

### **What and Why**

The teaching method of the structural subjects in the Faculty of Architecture of the Politecnico di Torino, as in the ones of Engineering, traditionally adopted a systematic approach driven from the polytechnic background. That is, the school curriculum started from theoretical mechanics and - passing through the mechanics applied to the constructions - reached the analysis of a particular construction. In this sense, the organisation of the structural courses was driven from general topics to particular ones and from simple applications to complex ones.

In such a frame, the studies in theoretical mechanics generally extended as far as the third year out of the five ones characterizing the overall duration of the studies in Architecture. On the other hand, since the first courses in the history of architecture and in architectural design, the students generally encountered complex architectures often characterized by spatial structures.

It follows that, according to the traditional teaching approach, the students were not sufficiently prepared up to the fourth year to coordinate their structural knowledge with the ones of the other subjects of study.

Hence, the traditional pedagogy often involves a circumstance of splendid isolation for the structural subjects in the context of a School of Architecture. It follows that the students bear the burden of the structural teaching but do not appreciate the utility of such subject of study.

In order to overcome the above mentioned circumstance, from two years up to now we are experimenting with a new method. It places side by side the theoretical study of the structures and the architectural analysis and design of the constructions during all the duration of the studies in Architecture.

### **When and to What Extent**

The course at the 1<sup>st</sup> year is intended to give to the very new students in Architecture some preliminary elements in statics so to allow to them a conscious analysis of the mechanical behaviour of the structures presented by teachers and designed by them during the studio design. It provides from the first year an inviting point of entry to the study of structural design for architects proving that the science of statics does not have to be useless, simplistic or boring.

As concerns the following years of Diploma and M.Sc. courses, the even years are dedicated to the teaching of theoretical mechanics and constructions mechanics while the odd ones are characterized by courses of Structural Design. The former are restricted to the first academic period while the others are extended during the second period of the year in form of contributions to the studio design.

Finally, the doctorate school in Structural Engineering of the Politecnico completes the teaching model of the Faculty of Architecture. The course is attended by a relevant number of architects M.Sc. and it is partially dedicated to develop researches related with structures in architecture.

The teachers of the structural subjects at the I Faculty of Architecture entirely come from the Department of Structural Engineering of the Politecnico. In spite of the unique origin, teachers mainly have two kinds of academic background, i.e. an educational training in Architecture or in Civil Engineering. The integration between the different background is both assured by the complementary formation (40% of the Architects M.Sc. are also Ph.D. in Structural Engineering) and by the interests of teachers in research and design activity about structures in architecture. The generational overturning is assured by a number of experienced full professors and by a growing number of young assistant professors.

## Who

The basis of mechanics must be the same for a civil engineer as for an architect, but the teaching pedagogy and its timing do not necessarily have to be the same, because of the different final levels of probing, the different educational project, the different role played during the design process. Taking in mind this statement, the proposed pedagogy propounds the alternation of theoretical teaching and application to the architectural design from the very beginning of the studies in architecture. Such approach allows reaching two main goals.

## How

1. Define a real comprehension of the physical phenomena and a good control of the modelling tools so to permit the conscious, critical and creative application of construction norms and design schemes. In order to achieve this objective a particular emphasis is put on the relationship between the mechanical model and the goals of the analysis, having recourse to both physical and analytical models, to fully extended course notes rich in visual material and examples, to a closed control of the level of learning by means of periodic short tests.
2. Put in place an effective synergy and knowledge transfer between the structural teaching and the design of architecture in terms of safety, reliability, durability of constructions but also to cite or create suitable and expressive structural forms. This principle is concretised in an extended contribute of the structural teacher, as for other teachers from the domains of technology, history and drawing of architecture, in the frame of the studio design teaching. Such contributions are developed under the form of both *ex cathedra* lessons about themes and applications related with the ones of the studio design and tutoring and assistance along the different phases of the architectural design developed by the students.

In the very next years, the main task of the I Faculty of Architecture of Turin about its pedagogic mission is to completely actuate and test the model described above. In this frame, one of the most important items of the mission statements of the school remains the turning to account of the great polytechnic tradition of the school, in the sense of a more effective synergy between the various disciplines that concur in the architectural design and in particular between the structural subjects and the architectural design. The *in itinere* and final evaluation of this model in terms of academic organization, pedagogic results in every subject of teaching and formation quality of the students will represent a fundamental stage and a further opportunity to improve the model itself.

## Virtual Reforms



ITALY

# The Teaching of Construction in Architecture Education: Current Pedagogy and Innovative Teaching Methods

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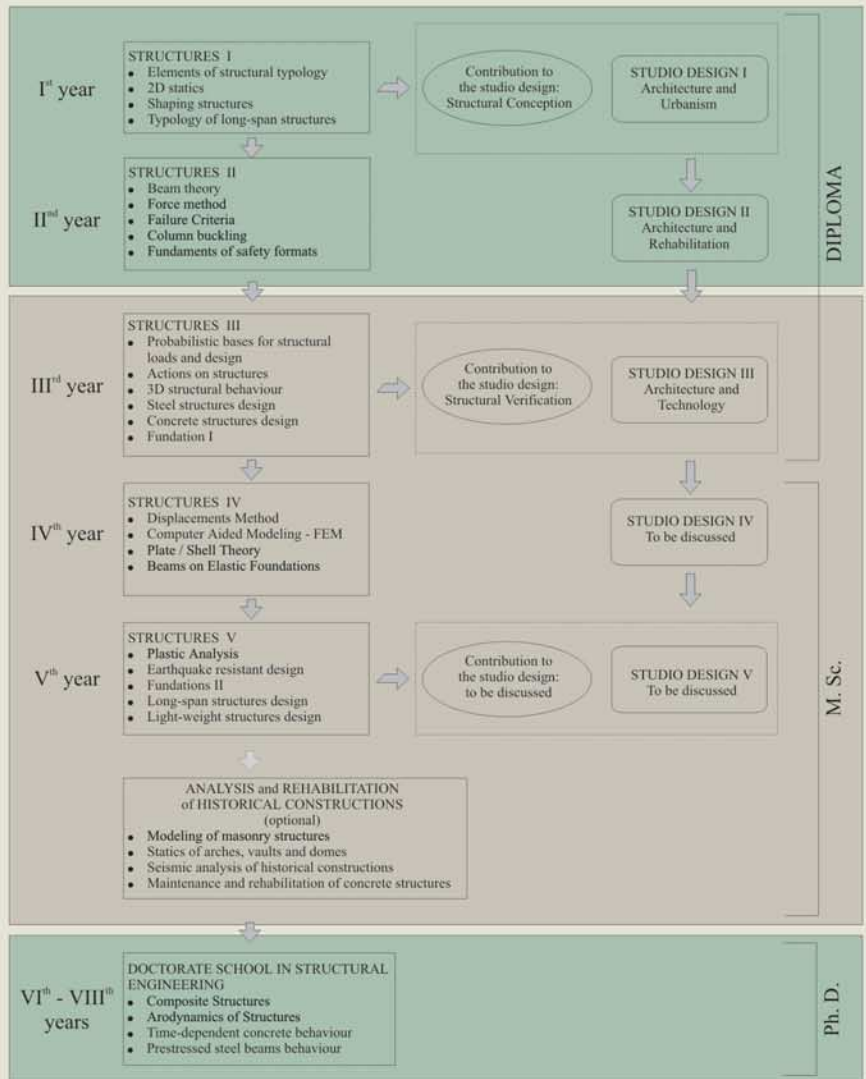
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## When and to What Extend

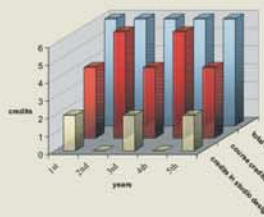
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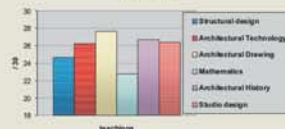


Experimentation yet in place  
 Experimentation to be applied next years

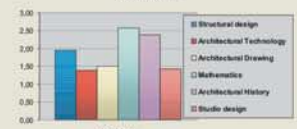
Distribution of credits during the studies duration



Mean marks



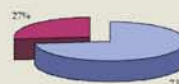
Selectivity Rate



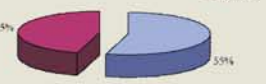
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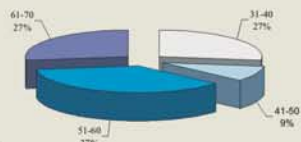
PhD students in Structural Engineering (1997 - 2002)



teacher's academic background



Age of teachers in Structural Engineering





ITALY

# The Teaching of Construction in Architecture Education: Current Pedagogy and Innovative Teaching Methods

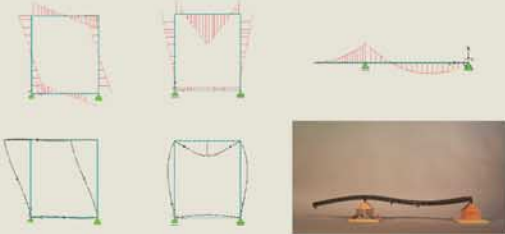
## How

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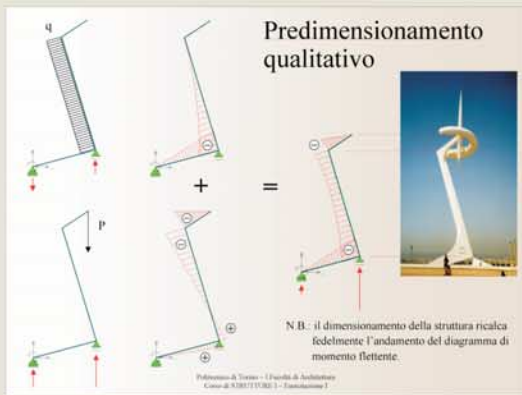
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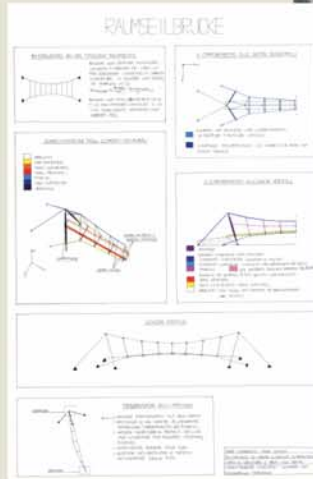
1<sup>st</sup> year course Rigid and deformable physical models: an useful and intuitive start-up in statics.



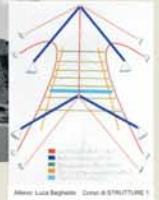
1<sup>st</sup> year course - An extract from course notes: shaping structures throughout the qualitative relationship between the loads and the resistant section of structural members.



Some results of the competition promoted between the 1<sup>st</sup> year students on the theme: "Recognize the structure in an architecture"



The subject of the competition: the suspended Raumsseil bridge.



The hierarchy of the structural members of the bridge extracted by another work

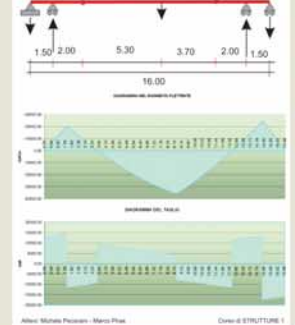
An example of structural analysis applied to a design work developed during the 1<sup>st</sup> year studio design



The hierarchy of the structural represented by a 3D view



The cross section of the architectural draw

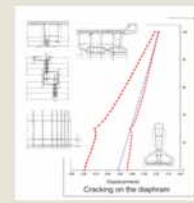


An example of design work developed during the 1<sup>st</sup> year studio design



The Computing Laboratory of Structures (L.I.S.) at the Faculty of Architecture: a fundamental tool in teaching practice from Diploma to Ph.D.

Some results extracted from Doctoral Thesis in Structural Engineering developed by Architects M.Sc.



Continuous bridges with precast beams



## Virtual Reforms

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