## • ROSE FACULTY

Aiming at a unique diversity of teaching and research training in the field of Earthquake Engineering, the organisation of the ROSE School is based on a relatively short permanence of scholars with extremely high qualification. Indeed, all lecturers at the School are internationally recognised experts in the field, coming from a number of distinguished institutions.

**Director**
G.M. Calvi

**Emeritus Director**
M.J.N. Priestley

**Teaching Body**

N. Abrahamson
D.P. Abrams
S. Akkar
D.L. Anderson
R. Archuleta
F. Auricchio
G. Benzoni
J. Berrill
J.J. Bommer
D.M. Boore
F. Brezzi
A. Carr
G. Cassiani
M. Cocco
M.P. Collins
J. Conte
H. Crowley
A. Dazio
A. Der Kiureghian
R. DesRoches
A. Elghazouli
A. Elnashai
R.E. Englekirk
M. Erdik
E. Faccioli
M.N. Fardis
G.L. Fenves
A. Filiatrault
P. Gamba
L. Gambarotta
M.C. Griffith
P. Gülkan
T.J.R. Hughes
H. Igel
E. Kausel
K. Kawashima
M.J. Kowalsky
S. Kramer
C.G. Lai
R. Leon
G. Magenes
G. Mancini
G. Martin
E. Miranda
G. Monti
M. Nakashima
S. Nielsen
S. Otani
S. Pampanin
V. Pane
R. Paolucci
A.S. Papageorgiou
A. Pavese
A. Pecker
M. Pender
R. Pinho
P.E. Pinto
C. Prato
J.H. Prevost
G. Rassati
E. Rathje
J. Restrepo
G. Rix
F. Sabetta
C. Scholz
F. Seible
D. Slejko
G. Solari
E. Spacone
J. Stanton
J.P. Stewart
H. Sucuoglu
T. Sullivan
S. Tinti
T. Triantafillou
G. Valensise
D. Veneziano
K. Wilmanski

The IUSS-Pavia is the last step of a long lasting higher education process started on 825 when King Lotharius appointed Pavia, the ancient capital of the Lombard kingdom, as the site for higher education of his kingdom. This process went through the foundation in 1361 by Emperor Charles IV of the Studium Generale later on named University of Pavia. The first Colleges for university students were established in the 15th and 16th centuries. They are now 15 offering, to the almost 2.000 students, a unique opportunity of study and cultural enrichment in a multidisciplinary and multiethnic environment. Through centuries the University of Pavia became one of the leading institutions in Europe.

IUSS fulfils, since 1997, an advanced teaching and research model successfully implemented by other prestigious institutions in Italy, like the Scuola Normale Superiore and the Scuola Sant'Anna in Pisa. Due to the completeness of its education and training fields, which allows a strong interdisciplinary approach, the mission of IUSS is that of contributing to the growth of a small number of selected students by offering them, at any step of their higher education, qualified programs enhancing their capabilities and knowledge. The Institute is also committed to scientific progress by preparing young researchers and developing scientific research programs.


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Education and Culture
**Erasmus Mundus**

The European Commission has approved and financed an Erasmus Mundus Masters on Earthquake Engineering and Engineering Seismology (MEEES), coordinated by the ROSE School and featuring also the participation of the University of Grenoble Joseph Fourier (France), the University of Patras (Greece) and the Imperial College of London (UK), as project partners, as well as of Joint Research Centre (Ispra, Italy) and the Italian Institute for Geophysics and Vulcanology (Italy) as satellite participants. Within the framework of this prestigious Erasmus Mundus programme, which aims to enhance quality in European higher education and to promote intercultural understanding through co-operation with third countries, a relatively large number of scholarships are available for both non-European as well as European students. Interested applicants are invited to visit the MEEES website (www.meees.org) for detailed information and instructions on financial conditions and application procedures.


*Design **Eucentre** - Pavia Italy*


Università degli Studi di Pavia

CAR - Collegio Cardinale Riboldi

IUSS Sapere Aude
Istituto Universitario di Studi Superiori Pavia

# The Ninth International ROSE School Seminar

## Collegio Cardinale Riboldi
Pavia, Italy
21-22 May 2009

ROSE SCHOOL

Centre for Post-Graduate Training and Research in Earthquake Engineering & Engineering Seismology

## • THE ROSE SCHOOL

The Centre for Postgraduate Training and Research in Earthquake Engineering and Engineering Seismology (ROSE School) is part of the Institute for Advanced Study of Pavia (IUSS: Istituto Universitario di Studi Superiori), a higher education institution in Italy that offers international advanced postgraduate programmes (Masters and Doctorate). Innovative, internationally planned, open minded, grown on the traditionally fertile soil of the University of Pavia, and based on a system of Colleges unique in Italy, the IUSS prepares brilliant individuals to take on the most challenging and demanding public and private posts in contemporary Italy, Europe, the Mediterranean area and the rest of the world.

The ROSE School provides therefore higher-level education in the field of earthquake engineering, offering a number of courses covering applied mechanics, structural engineering, earthquake engineering, engineering seismology and soil dynamics, with emphasis on both theoretical background and design considerations. The MSc and PhD degrees are jointly awarded by the IUSS and the University of Pavia.

Each course is intensively taught in a period of three to five weeks, during which the respective lecturer is able to fully dedicate his/her time and efforts exclusively to the scholastic activities at the school, thus ensuring teaching and research training at the highest possible levels of quality. All of the above endows a truly unique character to the ROSE School, be it for its fully international nature or for its innovative organisation in education and research training in the field of Earthquake Engineering.

## • INTERNATIONAL ROSE SCHOOL SEMINARS

As a part of the ROSE programme, an International seminar is organised every year, to provide the School students with an opportunity to present and discuss their research work to an audience of international experts.

In addition to standard presentations on research work carried out at the School, the annual Seminars feature also the tradition of inviting a prominent scientist to deliver a keynote lecture on a given contemporary and highly relevant topic in the field of Earthquake Engineering. At this year's event, such keynote address will be delivered by Professor Shunsuke Otani with the title "Early age of earthquake engineering and engineering education".

It is also foreseen that contributions to the seminar will be published, after a standard review process, in a special issue of the Journal of Earthquake Engineering, which will be distributed to all participants and journal subscribers in mid 2010. Copies of the JEE Special Issues containing the proceedings of previous editions of this annual Seminar are available from the ROSE School Secretariat, on request.

## • ATTENDING THE EVENT

In addition to ROSE faculty and students, a maximum of 50 external participants may also be accepted, for which reason professionals and researchers worldwide are encouraged to take part in the event. A 160€ fee is required from external attendees, to cover for the cost of coffee/lunch breaks, seminar dinner and proceedings. Special financial conditions are, however, in place for University researchers or students, to whom a fee of not more than 120€ is usually requested. Those who wish to attend the Seminar are kindly invited to compile and submit the registration form to the ROSE School Secretariat, at the address given overleaf. If you need assistance of any kind (registration form, accommodation, travelling directions, etc.), please do not hesitate in contacting our Administrative Officer, Mr. Saverio Bisoni (**secretariat@roseschool.it**). You may also refer to the ROSE website for further information on all ROSE School activities.

## • VENUE

The ROSE School is located at the European Centre for Training and Research in Earthquake Engineering (EUCENTRE, **www.eucentre.it**), in Pavia, a historical town in the North of Italy (35 km from Milan), full of University tradition and fame.

The Seminar itself will take place at the Collegio Riboldi (**www.carcollege.it**), a landmark structure dating back to the second half of the seventeenth century, purposely-refurbished to serve as an international hosting facility for postgraduate students and visiting scholars working in the field of natural risk mitigation. It is located in the centre of Pavia, in Via Luigi Porta, 4.

## • POST-SEMINAR ACTIVITIES

A cultural event is organized on Saturday May 23 to visit a cathedral of great historical, architectural, and structural significance for its masonry elliptical dome which is the world's largest (internal axes 37 by 25 m). The monument is at Vicoforte, a small town located at a couple of hours driving from Pavia. Transportation will be provided. The complete programme of the tour can be found either at the ROSE School web site (**www.roseschool.it**) and at the EUCENTRE web site (**www.eucentre.it**).

## • PROGRAMME OF THE SEMINAR

### Thursday, 21st May

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|---|---|
| 13.00-14.30 | Welcome lunch and registration |
| 14.30-16.00 | **Session 1 - Chairman: G. Magenes** |
| | Definition of seismic input at the Sanctuary with the world's largest elliptical dome at Vicoforte, Italy<br>H. Sanchez[1], C.G. Lai, M. Corigliano, L. Scandella |
| | Displacement-Based Seismic Risk Assessment of Adobe Dwellings<br>N. Tarque[1], H. Crowley, H. Varum, R. Pinho |
| | Development of a seismic loss model for Mansehra city, Pakistan: Application to unreinforced masonry building stock<br>N. Ahmad[1], H. Crowley, R. Pinho, Qaisar Ali |
| 16.00-16.30 | *Coffee break* |
| 16.30-18.00 | **Session 2 - Chairman: C. Lai** |
| | Response statistics of uncertain dynamical systems subjected to earthquake loading using sparse grid collocation methods<br>J. Crempien[3], F. Auricchio, C. Lai, F. Nobile |
| | Extended Finite Element Method for Modeling Arbitrary Discontinuities<br>A. Ahmed[3], F. Auricchio |
| | Numerical Issues in Distributed Inelasticity Modelling of RC Frame Elements for Seismic Analysis<br>A. Calabrese[1], J. Pacheco de Almeida[1], R. Pinho |
| 19.30-23:30 | *ROSE Seminar Dinner* |

### Friday, 22nd May

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|---|---|
| 9.00-10.30 | **Session 3 - Chairman: T. Sullivan** |
| | Issues on seismic analyses of reinforced concrete frames with fibre and concentrated-plasticity programs<br>F. Biserna[3], M. Savoia, B. Ferracuti, R. Pinho |
| | Shake table test of a R.C. building designed for gravity loads only, seismic response and frame-panel interaction<br>I. Lanese[3], A. Pavese, F.J. Crisafulli |
| | Behaviour of Deep Reinforced Concrete Beams Under Monotonic and Reversed Cyclic Load<br>B. Mihaylov[2], E.C. Bentz, M.P. Collins |
| 10.30-11.00 | *Coffee Break* |
| 11.00-13.00 | **Session 4 - Chairman: A. Pavese** |
| | Seismic Design Strategies for Structures with Complex Geometry<br>A. Lago[1], T. Sullivan, G.M. Calvi |
| | Numerical simulation of the behaviour of the gusset plate connection in a concentrically braced frame under the cyclic loading<br>K.K. Wijesundara[1], D. Bolognini, R. Nascimbene, G.M. Calvi |
| | Development of a DBD procedure for steel dual systems with buckling-restrained-braces and moment resisting frames<br>T. Maley[1], T. Sullivan, G. della Corte |
| | Critical assessment of seismic design procedures for steel moment-resisting frames<br>A. Villani[3], J.M Castro |
| 13.00-14.30 | *Lunch break* |
| 14.30-15.30 | Keynote lecture<br>Early age of earthquake engineering and engineering education<br>S. Otani |
| 15.30-17.00 | Graduation ceremony<br>Programme of future activities & Closing speeches |

[1] PhD Student, [2] PhD Alumnus, [3] MSc Student