

## **ENRICO SPACONE**

Professor of Structural Engineering  
Department of Engineering and Geology  
University "G. D'Annunzio" of Chieti-Pescara

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### **PERSONAL INFORMATION**

Name: *Enrico Spacone*  
Year of birth: 1961  
Nationality: Italy, Switzerland, USA

### **ADDITIONAL INFORMATION**

Work address: Dept. of Engineering and Geology – University G. D'Annunzio, viale Pindaro 42, 65127 Pescara, Italy +39-085-453-7276, mobile +39-333-9699023  
E-mail: [espacone@unich.it](mailto:espacone@unich.it)  
Languages: Speaks English, Italian and French fluently. Some basic knowledge of Spanish and German.

### **PROFESSIONAL REGISTRATION**

Professional Engineer License in Italy (1988)

### **EDUCATION**

Ph.D. in Civil Engineering, University of California, Berkeley, 1994  
M.S. in Civil Engineering, University of California, Berkeley, 1990  
B.S. in Civil Engineering (110/110 with Honors), University "La Sapienza", Rome, Italy, 1987

### **EMPLOYMENT**

2001-2021- Professor, University "G. D'Annunzio" of Chieti-Pescara, Italy  
President, 1<sup>st</sup> level (3 year) degree in Biomedical Engineering, University "G. D'Annunzio" of Chieti-Pescara, Italy  
2009-15 Member of the Academic Senate, University "G. D'Annunzio" of Chieti-Pescara, Italy  
2012-14 Chair, Department of Engineering and Geology, University "G. D'Annunzio" of Chieti-Pescara, Italy  
2009-12 Chair, Department of Engineering, University "G. D'Annunzio" of Chieti-Pescara, Italy  
1995-2001 Assistant and then Associate Professor Professor, University of Colorado, Boulder, USA  
6/94-12/94 Post-Doctoral Research Assistant, University of California at Berkeley, USA  
6/90-5/94 Research Assistant, University of California at Berkeley, USA  
9/87-6/89 Teaching Associate, Swiss Institute of Technology, Lausanne, Switzerland  
9/87-6/89 Research Engineer, Swiss Institute of Technology, Lausanne, Switzerland

### **VISITING PROFESSOR APPOINTMENTS**

Summer 2006 EPFL, Swiss Institute of Technology, Lausanne, Switzerland  
Summer 2010 University of Colorado, Boulder, USA  
Summer 2016 Fuzhou University, China  
Fall 2016 Universidad Catolica de Lima, Peru  
Spring 2017 University of Porto, Portugal  
Summer 2017 Fuzhou University, PR China  
Summer 2018 Fuzhou University, PR China  
Winter 2019 Fuzhou University and Tsinghua University, PR China

2021-2022 University of Bristol, UK (5 months)

### **AWARD/HONORS**

2023-2024 Leverhulme Visiting Professorship (University College London)  
2022- Member of European Academy of Sciences  
2002-03 Fulbright Teaching/Research Grant, University of Ljubljana, Slovenia.  
2001 Outstanding Faculty Member, Dept. of Civil, Environmental and Architectural Engineering (CEAE), University of Colorado, Boulder, USA.  
2001 Teaching Award, Dept. of CEAE, University of Colorado, Boulder  
1998 Junior Faculty Development Award, University of Colorado, Boulder  
1997 Young Researcher Award, Dept. of CEAE, University of Colorado, Boulder

### **MAIN RESEARCH INTERESTS**

Nonlinear analysis of structures (Nonlinear models for analysis of reinforced concrete and masonry buildings, enhancement of nonlinear methods of analysis)

Earthquake engineering (Seismic design of new reinforced concrete and masonry structures)

Assessment and retrofitting of existing buildings (Methods of assessment and retrofitting techniques, joint structural and energy upgrading of existing buildings)

Performance of buildings and structures at the urban scale (Multi-hazard risk assessment and mitigation at the urban scale)

Cultural Heritage preservation (Multi-hazard risk assessment and mitigation at the urban scale)

Raw earth and strawbale structures (design of new structures and retrofitting of existing and historical buildings)

### **MAIN FUNDED PROJECTS**

ERIES Engineering Research Infrastructures for European Synergies H2020- INFRA-2021-SERV-01-07: Progetto SAFE 3D PRINTED-CS (to be carried out at Univ. Of Bristol) (Co-PI), 2023-24.

MUR (Italian Ministry of University and Research): GENESIS (GEstioNE del rischio SISmico per la valorizzazione turistica dei centri storici del Mezzogiorno - Management of the seismic risk of the historical centers of south Italy for their touristic valorization), project ARS01\_00883, 8,9M Euros for 25 partners (PI), 2023-2025.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Safety of Bridges (Spacone and Camata PIs), 100.000 Euros, 2022.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete Existing Structures (Project National Co-Coordinator), Implicit Risk in New And Existing Reinforced Concrete Buildings (Local Coordinator), Masonry Structures (Local Unit Member), Vulnerability at Territorial Scale (Local Unit Member), approx. 180.000 Euros/year, 2019-2021.

SERA Transnational Access Program H2020-INFRAIA-2016-1: Progetto RE-BOND – REsponse of as-Built and strengthened three-leaf masONry walls by Dynamic tests (carried out at Univ. Of Bristol) (PI), 2018-19.

Elarch - Erasmus Mundus Program (EU Partner): Euro-Latin America partnership in natural Risk

mitigation and protection of the Cultural Heritage – 2015-2018 (<http://www.elarch.org>) (Local Coordinator), approx. 3M Euros.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete New and Existing Structures (Project National Co-Coordinator), Implicit Risk in Code Compliant New Reinforced Concrete Buildings (Local Coordinator), Masonry Structures (Local Unit Member), Vulnerability at Territorial Scale (Local Unit Member), approx. 60.000 Euro, 2018.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete New and Existing Structures (Project National Co-Coordinator), Implicit Risk in Code Compliant New Reinforced Concrete Buildings (Local Coordinator), Masonry Structures (Local Unit Member), Vulnerability at Territorial Scale (Local Unit Member), approx. 65.320 Euro, 2017.

ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete New and Existing Structures (Project National Co-Coordinator), Implicit Risk in Code Compliant New Reinforced Concrete Buildings (Local Coordinator), Masonry Infills (Local Unit Member), Vulnerability at Territorial Scale (Local Coordinator), approx. 66.800 Euro, 2016.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete New and Existing Structures (Project National Co-Coordinator), Masonry Structures (Local Coordinator), Infills (Local Unit Member), Vulnerability at Territorial Scale (Local Coordinator), approx. 68.000Euro, 2015.

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering) Project: Reinforced Concrete New and Existing Structures (Project National Co-Coordinator), Masonry Structures (Local Coordinator), Infills (Local Unit Member), Vulnerability at Territorial Scale (Local Coordinator), approx. 68.000 Euro, 2014.

EU-NICE - Erasmus Mundus Program (EU Partner): Eurasian University Network for International Cooperation in Earthquakes – 2011-14 (Local Coordinator), approx. 3M Euros.

DPC (Italian Dept. Of Civil Protection): ReLuis Project: Reinforced Concrete Structures (Local Coordinator), 136.000 Euro, 2010-2013.

DPC (Italian Dept. Of Civil Protection): ReLuis Project: Validation of Italian Seismic Design Codes: Reinforced Concrete Bridges, Reinforced Concrete Buildings and Retrofitting with FRP (Local Coordinator), 150.000 Euro, 2005-2009.

Italian Ministry for Cultural Heritage and Tourism (Mibact): Seismic Safety Evaluation of State Museums, San Francesco d'Assisi Church in Gerace and Mileto State Museum, 17.200 Euro (PI) (2016).

Italian Ministry for Cultural Heritage and Tourism (Mibact): Seismic Safety Evaluation of State Museums, National Archeological Museum Massimo Pallottino, Melfi and National Archeological Museum Domenico Ridola, Matera, 58.800 Euro (PI) (2014-2015).

DPC (Italian Dept. Of Civil Protection): ReLuis (Italian Network of University Laboratories for Earthquake Engineering): Seismic Safety Assessment and Retrofitting Design of ITC-ITG School in Sulmona (AQ), 60.000 Euro, (PI) 2010.

Poggio Picenze Municipality: Reconstruction Plan of the Town Historical Center after the April 4, 2009

L'Aquila Earthquake 300.000 Euro approx. (Principal Investigator, PI) (2010-11).

ERSE (già CESI Ricerca), Progetto "Metodologie per l'analisi, la valutazione e la gestione del rischio rappresentato dalle opere di sbarramento idraulico", 15.000 Euro (PI), 2009.

MIUR (Italian Ministry for University and Research) : "Tecniche e materiali innovativi per il rinforzo sismico di strutture esistenti" 297.000 Euro, Project National Coordinator, 12/2004-12/2006

MIUR (Italian Ministry for University and Research): "Opere in cemento armato per l'edilizia e le infrastrutture: diagnostica, modellazione e riabilitazione" (Reinforced Concrete Structures for Housing and Infrastructures: diagnosis, modeling and retrofitting) 399.600 Euro, Project National Coordinator, 12/2002-12/2004

National Science Foundation: "Collaborative Research: Propagation of Uncertainties in Nonlinear Frame Analysis of RC Buildings for Performance-Based Seismic Engineering." E. Spacone (PI) 2001-2004 (\$150,000)

National Science Foundation: "Fast Hybrid Test Platform for Seismic Performance Evaluation of Structural Systems." P.B. Shing (PI), and E. Spacone (Co-PI) 2001-2004 (\$1,983,554)

National Science Foundation: "Models for R/C/ Structures Reinforced with Fiber Reinforced Plastics", 08/1998-07/2001, E. Spacone (PI) (\$210,000 + \$30,000 from CU Boulder Graduate School + \$5,000 REU Supplement in 1999 + \$18,423 Supplement in August 2000).

Colorado Advanced Software Institute: "A Module for Analysis and Design of Segmental Prestressed Concrete Bridges", E. Spacone (PI), Finley-McNary (Collaborating Company), 1999-2000 (\$32,000).

Colorado Advanced Software Institute: "NON-PUSH: A Program for Nonlinear Push-Over Analysis of Building Structures", E. Spacone (PI), KL&A of Colorado (Collaborating Company), 1998-1999 (\$37,319).

National Science Foundation: "Modeling of RC/SRC Systems with Flexibility-Based Models", E. Spacone (PI), P.B. Shing (Co-PI) and D. Frangopol (Co-PI), 1995-1998 (\$158,738).

National Science Foundation, "Performance of Reinforced Concrete Bridge Piers during the 1995 Hyogoken-Nanbu Earthquake", P.B. Shing (PI), K. Willam (Co-PI) and E. Spacone (Co-PI) 1996-1999 (\$260,015).

Undergraduate Excellence Fund, College of Engineering, University of Colorado, Boulder: "Hands-on Equipment for Teaching Structural Engineering", 1997-1998. E. Spacone (PI), D. Frangopol (Co-PI) (\$25,000).

National Research Council, CAST program "Beam Models with Partial Bond for Composite Structures", E. Spacone (PI), 1996-1997 (\$21,000).

NATO Collaboration Research Grant: "Models for Seismic Assessment of Reinforced Concrete Bridge Piers", E. Spacone (PI), Summer 1997 (\$8,000).

CU-Boulder Junior Faculty Development Award: "Development of a New Approach to Seismic Analysis of Buildings and Bridges." Academic Year 1998-99 (\$5,000).

#### ***CLASSES TAUGHT AT UNIVERSITY OF CHIETI-PESCARA***

Structural Design (Reinforced Concrete) (6 CFU) (undergraduate course for 3 <sup>rd</sup> year Engineering students)	2018-19-20-21
Introduction to Structural Design (6 CFU) (undergraduate course for 1 <sup>st</sup> year Engineering students)	2016 - 2017
Structural Design (Reinforced Concrete and Steel) (12 CFU) (undergraduate course for 3 <sup>rd</sup> year Engineering students)	2015-16-17-18
Seismic Vulnerability of Existing Buildings (6 CFU) (undergraduate course for 5 <sup>th</sup> year Engineering students)	2013-14-15-16
Seismic Design of Structures (6 CFU) (undergraduate course for 4 <sup>th</sup> year Engineering students)	2010–11-12-13, 2018-19-20-21
Seismic Design of Structures (8 CFU) (undergraduate course for 4 <sup>th</sup> year Architecture students)	2002–03-04-05-06-06-08-09-10
Design of Concrete Structures (8 CFU) (undergraduate course for 4 <sup>th</sup> year Architecture students)	2008-09
Nonlinear Analysis of Structures (6 CFU) (course for PhD Engineering students)	2003 and 2007

**CLASSES TAUGHT AT THE UNIVERSITY OF COLORADO, BOULDER, USA**

(4000 level classes and below are undergraduate classes: 5000 level and above are graduate classes)

CVEN4835/5835	Applied Numerical Design and Analysis of Masonry and Reinforced Concrete Structures (co-taught with Prof. G. Camata)	Summer 2010
CVEN3227	Probability, Statistics and Decision Making	(Spring) S1996
CVEN3535	Structural Engineering II	(Fall) F2000, S2000, S1998, F1997, S1997, S1996, S1995
CVEN4555	Reinforced Concrete Design	F2000, F1999, F1998, F1996
CVEN4525/5525	Analysis of Frame Structures	F1999, F1998, F2001
CVEN5161	Advanced Mechanics of Materials	F1997, F1996, F1995
CVEN5585	Adv. Topics In Reinforced Concrete Design	S2001, S1999, S1998
CVEN7565	Inelastic Analysis of Structures	S1997

**CLASSES TAUGHT AT THE EUROPEAN SCHOOL OF EARTHQUAKE ENGINEERING, ROSE SCHOOL, PAVIA, ITALY**

Structural Dynamics (6 CFU)	2004
Nonlinear Analysis of Structures (6 CFU)	2009
Seismic Analysis of Structures (6 CFU)	2011, 2014, 2017

**CLASSES TAUGHT AT THE UNIVERSITY OF PAVIA, ITALY**

Seismic Analysis of Structures (6 CFU)	2019, 2022
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**OTHER CLASSES**

I have taught classes and teaching modules in MS programs in Civil Engineering and Seismic Engineering in different Italian Universities, notably the University Sapienza of Rome, University of Trieste, University of L'Aquila.

I taught classes in Nonlinear Analysis of Structure at the CISM (International Centre for Mechanical Sciences), Udine, Italy.

I teach on a regularly basis continuing education short courses in Seismic Design, Seismic Retrofitting Linear and Nonlinear Structural Analysis, mainly for civil engineers.

### **SELECTED SERVICE ACTIVITIES**

Member of ANVUR-MIUR (Italian Ministry for University and Research) committee for evaluation of research for the years 2011-14

Member of several Italian faculty committees for hiring of Associate and Full Professors (from 2001)

Member of the Academic Senate, University "G. D'Annunzio" of Chieti-Pescara, Italy ( two terms from 2009 to 2015)

Member of University committee in charge of drafting new University Statute, University of Chieti-Pescara, 2014

Chair, Department of Engineering and Geology, University "G. D'Annunzio" of Chieti-Pescara, Italy (2012-2014)

Chair, Department of Engineering, University "G. D'Annunzio" of Chieti-Pescara, Italy (2009-2012)

Coordinator: Doctoral Program in Design and Rehabilitation of Conventional and Innovative Structures, University of Chieti-Pescara, (2004 - 2009)

Associate Editor of ASCE Journal of Structural Engineering (2001-2008)

Coordinator of Structural Engineering and Structural Mechanics group (9 faculty) of CEAE Dept, University of Colorado, Boulder (2001)

Member of Graduate Committee in Department of Civil Environmental and Architectural Engineering, University of Colorado, Boulder (1995-2001).

Member of Joint Evaluation Committee for Structural Engineering and Structural Mechanics Program, CEAE Department, University of Colorado, Boulder, Fall 2000.

Member of Strategic Plan Council, College of Engineering, University of Colorado, Boulder, Spring-Summer 2000.

Member of the American Society of Civil Engineers (ASCE): until 2004

Member of ASCE Committee "Methods of Analysis"

Member of ASCE Committee on "Seismic Effects"

Member of ACI-ASCE Committee 447 "Finite Element Analysis of Reinforced Concrete Structures"

Member of fib (Federation Internationale du Beton) Task Group 4.4 "Computer-Based Modeling and Design": until 2004

Organizer of several sessions at International Conferences (notably, ASCE Structures Congress, COMPDYN)

Reviewer for several international Journals, notably: ASCE Journal of Structural Engineering, ACI Structural Journal, Earthquake Engineering and Structural Dynamics, Engineering Structures, Computer and Structures, Bulletin of Earthquake Engineering.

## ***PROFESSIONAL EXPERIENCE IN EARTHQUAKE ENGINEERING***

Seismic Vulnerability Assessment of the building hosting the Administration of the Abruzzo Region, viale Bovio 425, Pescara -2008

Seismic Strengthening through base isolation of the building hosting the Administration of the Abruzzo Region, viale Bovio 425, Pescara -2010

Seismic Vulnerability Assessment and Seismic Strengthening of the ITG-ITC School, Sulmona (AQ) – 2009-10

Seismic Vulnerability Assessment of the Bank of Italy building, Pesaro – 2009-10

Consult to the Administration of the Abruzzo Region for the Seismic Vulnerability assessment of the Region strategic buildings, 2008-

Consult to the ANAS (Italian Road Administration) for the Seismic Vulnerability assessment of approximately 700 bridges, 2010-

E-ELT Telescope Project - Probabilistic Seismic Hazard Assessment Study at Ventarrones Site (Northern Chile), ESO, 2009-

## ***CURRENT AND FUTURE RESEARCH INTERESTS***

My initial focus in research was modeling of frame structures for nonlinear static and dynamic analysis for the seismic vulnerability assessment of structures. The force-based fiber-section two-node frame element developed in my PhD thesis and its later enhancements regarding inclusion of shear deformations and considerations on localization issues has been implemented in most research software programs and, more recently, a few commercial programs.

The element, initially developed for reinforced concrete structures, is now being extended with very interesting results to the analysis of masonry structures, within the frame

Nonlinear analysis of structures (Nonlinear models for analysis of reinforced concrete and masonry buildings, enhancement of nonlinear methods of analysis)

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