

# ΑΝΑΚΟΙΝΩΣΗ

Σεμινάριο:

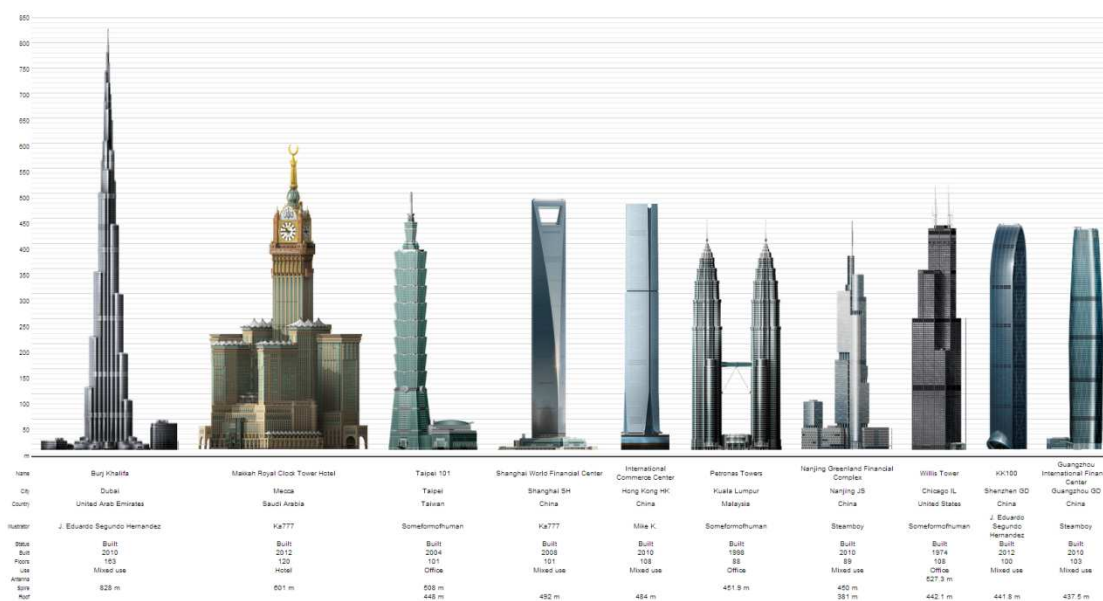
## «Ανάλυση και Σχεδιασμός Πολύ Υψηλών Κτηρίων»

Την **Παρασκευή 16 Μαΐου 2014**, στο Αμφιθέατρο «Ε.Ν. Μαστρογιάννης», θα πραγματοποιηθεί σεμινάριο με θέμα: «Ανάλυση και Σχεδιασμός Πολύ Υψηλών Κτηρίων». Ομιλητές θα είναι ο Καθηγητής του Τμήματος Πολιτικών Μηχανικών του Πολυτεχνείου του Μιλάνο **Franco Moia** και οι συνεργάτες του από το Τεχνικό γραφείο **ECSD**, με έδρα το Μιλάνο. Το σεμινάριο θα γίνει στα Αγγλικά και απευθύνεται, κυρίως (αλλά δεν περιορίζεται), σε τελειόφοιτους (πεμπτοετείς) φοιτητές Α΄ & Β΄ Κατεύθυνσης και σε μεταπτυχιακούς φοιτητές του Τμήματος των Κατευθύνσεων «Αντισεισμικός Σχεδιασμός Κατασκευών» και «Γεωτεχνική Μηχανική».

Η ώρα έναρξης του σεμιναρίου είναι **11.00**. Το πρώτο μέρος θα ολοκληρωθεί στις 13.40, ενώ το δεύτερο θα αρχίσει στις 15.00 και θα τελειώσει στις **18.00**.

Επισυνάπτονται:

- Σύντομη περιγραφή των περιεχομένων και των στόχων του σεμιναρίου
- Σύντομα βιογραφικά σημειώματα των ομιλητών και
- Το πρόγραμμα του σεμιναρίου.





Technical-scientific seminar on

# Analysis and design of tall building structures

University of Patras

Date: 16<sup>th</sup> May 2014

## ❖ CONTENTS AND OBJECTIVES OF THE SEMINAR

Recent trends towards developing increasingly higher and slender structures have led to a new generation of constructions. The growth in modern tall buildings, involving also historic countries such as Italy, is nowadays a worldwide phenomenon that is leading the whole engineering community to face unprecedented challenges.

In order to have an insight into the impressive world of tall buildings, this seminar will cover a variety of topics related to the analysis and design of these constructions focusing on the structural engineering issues.

The seminar is organized in two sessions, one in the morning and one in the afternoon. The morning session will open with a general introduction to the structural challenges of tall buildings, focusing on static analysis and design and providing an understanding of the peculiar structural forms used in tall buildings. In the second presentation of the morning session the foundation systems of high-rise structures will be addressed, dealing with the geotechnical engineering issues that have to be faced in the design process.

The main features of the analysis and numerical modeling of the structural systems will be then presented with particular reference to finite element modeling techniques.

The first session will close with a presentation devoted to long term effects on reinforced concrete tall buildings. Long term column shortening due to creep and shrinkage, affecting the service life behavior of structural elements, will be discussed together with the interaction between steel and concrete members and the use of prestressing in tall constructions.

The second session, which will be delivered in the afternoon, will turn into topics related to the dynamic analysis of tall buildings, with reference to wind and earthquake loads, dynamic tests and monitoring.

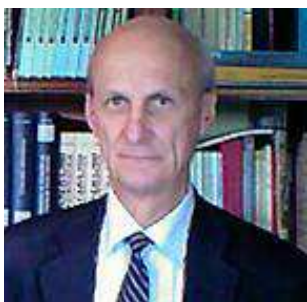
Wind loads and wind-induced effects on tall structures will be presented, introducing the basic concepts of aerodynamics and aeroelasticity. The experimental approach for investigating wind loads and effects based on the use of wind tunnel facilities will be discussed. The main topic of wind-induced vibrations and occupant comfort in serviceability conditions will be also addressed.

The second presentation of the afternoon session is devoted to the seismic design of tall buildings, covering a variety of topics, ranging from the seismic hazard assessment to the analysis techniques and the definition of the structural systems resisting to lateral loads.

Dynamic tests on tall buildings which are nowadays receiving a rapidly increasing importance will be also introduced, presenting the different approaches of the so-called Operational and Experimental Modal Analyses (OMA and EMA), the use of the different excitation tools, the comparison between experimental and numerical predictions and, finally, the dynamic approaches for structural health monitoring.

The seminar will close with the presentation of three major buildings in Italy, namely Palazzo Lombardia, 161.3m high, the seat of the Government of Regione Lombardia, Milan, completed in 2010, Torre Isozaki, 202.2m, an office building owned by Allianz, Milan, currently under construction, and Regione Piemonte, 204.96m high, the seat of the Government of Regione Piemonte, Turin, still under construction.

## ❖ PRESENTERS



### **Franco Mola**

is Full Professor of 'Theory and design of reinforced concrete and prestressed concrete structures' at the Department ABC of Structural Engineering of Politecnico di Milano. He is the Owner and Executive Manager of ECSD S.r.l. Engineering Consulting and Structural Design. Since 1971 his activity combines extensive research, documented by more than 200 papers published in national and international journals and conference proceedings, with structural engineering consultancy and construction design. His main research contributions deal with long-term effects of reinforced concrete and prestressed concrete structures, analysis of slender reinforced concrete structures in presence of second order phenomena, limit state analysis of prestressed and reinforced concrete structures and analysis of advanced design issues related to tall buildings, such as column shortening, vibrations and interactions between structural and non-structural elements. In his wide experience in structural engineering, several remarkable projects can be cited, ranging from tall buildings and towers to bridges and flyovers, precast warehouses, hospitals, heritage buildings (churches, bell towers, domes, masonry buildings). In the field of tall buildings, he has worked as structural designer, construction supervisor and general design coordinator for "Palazzo Lombardia", 161.3m, the tallest completed building in Milano and Italy. He is structural designer and general design coordinator of "Torre Regione Piemonte", 204.96m, the new seat of Regione Piemonte (currently under construction in Turin), and structural design supervisor of "Torre Isozaki", 202.2m, (currently under construction in Milan).



### **Elena Mola**

is a Civil Structural Engineer. She is Administrator at ECSD S.r.l.. She has received her Ph.D. at the 'Ecole Doctorale Energetique et Mecanique de l'Institut Polytechnique National de Grenoble' in 2007 with a thesis titled 'Seismic Vulnerability Assessment of existing plan-wise irregular reinforced concrete structures'. Since 2007 she serves ECSD S.r.l. as Administrator, Project Manager and Human Resources Manager. She works as Seismic Engineering Consultant for advanced analyses and provides structural dynamics consultancy for dynamic tests of bridges and structures. Elena Mola cooperates in delivering lectures at the Laboratory of Architecture Building II at the Faculty of Architecture of Politecnico di Milano. She is author of several publications and presentations at national and international conferences, particularly about research topics related to seismic engineering, such as vulnerability assessments, dynamic tests on existing structures and seismic retrofitting.



**Laura Maria Pellegrini**

is Civil Structural Engineer at ECSD S.r.l.. Her main responsibilities cover structural design, construction site supervision, advanced Finite Element modeling. She graduated at Politecnico di Milano in 2007. Her research activity deals with long term effects on reinforced concrete structures. She has been involved in the structural design of the Palazzo Lombardia building in Milan and, currently, of the Regione Piemonte building in Turin. She cooperates with Prof. F. Mola and Elena Mola as an assistant to the Laboratory of Architecture Building II at the Faculty of Architecture and she is Teaching Assistant of reinforced concrete and precast reinforced concrete constructions at the Faculty of Engineering and Teaching Assistant in the Master in Concrete Structure at Politecnico di Milano.



**Carlo Segato**

is Civil Structural Engineer at ECSD S.r.l. His main responsibilities cover structural design, construction site supervision and project valuator assistance. He graduated at Politecnico di Milano in 2006. Among his activities, he has been involved in the structural retrofitting of prestressed concrete bridges built with the segmental approach and in experimental tests for the checking of materials and structures with particular reference to seismic vulnerability. He is currently employed in the structural design supervision of the Isozaki Tower of the CityLife district in Milan.



**Chiara Pozzuoli**

is a Civil Structural Engineer. She is Wind Engineering and Structural Dynamics Consultant at ECSD S.r.l.. She received her Ph.D. in 'Mitigation of Risk Due to Natural Hazards on Structures and Infrastructures' from the University of Florence, Italy, and the Technical University of Braunschweig, Germany in 2012 with a thesis titled 'Aeroelastic Effects on Tall Buildings: Performance-Based Comfort Analysis'. Her research efforts focus on natural hazards, wind tunnel testing of structures, wind-induced vibrations, aerodynamics and aeroelasticity of bluff bodies, wind risk assessment, performance-based design.



**Georgios Stefopoulos**

is a Civil Structural Engineer. He has joined ECSD S.r.l., Milan in 2011. His main activities cover advanced numerical modeling, structural and seismic analysis of steel and reinforced concrete structures. He graduated in Civil Engineering at the University of Patras in 2010.

He is registered at the Technical Chamber of Greece from the 28<sup>th</sup> of June 2013. He is currently involved in the modeling and in the long term effects analysis of the Isozaki tower in Milan.

## ❖ SEMINAR SCHEDULE

May, 16<sup>th</sup> 2014

11:00-14:00 and 15:00-18

### ❖ Morning session: Tall Buildings Structures: challenges, analysis and design

11:00-11:40	<b>Opening session</b> Introduction to the static analysis and structural design of tall buildings: historical perspective (Italian and worldwide), structural forms, core structures, floor systems. Long term effects in r.c. tall buildings, general aspects.	Prof. F. Mola
11:40-12:20	<b>Foundations and geotechnical engineering for tall buildings</b> foundation systems and design issues	C. Segato
12:20-13:00	<b>Long term effects in tall r.c. buildings</b> Column shortening, interaction between steel and concrete members, use of prestressing in tall buildings	L. Pellegrini Prof. F. Mola
13:00-13:40	<b>Structural systems, modeling and analysis</b> EF modeling techniques, analysis methods, peculiar design issues	L. Pellegrini G.Stefopoulos

### ❖ Afternoon session: Dynamic analysis of tall buildings: wind and earthquake loads, dynamic tests and monitoring

15:00-15:50	<b>Wind loads and wind-induced effects on tall buildings</b> Basic concepts of tall buildings aerodynamics and aeroelasticity Wind tunnel tests and assessment of wind loads Wind-induced vibrations and occupant comfort	C. Pozzuoli
15:50-16:15	<b>Seismic design of tall buildings</b> Seismic hazard definition, lateral load resisting systems, earthquake vs wind, analysis techniques	E. Mola
16:20-17:00	<b>Dynamic tests of tall buildings</b> Experimental and Operational Modal Analysis, use of different excitation tools, comparison between experimental and numerical predictions, structural health monitoring	E. Mola, C. Segato
17:00-18:00	<b>The design of three major buildings in Italy</b> <ul style="list-style-type: none"> <li>– <i>Palazzo Lombardia</i> (Seat of the Government of Regione Lombardia, Milan, h.161.30m, completed in 2010)</li> <li>– <i>Torre Isozaki</i> (Office building owned by Allianz, Milan, h.202.2m, under construction)</li> <li>– <i>Regione Piemonte</i> (Seat of the Government of Regione Piemonte, Turin, h. 204.96m, under construction)</li> </ul>	Prof. F. Mola E. Mola C. Segato L. Pellegrini C.Pozzuoli G. Stefopoulos