



Unione Europea



Ministero dell'Istruzione,
dell'Università e della Ricerca



Università degli Studi di Salerno

DIPARTIMENTO DI INGEGNERIA CIVILE

Dottorato di Ricerca in Ingegneria delle Strutture e del Recupero Edilizio ed Urbano

Corso su “Progettazione ed Analisi di Strutture Tensegrity (ST)”
Course “Analysis and Design of Tensegrity Structures (TS)”
3CFU / 3 ECTS

Prof. Robert E. Skelton – University of California at San Diego

Prof. Fernando Fraternali – Università di Salerno

PROGRAMMA - PROGRAM

❖ **Martedì 12 Giugno 2012 - Aula 112 / Tuesday June 12, 2012 - Room 112**

- **14.00-16.00** Introduzione e Motivazione
Introduction and Motivation
- **16.30-18.30** Ottimizzazione di ST in Regime di Flessione – Parte I
Optimal TS for Bending Loads – Part I

Prof. Fernando Fraternali (Università di Salerno)

❖ **Venerdì 15 Giugno 2012 - Aula 112 / Friday June 15, 2012 - Room 112**

- **14.00-16.00** Ottimizzazione di ST in Regime di Flessione – Parte II
Optimal TS for Bending Loads – Part II
- **16.30-18.30** Ottimizzazione di ST in Regime di Compressione – Parte I
Optimal TS for Compressive Loads – Part I

Prof. Fernando Fraternali (Università di Salerno)



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❖ **Martedì 19 Giugno 2012 - Aula 112 / Tuesday June 19, 2012 - Room 112**

- **14.00-16.00 Ottimizzazione di ST in Regime di Compressione – Parte II
Optimal TS for Compressive Loads – Part II**
- **16.30-18.30 Progettazione di Unità Omotetiche – Frattali Tensegrity
Unit-Self-Similar Design – Tensegrity Fractals**

Prof. Fernando Fraternali (Università di Salerno)
Prof. Robert E. Skelton (University of California at San Diego)

❖ **Giovedì 21 Giugno 2012 - Aula 112 / Thursday June 21, 2012 - Room 112**

- **14.00-16.30 Dinamica delle ST – Parte I
Tensegrity Dynamics – Part I**
- **16.30-18.30 Dinamica delle ST – Parte II
Tensegrity Dynamics – Part II**

Prof. Robert E. Skelton (University of California at San Diego)

❖ **Venerdì 22 Giugno 2012 - Laboratorio di Strutture / Friday June 22, 2012
- Structural Engineering Lab**

- **14.00-19.00 Laboratorio di Simulazione e Progettazione – Parte I
Design and Simulation Laboratory – Part I**

Prof. Robert E. Skelton (University of California at San Diego)

❖ **Lunedì 25 Giugno 2012 - Laboratorio di Strutture / Monday June 25, 2012
- Structural Engineering Lab**

- **14.00-19.00 Laboratorio di Simulazione e Progettazione – Parte II
Design and Simulation Laboratory – Part II**

Prof. Fernando Fraternali (Università di Salerno)
Prof. Robert E. Skelton (University of California at San Diego)



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❖ **Martedì 26 Giugno 2012 - Laboratorio di Strutture / Tuesday June 26, 2012 - Structural Engineering Lab**

- **14.00-19.00 Laboratorio di Simulazione e Progettazione – Parte III
Design and Simulation Laboratory – Part III**

Prof. Fernando Fraternali (Università di Salerno)
Prof. Robert E. Skelton (University of California at San Diego)

❖ **Venerdì 29 Giugno 2012 - Laboratorio di Strutture / Friday June 29, 2012 - Structural Engineering Lab**

- **14.00-19.00 Prova finale**

Prof. Fernando Fraternali (Università di Salerno)
Prof. Robert E. Skelton (University of California at San Diego)

Riferimenti bibliografici – Bibliography

- Skelton, R. E. and de Oliveira, M. C. (2010). Tensegrity Systems. Springer
- Appunti dalle lezioni - Class notes

Assistenza al corso / Teaching Assistants

- Saverio Spadea
- Lucia Senatore



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Robert E. Skelton – Short BIO

- UCSD Daniel Alspach Professor of Dynamics and Control til 2009, now Professor Emeritus
- Norman Medal, American Society of Civil Engineers, 1999.
- External Independent Readiness Review Committee, 1997-1999: Second and Third Servicing Missions for the Hubble Space Telescope
- Fellow, Institute of Electrical and Electronic Engineers (IEEE), 1995.
- Fellow, American Institute of Aeronautics and Astronautics (AIAA), 1990.
- Alexander von Humboldt Senior U.S. Scientist Award, 1992
- Russell Severance Springer Chair, University of California Berkeley, 1991.
- Japan Society for the Promotion of Science Award, 1986.
- National Research Council's Aeronautics and Space Engineering Board 1983-88.
- Lockheed Missles and space company, Huntsville 1963-1965
- Sperry Rand, Huntsville 1965-1975

Relevant Experience:

- Designed built and sea tested the first station-keeping sonobuoy, which is the first system to generate energy from wave motion to drive the navigation and propulsion system.
- Designed, built and flight tested a deployable wing (sponsored by an aerospace company)
- Designed and analyzed for proof of concept a shape-controllable sonobuoy
- Designed control system for solar observatory- SKYLAB
- Designed control systems for Hubble space Telescope

Fernando Fraternali – Short BIO

Fernando Fraternali is an Associate Professor of Structural Mechanics in the Department of Civil Engineering of the University of Salerno, Italy. F. Fraternali received the M.Sc. and the B.Sc. in Civil Engineering from the University of Salern and the PhD in Multiscale Mechanics from the King's College of London. He has participated as a PI, co-PI or research staff member in various research projects funded by the Italian National Research Council, the Italian Ministry of Education, the Italian Network of Seismic Engineering Laboratories (ReLUIS), the Regione Campania (Italy), and US research agencies. Most of his current and past research work has dealt with multiscale modeling and simulation of materials and structures; multiscale fracture mechanics; design, analysis and experimentation of innovative materials, such as environmentally compatible composite materials, nanomaterials and biomaterials; nonlinear dynamics of materials and structures; structural optimization; and mechanics of masonry structures. F. Fraternali has been awarded a Fulbright Research Scholarship for the Academic Year 2005/2006 and has been Visiting Associate in Aeronautics at the Graduate Aerospace Laboratories of the California Institute of Technology from September 2005 through present (several periods). In 1991 he has also visited the Department of Engineering Science and Mechanics of the Virginia Polytechnic Institute and State University. F. Fraternali is in the Board of Editors of the International Journal of "Mechanics Research Communications", and is member of the International Association for Computational Mechanics (IACM), the International Society of Mesomechanics (ISM), the European Mechanics Society (EUROMECH), the European Research Center "Laboratoire Lagrange", the Bioengineering Society (UK), the Italian Association of Theoretical and Applied Mechanics (AIMETA), the Italian Association for Stress Analysis (AIAS), and the United States Association for Computational Mechanics (USACM). He serves as a reviewer for a large number of ISI journals.