of the Department

At the Department of Architecture our mission is to challenge the participants to develop their abilities in solving complex problems by thinking creatively & informed decision making as a core of their professional schooling. Offering them a diverse interdisciplinary and meticulous program of studies led by an adroit faculty in a comprehensive studios or class environment and preparing them for leadership roles in the field of Architecture, Construction, Landscape, Built Environment and community development.

Course code: **AR-354** Course title: **Structure for Architects-III**

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| --- | --- | --- |
| Program | B. Arch | |
| Credit Hours | 2+0 | |
| Duration | 2 HOURS | |
| Prerequisites | **Materials and Construction I & II**  **Structure For Architects-I & II** | |
| Resource Person | Section-A: Ar. Madiha Ghafoor  Section-B: Engr. Beenish Mujahid | |
| Counseling Timing | Madiha Ghafoor | Beenish Mujahid |
| Contact | [madiha\_ghafoor@umt.edu.pk](mailto:madiha_ghafoor@umt.edu.pk) | [beenish.mujahid@umt.edu.pk](mailto:beenish.mujahid@umt.edu.pk) |

**Chairman/Director signature………………………………….**

**Dean’s signature……………………………**

**Date………………………………………….**

**Program educational objectives (PEO’s) of Bachelor of Architecture**

**PEO 1:** Ability to comprehend architectural skills manual as well as relevant computer programs

and think creatively and identify new trends in Architectural design

**PEO 2:** Critical learning for a broad function in various areas of Architectural sciences and

building technology including building materials, construction techniques, structural, mechanical, electrical, environmental, earthquake, and construction management

**PEO 3:** Ability to keep themselves abreast with recent developments in the relevant Architecture

and a broad theoretical and conceptual base focusing on research, creativity and

innovation

**PEO 4:** Spirit of discipline and respect for the code of ethics of the profession.

**Program Learning outcomes PLO’s)**

Graduates of the B-Architecture at UMT are expected to have acquired and developed the following set of knowledge, skills and personality traits (these are also referred to as graduate attributes).

**PLO 1** **Architectural Knowledge:** An ability to apply knowledge of mathematics, science, architectural fundamentals and an architectural specialization to the solution of complex architectural problems.

**PLO 2** **Design Analysis:** An ability to identify, formulate, search literature, and analyze complex architectural problems reaching substantiated conclusions using principles of natural sciences and architecture.

**PLO 3** **Design/Development of Solutions:** An ability to design solutions for complex architectural problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.

**PLO 4** **Case study analysis:** An ability to investigate complex architectural problems in a methodical way including literature survey, design and conduct of field surveys, analysis and interpretation of field data, and synthesis of information to derive valid conclusions.

**PLO 5** **Modern Tool Usage:** An ability to create, select and apply appropriate techniques, resources, and modern architectural computer simulations, including prediction and modeling, to complex activities, with an understanding of the limitations.

**PLO 6** **The Architect and Society:** An ability to apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional architectural practice and solution to complex problems.

**PLO 7** **Environment and Sustainability:** Ability to understand the impact of professional architectural solutions in societal and environmental contexts and demonstrate knowledge of and need for sustainable development.

**PLO 8** **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of architectural practice.

**PLO 9** **Individual and Team Work:** An ability to work effectively, as an individual or in a team, on multifaceted and/or multidisciplinary settings.

**PLO 10** **Communication:** An ability to communicate effectively, orally and written, on complex architectural activities with the architectural community and with society at large, such as being able to comprehend and write effective reports, design documentation and make effective presentations. To develop an understanding of architectural language through manual and digital ways, in order to make working drawings and presentable sheets using different rendering modes.

**PLO 11** **Project Management:** An ability to demonstrate management skills and apply architectural principles to one's own work as a member and/or leader in a team and to manage projects in a multidisciplinary environment.

**PLO 12** **Lifelong Learning:** Ability to recognize the importance of, and pursue lifelong learning in the broader context of innovation and technological developments.

**Course learning outcomes (CLO’s)**

After studying this course, the students will be able to:

1. Select Large Span Structure/column free structure for their design project. (C1)
2. Interpret conceptual ideas of steel structures. (C2)
3. Develop understandings about fundamentals of membrane structures. (C3)
4. Experiment with different materials and techniques to enhance concept of tensile structures. (C3)
5. Classify High Rise Structures: Interior and Exterior Structures. (C4)
6. Propose an earthquake resistant structure. (C7)

**Mapping of CLO’s to Program’s learning outcomes (PLO’S)**

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Semester** | **Course Code** | **Title** | **Course Learning outcomes** | **PLO 1: Architectural Knowledge** | **PLO 2: Design Analysis:** | **PLO3: Design/Development of Solutions Design/Development of Solutions Design/Development of Solutions Design/Development of Solutions** | **PLO 4: Case study analysis** | **PLO 5: Modern Tool Usage** | **PLO 6: The Architect and Society** | **PLO 7: Environment and Sustainability** | **PLO 8: Ethics** | **PLO 9: Individual and Team Work** | **PLO 10: Communication** | **PLO 11: Project Management** | **PLO 12: Lifelong Learning** |
| **5th** | **AR-354** | **STRUCTURE FOR ARCHITECTS-III** | Select Large Span Structure/column free structure for their design project | √ |  | √ |  |  |  |  |  |  |  |  |  |
| Interpret conceptual ideas of steel structures | √ |  |  | √ |  | √ |  |  |  |  |  |  |
| Develop understandings about fundamentals of membrane structures |  |  | √ |  | √ |  |  |  | √ |  | √ |  |
| Experiment with different materials and techniques to enhance concept of tensile structures |  |  |  | √ |  |  |  | √ |  |  |  | √ |
| Classify High Rise Structures: Interior and Exterior Structures. | √ |  |  | √ |  |  |  |  |  |  |  |  |
| Propose an earthquake resistant structure |  |  |  |  |  |  | √ |  |  |  |  | √ |

**Learning Methodology**

* Lectures as provided in the schedule of the semester activities
* Assignments related to all studied topics.
* Presentation on allocated topics by doing case studies of buildings

**Grade Evaluation Criteria**

Following is the criteria for the distribution of marks to evaluate final grade in a semester.

**Marks Evaluation Marks in percentage**

Quizzes 10%

Assignments 10%

Mid Term 25%

Term Project 5%

Final exam 50%

Total 100%

**Recommended Text Books**

Building Construction: Principles, Materials & Systems by Madan L Mehta, Walter Scarborough & Diane Armpriest, 2nd Ed, 2016

Building Structures Illustrated by Francis D. K. Ching, 2nd Ed, 2014

**Reference Books**

1. Pearson Construction Technology, CM216, 2009
2. Building Construction Illustrated by Francis D.K.Ching, 4th Ed, 2008
3. Construction materials, methods and techniques by William P. Spence and Eva Kultermann, 3rd Ed, 2006
4. Modern Construction Handbook by Andrew Watts, 3rd Ed, 2014
5. Structure and Architecture by Angus J.Macdonald, 2nd Ed, 2000
6. Barry’s Advanced Construction of Buildings by Stephen Emmitt ,‎ Christopher A. Gorse , 3rd Ed, 2014
7. Building Construction by Varghese, P.C., 3rd Ed, 2009
8. Construction Technology 2 Industrial and commercial building by Riley, Mike and Alison, 3rd Ed, 2014
9. Construction Practice by Cooke and Brain, 1st Ed, 2011
10. Professional Building Construction Directory 1994 by Professional Publishers
11. Structural basis of architecture by Bjorn N.Sandaker, Arne P.Eggen & Mark R.Cruvellier, 2nd Ed, 2011.
12. Structure for architects and Engineers by Philip Garrison, 1st Ed, 2005
13. The Architect’s Studio Companion by Edward Allen and Joseph Iano, 3rd Ed, 2012

**Calendar of Course contents to be covered during semester**

Course code: AR-354 Course title: Structure for Architects-III

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| --- | --- | --- | --- |
| **Week** | **Course Contents** | **CLO** | **Reference Chapter(s)** |
| 1 | Introduction to Material Steel  Steel Spanning System  **Assignment#1**  **Study of Manufacturing Process of Steel and Steel Industries in Pakistan.** | 1,2 | Chapter # 18  Building Construction: Principles, Materials & Systems, 2nd Ed, 2016 |
| 2 | Steel Columns  Steel Connections  Fastening techniques in steel structures | 1,2 | Chapter # 19  Building Construction: Principles, Materials & Systems, 2nd Ed, 2016 |
| 3 | Single storey steel Structures with special focus on wall and roof coverings.  **Assignment # 2**  **Preparation of general layout drawing for steel structures.**  **Also make its model in group of four students.**  **Quiz -I** | 1,2 | Steel Industrial Building  By  Engr. Maha Moddather |
| 4 | Pre-fabricated Construction  Study visit to Izhar Precast Concrete and Steel | 1 | Building Construction  by  S.K.Sharma |
| 5 | **Assignment #3**  **Students will make drawing of Design Project given in Design Studio based on the knowledge taken from Izhar Steel.** | 1 | Class Notes |
| 6-7 | Expansion Joints  **Assignment # 4**  Mark expansion joints in any design projects.  **Quiz -II** | 1 | Expansion joint treatment: material & techniques  by  Farhana M. Saiyed , Ashish H. Makwana, Jayeshkumar Pitroda & Chetna M. Vyas |
| **Mid Term Exam (8th Week)** | | | |
| 9 | Long Span Structures  Shell Structures | 1,3 | Chapter # 6  Building Structures Illustrated by Francis D.K.Ching, 2nd Ed, 2014 |
| 10-11 | Cable Structures  Membrane Structures  Plate Structures  Pneumatic Structures | 3,4 | RAMCON & HATCH-leading industries in membrane structures in Pakistan |
| 12 | **Presentation # 1**  Long Span Structures of Existing Buildings | 1,3,4 |  |
| 13 | Seismology | 6 | Chapter # 5  Building Structures Illustrated by Francis D.K.Ching, 2nd Ed, 2014 |
| 14 | High Rise Structures | 5 | Chapter # 7  Building Structures Illustrated by Francis D.K.Ching, 2nd Ed, 2014 |
| 15 | **Quiz-III**  **Term Project:** Students will prepare models of high rise structures and give presentations on High Rise Structural Systems. | 5 |  |
| **Final Term Exam (Comprehensive)** | | | |