UNIVERSITÀ
DEGLI STUDI
FIRENZE

DiDA – DIPARTIMENTO DI ARCHITETTURA/ARCHITECTURE DEPARTMENT
C.d.L ARCHITETTURA MAGISTRALE – Curriculum in **ARCHITECTURAL DESIGN** - **iCAD -** Class LM-4 coc. B076
a.a.2017-18

ARCHITECTURE STRUCTURAL DESIGN LAB

PROF.RICCARDO RENZI (Architectural Design I)
PROF.MARIO DE STEFANO (Structural Design)
PROF.GIUSEPPE RIDOLFI (Building System Design)

Class Overview
The course includes an integrated multidisciplinary teaching in: *Architectural Design*, *Structural Design*, and *Building Systems Design*, focused on structural analysis. The specific educational purposes of a further discussion of the theoretical and operative basis behind structural design and dimensioning are integrated with the more general control of the design and composition, and of its constructive connotations, according to an educational plan aimed at providing, through the new Laboratories, an ever increasing organic consultation between the various aspects involved in the design process. Quick look at http://issuu.com/dida-unifi/docs/icad

Common rules
During class is forbidden to use cell phones, drink and eat, and listen to music, talk loud or act in any way to disturb, etc.. During lecture is forbidden to use also computer etc. The student has to be present at each lecture and each desk critique/review. Each project/assignment deadline as scheduled is mandatory. The student will be able to reach the final exam only if has reached a minimun of 75% of presence at the lessons.

ARCHITECTURAL DESIGN 1 - B018878 - 6CFU –

PROF. RICCARDO RENZI
Teaching assistants: Elena Ceccarelli, Anna Dorigoni, Stefano Fusi, Andia Guga, Alessandra Marchetti.
Coll: Gabriele Marinari.

Overview
The course is based on the architecture in different scale: from urban to the interior one. The student will be designing the final project starting from reading the city and than developing the concept in volumes. Later on the concept will become the final idea working with functional and organized interior spaces.

Assignment
Before to focus on final project each student will have to deliver (mandatory deadlines) several assignments. These exercises are useful for the student to understand italian architecture and its particular system of hidden compositional rules, of building, of city, of public space. All the assignment are mandatory and will be delivered to the teacher as scheduled. The student will have also to read some books. All the assignments are held by a single student.

Final Project
Final Project will be the design for a new building. It will focus on building as special architecture and its role in the contemporary space of the city. The student will have to be present at Desk Critique/Review to show the project to the teaching staff. Only when the teaching staff will agree that the project is complete the student will be able to reach the final exam. The Architectural Structural Design Lab will have a single grade for each single student and it will be the mathematical media between the grades of Architectural Design I, Structural Design and Building System Design and its assignments.

Attendance
The student has to be present at each lecture and each desk critique/review. Each project/assignment deadline as scheduled is mandatory. The student will be able to reach the final project only if has reached a minimun of 75% of presence at the lessons. In each Desk Critique/Review student will have to show drawings (handmade or printed) in scale (1:500/1:200/1:100/1:50/1:20 are the scale accepted) and handmade model of the project (1:500/1:200/1:100/1:50). The teacher will not respond at any email from the student asking suggestions or indication on the project/assignment, the Desk Critique/Review is the only way for the student to show the work in progress. For each student is mandatory to sign in at the morning arrive in teacher's register of attendance.

Behaviour
During class is forbidden to use cell phones, drink and eat, and listen to music, talk loud or act in any way to disturb, etc.. During lecture is forbidden to use also computer etc. The student will have to carry always a A4 sketch book and drawings tools, plus materials for work on models as working in class.

Mandatory readings (a short abstract of these books will be provided by each single student at the end of class)
Le Corbusier, Toward an architecture, 1923
B. Zevi, Architecture as Space, 1948
A. Rossi, The Architecture of the city, 1966
K. Elam, Geometry of design, 2001

Essential texts
K. Lynch, The image of the city, 1960
E.T. Hall, The Hidden dimension, 1966
G. Grassi, Architecture dead language, 1967
N. Pevsner, A history of building types, 1978
C. Norberg-Schultz, Western Architecture, 1979
W. Lotz, Architecture in Italy 1500-1600, 1995

Suggested readings
C. Sitte, City Planning According to Artistic Principles, 1889
F.L. Wright, An organic architecture. The architecture of democracy, 1939 (1945)
W. Gropius, Scope of Total Architecture, 1955
P. Johnson, Mies van der Rohe, 1948
L. Mumford, The city in history, 1961
R. Koolhaas , Delirious New York, 1978
C. Van de Ven, Space in architecture, 1980
K. Frampton, A critical history of Modern Architecture, 1980
D. Watkin, German architecture and the classical ideal, 1987 (1990)
J. Baudrillard, J. Nouvel, The singular object of architecture, 2003
R. Koolhaas, Junkspace, 2006
P. Zumthor, Atmospheres, 2007

Email: riccardo.renzi@unifi.it ----Teacher's page http://www.unifi.it/p-doc2-2015-0-A-2c2a3a293429-1.html

STRUCTURAL DESIGN - B020740 - 6CFU –

PROF. MARIO DE STEFANO
Teaching assistant: Prof. Valerio Alecci

Overview
The Modulus of Structural Design aims at providing the students with the main theoretical bases and code requirements necessary for the structural design in seismic zones. Students will be able to understand the main structural features of reinforced concrete and masonry buildings and problems arising from regularity/ irregular shapes both in plan and elevation; they will also analyse o building damages and collapse mechanisms due to seismic events.

Learning Objectives
The Course of Architectural Structural Design Lab includes an integrated multidisciplinary teaching in: Architectural Design, Structural Design, and Building Systems Design, focused on structural analysis. The specific educational purposes of a further discussion of the theoretical and operative basis behind structural design and dimensioning are integrated with the more general control of the design and composition, and of its constructive connotations, according to an educational plan aimed at providing, through the new Laboratories, an ever increasing organic consultation between the various aspects involved in the design process.

Teaching Methods
Specific topics of the Modulus of Structural Design are presented during initial lectures. Subsequently, structural design of particular elements will be carried out and students will have to present their drawings at Desk Critique/Review to discuss and revise them with the teaching staff.

Further information
During class is forbidden to use cell phones, drink and eat, and listen to music, talk loud or act in any way to disturb, etc.. During lecture is forbidden to use also computer etc. The student has to be present at each lecture and each desk critique/review. Each

project/assignment deadline as scheduled is mandatory. The student will be admitted to the final exam only if has reached a minimun of 75% of attendance at the lectures.

Type of Assessment
Final exam will grade the final integrated project

Topics
Lessons from earthquakes:
- The L'Aquila seismic event of 6th of april, 2009.
- Reinforced concrete buildings damages and collapse mechanisms
- Masonry buildings damages and collapse mechanisms
- The effect of the structural regularity/irregularity
- Eurocode requirements

Principles of Conceptual Design:
- Structural simplicity
- Regularity
- Bi-directional strength and stiffness
- Torsional strength and stiffness
- Floor slabs as rigid diaphragms
- Adequate foundations

Design of reinforced concrete structural elements:
- Concrete and steel
- Ultimate Limit State
- Serviceability Limit State
- Bending design of rectangular cross sections
- Design of rectangular cross sections under combined axial and bending actions

Recommended Texts
EC8, Eurocode EN 1998, European Union norm on construction. Design of structures for earthquake resistance, 1998.
Seismic Design of Reinforced Concrete and Masonry Buildings, Paulay, T. and Priestley, N., John Wiley & Sons, 1992.
Design of Earthquake Resistant Buildings, Wakabayashi, M., McGraw-Hill, New York, NY, 1986.
The Seismic Design Handbook, F. Naeim, Ed., Kluwer Academic Publishers, 2001.
Earthquake Resistant Design, Dorwick, D., Wiley, New York, NY, 1989.
Fundamentals of Earthquake Engineering, Newmark, N. and Rosenblueth, E., Prentice Hall, New York, NY, 1971.

BUILDING SYSTEM DESIGN – B020741 – 6CFU

PROF. GIUSEPPE RIDOLFI

Overview
Form Manufacturing is mainly focused on BIM: the most well-known acronym of digital technologies in AEC. A pro-fessional procedure yet required in many countries. A new modus operandi catching the atten-tion of other growing services in construction How it works, and how we can work with it are the questions the course is addressing focusing on design conception, and management. Design as a research practice based on digital crafting, physical testing and prototyping are also covered

Suggested readings
Bibliography, reading materials, lectures integrations, tutorials to assist assignments and other resources including full Syllabus, and Class Schedule are available online at Mailab.biz.
Students are required to access regularly the website to check news and resources update.

Learning Objectives
Upon completion the class, the student is expected to acquire:

• capacity to understand contemporary digital architecture;
• knowledge and skills to conceive and manage construction operational workflows and architectural artifacts under the digital technologies of industrial manufacturing;
• geometrical knowledge and skills to operate in form generation and modeling software;
• confidence with spatial aggregations of a different kind of elements, and structural behaviors
• abilities to manage the designing process combining architectural design, structural engineering, construction technologies,

materials and computer fabrication techniques
• basic understanding of the computer-numerically assisted fabrication process and software to feed it
• capacity to produce iterative models to test and to verify architectural hypothesis
• awareness on advanced technologies and new materials suitable for architecture
• abilities to conceive communication strategies and to realize effective public presentations

Prerequisites
Student attending the class is required to have her/his laptop with preinstalled 3D CAD software, raster/vector graphic programs and any other digital tools for visual communication and public presentations. Plugins and other specific software to support class activities will be available for free downloading during the semester.
Although the class is an introductory teaching on BIM and Computational Design, each student is expected to have confidence in CAD with a basic understanding of solid modeling and to be skilled in graphic design for final and intermediate presentations. Because the class is not providing any teaching about the use of CAD and graphic software and considering that the class proceeds from scratch to advanced modeling techniques, till parametric/generative design in second year, students is strongly recommended to enter short courses on BIM / 3D CAD provided by the «Laboratorio Informatico del Dipartimento di Architettura (LIA)» In addition, students are required to have completed studies on traditional materials and technologies for architectural constructions.

Teaching Methods
The class is a fab-lab conceived as an hybrid computer based hands off/hands on activity, supported by the Department's Architectural Models Laboratory (LMA), MAILAB – Multimedia Architecture Interaction, reinforced by theoretical dissertations; discussions; and intermediate individual / collective reviews presentations.
Theoretical activities are carried out through teacher's slide presentations integrated by guest lectures, selected readings, case-study analysis.
Other activities are developed through home and in-class assignments concerning the release of a "Construction Prototype Model" for the structural system of the main Lab's Project, and other exercises con natural morphogenesis; physical/digital shape manipulations and generations; manufacturing; case-study analysis; experiments based on transformational methods entailing manipulation of surfaces or objects through different procedures and techniques (cutting/stretching, morphing/warping, folding/unfolding, origami/kirigam, waffling, tessellation).

Further information
Academic integrity and honesty. The class is against plagiarism and dishonesty. Cheating, appropriation of materials from other authors without crediting them and re-using researches or projects done in previous course without appropriate authorization is a violation of the University's code of academic integrity. Penalties for such violations can result in loss of credits, to fail the course and, in severe cases, to incur legal actions. Students are invited to place clearly source references and credits in appropriate way using standard conventions.

Type of Assessment
Student work evaluation is based on attendance, and credits get during the semester. Class policy establishes that if the student is not attending compulsory classes (see the Class schedule) or has collects more than three absences fails the exam. In any case, the professor is not responsible for students who are not receiving information due to their truancy

Evaluation is expressed on the assignments' results and graded in thirty taking in consideration originality, creativity, refinement, dedication, attention, completeness, correctness:
• 30L- 29 exceptional evaluation, awarded to students whose work is outstanding
• 28-27 distinguished evaluation, awarded to students whose work is good
• 26-24 average evaluation, awarded to students whose work is adequate
• 23-18 low evaluation, awarded to students whose work is sufficient but not completely satisfying in all the aspects
• • NC «not classified», awarded to students whose work is missing or presents severe lacks.
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Students failing the course need to start a new course with no credits recognized.

Course program
With «Environmental Design» (second year), this course represents the disciplinary contribution of «Technology of Architecture» to the Master on Architectural Design. Both are focused on architectural project and computational parametric design embedding the decisional process, communication and designing as well: processes dealing with willness and facts, with "un-materiality" formalized, computed and extracted through digital technologies

The philosophy of the two classes is to jump over the software generated free-forms, or the prevalent use of design technology for calculation, visualization, and rendering.

The philosophy is to persue a coherent and interoperable process and to promote a research attitude based on digital materiality.

In this semester, the «Building Systems Design» class is focused on two different topics:
1) the production of the Building Information Model for a medium small architecture;
2) the fabrication of a Conceptual prototype for an architectural building system.

Here is the related Course Scheduling:
- Launching a Project: Concepts, Spaces, and Budgeting
- Site Surveying and Place Assessment
- Structural Mass Modeling and Environmental Based Computational Morphogenesis
- Brief for approval. Concept&Feasibility, Program, 3D Enriched Model of the Site
04 Nov. Design coordination for interoperability

- Joining and assembly architectures: structural elements and superstructures
- Working with Architectural Bim for structural design
- Embedding physical awareness and information extraction
- Structural and technological model. Draft deliverables review
- Conceptual prototype. Introduction
- Conceptual prototype. Researching and Sketching
- Conceptual prototype. Modeling and Testing
- Conceptual prototype. Prototyping the Model
- Final Design Deliver and Project Assessment