COURSE OUTLINE

1. GENERAL

SCHOOL	POLYTECHNIC		
DEPARTMENT	ARCHITECTURE		
LEVEL OF COURSE	UNDERGRADUATE		
COURSE CODE	ARC_640	**SEMESTER OF STUDIES**	SIXTH
COURSE TITLE	**BUILDING TECHNOLOGY 4**		
INDEPENDENT TEACHING ACTIVITIES		**TEACHING HOURS PER WEEK**	**ECTS CREDITS**
Lectures, seminars		**2**	
Studio Work & Assignments		**6**	
			6
COURSE TYPE	Field of Science (Architecture and Building Science) and Skills Development (Building Technology)		
PREREQUISITE COURSES:	BUILDING TECHNOLOGY 2		
TEACHING AND ASSESSMENT LANGUAGE:	Greek. Teaching may be however performed in English in case foreign students attend the course.		
THE COURSE IS OFFERED TO ERASMUS STUDENTS	Yes		
COURSE WEBPAGE (URL)	https://eclass.upatras.gr/courses/ARCH411/		

2. LEARNING OUTCOMES

The aim of the course is practicing on a specific integrated building design of specific requirements with emphasis on shaping the structural frame by metallic and/or wooden sections. The goal is to be clearly understood by the students: a) the context of the application and investigation of the construction of the examined structures, b) the parameters that affect the construction of these structures as well as c) the methods and tools available to the Architect to resolve these issues.

On successful completion of the module, students will be able to:

- Understand and employ the basic terminology of lightweight structures.
- Understand the properties, function and application of the different elements of metal, wood, membrane and tensile structural systems.
- Understand the manufacturing and assembly (in situ and/or prefabricated) processes of these materials.
- Acquire the ability of analysis and critical thinking on issues related to the structure, style and construction methods of lightweight structures.
- Select the proper building methods and materials for a project and communicate their design proposals choosing the appropriate means.
- Develop more design and representation skills in designing sections and details, deepening at small scales of design.
- Understand the need for an interdisciplinary approach and collaboration to the design process to ensure a successful project and a desirable use of the building.

General Abilities

Generally, by the end of this course the student will, furthermore, have develop the following general abilities (from the list above):

- *Searching, analysis and synthesis of facts and information, as well as using the necessary technologies*
- *Adaptation to new situations*
- *Decision making*
- *Autonomous (Independent) work*
- *Group work*
- *Excercise of criticism and self-criticism*
- *Promotion of free, creative and inductive thinking*
- *Respect to natural environment*
- *Work design and management*

3. COURSE CONTENT

The course of Building Technology 4 deepens in design of complex entities and structures (closed or open) from wood or metal, or a combination of them, large spans, prefabrication, etc. Issues are emphasized in the study building non-standard construction details through the detailed design of connecting components of interest, in conjunction with the composition of light elements of the outer shell of buildings. As in the previous semester the framework of courses aim to develop the perception of construction techniques of specific construction systems: namely the concept of structure and geometry of buildings from metal, wood, glass etc., their bearing elements, the various building systems and the relationship between structure and architectural form. Further emphasis will be placed on integrated planning implementation of integrating systems in construction and on the study of specific parts and detailing. The course is a continuation of the course Building Technology 3. It deals with additional information relating to the light construction and further deepening the elements already taught. Knowledge gained in the previous semester is essential, although typically not a pre-requirement for the course in accordance with regulations of the Department.

The following topics are covered in this course:

- Properties of materials: compressive, tensile, shear and bending stress, strain, tension, forces equilibrium, elasticity, curvature, resistance, stiffness and loading conditions.
- Metals: physical properties, manufacturing, construction and assembly.
- Wood and engineered-wood: physical properties, manufacturing, construction and assembly.
- Textiles: physical properties, manufacturing, construction and assembly.
- Frame, long-span members, bringing, shear walls.
- Applications in primary structure (frame) and building envelope (foundations, load-bearing walls, shear walls, curtain walls, partition walls, gladding, floor and roofing systems).
- Composite and sandwich structures.
- Metal alloys.
- Wood fibre composites.
- Polymer-based fibre composites (plastics).
- New unconventional materials and their use in applications with low weight requirements.
- New functionality and use in terms of reduced fuel consumption, environmental impact and life cycle cost.
- Fireproofing and fire protection.
- Detail Design – The Synthesis of Detail

4. TEACHING AND LEARNING METHODS - ASSESSMENT

<table>
<tr><td>TEACHING METHODS</td><td>Lectures, seminars and Studio Work Face to Face.
The course will be taught through lectures on specific subjects of construction and construction details and case studies. Students will visit worksites for practical experience. Exercises for this course may be based on the work completed in previous studios.</td></tr>
<tr><td>USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES</td><td>Use of Information and Communication Technologies (ICTs) (e.g. powerpoint) in teaching providing information on the theory and practice of the laboratory assignments and the methodology for multi-step syntheses. The lectures content of the course for each chapter are uploaded on the internet, in the form of a series of .pdf files, where from the students can freely download them.</td></tr>
<tr><td>TEACHING ORGANIZATION</td><td>
<table>
<tr><th>Activity</th><th>Work Load per Semester</th></tr>
<tr><td>Lectures (2 conduct hours per week x 13 weeks)</td><td>26</td></tr>
<tr><td>Studio Work (6 hours per week x 13 weeks)</td><td>78</td></tr>
<tr><td>Hours for private study of the student and preparation of assignments (150-78-26)</td><td>46</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Total number of hours for the Course (25 hours of work-load per ECTS credit)</td><td>150 hours (total student work-load)</td></tr>
</table>
</td></tr>
<tr><td>STUDENT ASSESSMENT</td><td>The form of assessment for this module is coursework and examination.

Final Written Examination (35%) that includes:
Multiple Choice Questions
Drawing Exercises
Critical thought and understanding of Theory Questions
Delivering of Autonomous Project Assignments (65%) including:
Studio Project Work
Theory Assignments
The criteria of assessment are listed in the course syllabus (outline and timeline of course) posted on the e-class platform. The criteria listed are the following: "the evaluation of students will be based on the degree of development, the ability of analytical thinking, understanding and assimilating the concepts, on creativity, on synthetic and design capability, as well as on participation in the educational process»</td></tr>
</table>

5. RECOMMENDED LITERATURE

PRIMARY READING (incl. Books in Greek)

- Τσινίκας, Νίκος, Π. (2016) *Αρχιτεκτονική Τεχνολογία* Γ' Έκδοση. University Studio Press A.E.
- Καλογεράς, Ν., και άλλοι (1999) *Θέματα Οικοδομικής,* Εκδόσεις Συμμετρία, Αθήνα.
- Κουκής, Σ. (2001) *Δομική Τεχνολογία.* Αθήνα
- Αθανασόπουλος, Χ. (2000). *Κατασκευή Κτιρίων. Σύνθεση και Τεχνολογία.* Αθήνα
- Ballard Bell, Victoria and Rand, Patrick (2006), Materials for Architectural Design, Lawrence King.
- Daniels, K. (2000), Advanced Building Systems: A technical Guide for Architects and Engineers, Birkhauser
- Deplages, Andrea (2005) Constructing Architecture. *Materials, Processes, Structures. A Handbook.* Birkhauser.
- Chudley, Stephen and Greeno, Roger (2010), Building Construction Handbook. Elsevier.
- Ching, D. K., Francis (2008),Building Construction Illustrated, 4th edition, J. Wiley & Sons

- Ching, D. K.Francis (2009), Building Structures Illustrated. Patterns, Systems & Design. J. Wiley & Sons.
- Farrelly, Lorraine (2009),*Construction and Materiality,* AVA Publishing SA, Switzerland.
- Hall, Andrew (ed), (2009), Details in Architecture. Creative Detailing by Leading Architects. Images publishing.
- Lyons, Arthur (2007), Materials for Architects and Builders, 3rd edition, Butterworth-Heinemann.

SUPPLEMENTARY READING

- Allen, Edward and Iano, Joseph (1990) Fundamentals of Building Construction: Materials and Methods, Wiley
- Ambrose, James (2002), Simplified Mechanics & Strength of Materials for Architects and Builders, Harry Parker.
- Braham, W.W. and Hale, J.A. (2007), Rethinking Technology, Routledge/ Taylor and Francis Group.
- Charleson, W. Andrew (2005) Structure as Architecture. Architectural Press – Elsevier
- Cowan, H. and Smith, P. (2004), Dictionary of Architecture and Building Technology, Routledge Taylor and Francis Group.
- Daniels, K. (2000), Low Tech, Light Tech, High Tech: Building in the Information Age, Birkhauser.
- Garrison, P. (2005) Basic Structures for Engineers and Architects. Blackwell Publications
- Herzog, Natterer, Schweitzer, Volz, Winter, (2004) *Timber Construction Manual*. Birkhauser
- Leatherbarrow, D. & Mostafavi, M. (2002), Surface Architecture, The MIT Press.
- Macdonald, J. Angus (2001) Structure and Architecture. Architectural Press – Elsevier
- Merritt, Frederick S., and Ricketts, Jonathan T. (2000), Building Design and Construction Handbook, 6th edition, McGraw-Hill.
- Schierle, G., G. (2006) Architectural Structures, USC Custom Publishing.
- Schodek, D.L. (2000), Structures, Prentice-Hall (4th edition)
- Steurer, Anton, (2006) *Developments in Timber Engineering. The Swiss Contribution.* Birkhauser
- Watts, Andrew, (2001) Modern Construction Handbook. Springer-Verlag Wien New York
- Weston, Richard (2003), Materials, Form and Architecture, Laurence King.