



UNIVERSITI TEKNOLOGI MARA

ARK801: ADVANCED CONSTRUCTION II

<b>Course Name (English)</b>	ADVANCED CONSTRUCTION II <b>APPROVED</b>
<b>Course Code</b>	ARK801
<b>MQF Credit</b>	2
<b>Course Description</b>	The course is a study on various forms and techniques of roofs and enclosures for medium scale and complex buildings. Lectures cover topics on structural system, construction technology, building materials and integration of services to ensure that the students grasp the application of the structural and envelope systems and their integration in the whole building scheme. At the end of the course students are to propose a constructional system and detailing of the roof and/or enclosure system for a building of their choice.
<b>Transferable Skills</b>	Reflective Learner Resourceful and Responsible Effective Communicator Ethically and Socially Sensitive Creative and Innovative Adaptable Independent and Critical Thinker Systematically Inquisitive Solution Provider Experienced Collaborator Expert in Field Balanced graduate (Intellectual-Spiritual-Emotional)
<b>Teaching Methodologies</b>	Lectures, Seminar/Colloquium, Demonstrations, Field Trip, Case Study, Tutorial, Discussion, Presentation, Supervision
<b>CLO</b>	CLO1 Explain various advanced structural system, constructional methods and materials for medium scaled and long span building. CLO2 Propose various advanced constructional methods, materials, and environmental solutions that are suitable in varying design situations.
<b>Pre-Requisite Courses</b>	No course recommendations
<b>Topics</b>	
<b>1. Introduction to Structural Systems</b> 1.1) Definition of Structure 1.2) Structural Failure 1.3) Structural Elements 1.4) Classification of Structure	
<b>2. Principles, characteristics and components</b> 2.1) 1 The structural system and its variations. 2.2) 2 Structural principle. 2.3) 3 Characteristic and classification. 2.4) 4 Innovation and advancement from conventional systems. 2.5) 5 Structural components and construction detailing. 2.6) 6 Choice of material for structure and finishes. 2.7) 7 Contemporary building designs. 2.8) 8 Influence of structure on aesthetics. 2.9) 9 Integration of building services 2.10) 10 Economic and environmental implications	

**3. Space Truss**

- 3.1) Structural Principle
- 3.2) Plane Truss
- 3.3) Space Truss
- 3.4) Parallel Prismatic Truss
- 3.5) Arched Prismatic Truss
- 3.6) Bowstring Prismatic Truss
- 3.7) Tree Truss
- 3.8) Taxonomy of Trusses

**4. Portal Frame**

- 4.1) Structural Principle
- 4.2) Types of Portal Frame
- 4.3) Portal Frame in Steel
- 4.4) Portal Frame in Timber
- 4.5) Portal Frame in Reinforced Concrete
- 4.6) Spacing of Main Bearing Members
- 4.7) Characteristics

**5. Folded Plate**

- 5.1) Structural Principle
- 5.2) Variations of Folded Plate
- 5.3) Folded Plate in Steel
- 5.4) Folded Plate in Reinforced Concrete
- 5.5) Folded Plate in Timber
- 5.6) Support and Retaining Folds

**6. Tensile Structure**

- 6.1) Cable-Stayed Structure:
- 6.2) Structural Principle
- 6.3) Mast
- 6.4) Cable
- 6.5) Rigid Structural Member
- 6.6) Anchorage
- 6.7) Fixing
- 6.8) Aesthetics
- 6.9)
- 6.10) Membrane structure:
- 6.11) Structural Principle
- 6.12) Membrane
- 6.13) Cable within Membrane
- 6.14) Membrane Support, and Fixing
- 6.15) Building Variants
- 6.16) Stages of Building Process
- 6.17) Membrane as Cladding

**7. Shell structure**

- 7.1) Developable shell:
- 7.2) Geometry
- 7.3) Structural Principle
- 7.4) Utilisation in Design
- 7.5) Reinforced Concrete Shell
- 7.6) Timber Lamella
- 7.7) Steel Diagrid
- 7.8) Gridnet
- 7.9)
- 7.10) Synclastic Shell:
- 7.11) Geometry
- 7.12) Structural Principle
- 7.13) Utilisation in Design
- 7.14) Reinforced Concrete Dome
- 7.15) Radial Dome
- 7.16) Schwedler Dome
- 7.17) Diagrid Dome
- 7.18) Geodesic Dome
- 7.19)
- 7.20) Anticlastic Shell:
- 7.21) Geometry
- 7.22) Structural Principle
- 7.23) Utilisation in Design
- 7.24) Structural System based on Ruled Surface
- 7.25) Structural System based on Translational Surface
- 7.26)
- 7.27) Freeform Shell:
- 7.28) Geometry
- 7.29) Structural Principle
- 7.30) Utilisation in Design

- 7.31) Diagrid
- 7.32) Gridnet
- 7.33) Trussed Ladder
- 7.34) Gridshell
- 7.35) Cut-out Metal Sheets
- 7.36) Hexagonal Parametric Glulam

Assessment Breakdown	%
Continuous Assessment	50.00%
Final Assessment	50.00%

Details of Continuous Assessment	Assessment Type	Assessment Description	% of Total Mark	CLO
	Assignment	n/a	50%	CLO2

Reading List	Recommended Text	<ul style="list-style-type: none"> <li>• Terri Meyer Boake, Vincent Hui 2012, <i>Understanding Steel Design</i>, Birkhauser Architecture [ISBN: 9783034602693]</li> <li>• Fuller Moore 1999, <i>Understanding Structures</i>, McGraw-Hill Science Engineering [ISBN: 9780070432536]</li> </ul>
	Reference Book Resources	<ul style="list-style-type: none"> <li>• Lyall S. 2002, <i>Masters of Structure: Engineering Today's Innovative Buildings</i>, Laurence King Publishing. London</li> <li>• Boschetti, J. (Ed.) 2004, <i>Details in Architecture 5</i>, The Images Publishing Group Pty Ltd. Victoria</li> <li>• Ching F., Adams C. 2015, <i>Building Construction Illustrated</i>, John Wiley &amp; Sons Inc. New York</li> <li>• Foster J., Harrington R. 1977, <i>Mitchell's Building Series - Structure and Fabric (Part 2)</i>, B.T. Batsford. London</li> <li>• Foster + Partners 2007, <i>Foster 40: Themes</i>, Prestel Verlag Munich, Berlin, London, New York</li> <li>• Herwig, O. 2003, <i>Featherweights: Light, Mobile and Floating Architecture</i>, Prestel New York</li> <li>• Herzog T., Naterer J., Schweitzer R., Volz M., Wolfgang Winter W. 2004, <i>Timber Construction Manual</i>, Birkhauser. Basel</li> <li>• Koch K-M. 2004, <i>Membrane structures</i>, Prestel Verlag. Munich, Berlin, London, New York</li> <li>• Lyall S. 2002, <i>Masters of Structure: Engineering Today's Innovative Buildings</i>, Laurence King Publishing London</li> <li>• Mostaedi A. 2003, <i>Architecture in Detail: Roofs</i>, Carles Broto &amp; Josep Ma Minguet Barcelona</li> <li>• Schunck E., Oster H., Barthel R., Kiessl K. 2003, <i>Roof Construction Manual: Pitched Roofs</i>, Birkhauser. Basel, Boston, Berlin</li> <li>• Slavid R. 2005, <i>Wood Architecture</i>, Laurence King Publishing. London</li> <li>• Van Uffelen C., Steybe S. 2008, <i>Pure Plastic: New Materials for Today's Architecture</i>, Verlaghaus Braun.</li> <li>• Wigginton M. 2003, <i>Glass in Architecture</i>, Phaidon. London, New York</li> </ul>
Article/Paper List	This Course does not have any article/paper resources	
Other References	This Course does not have any other resources	