

## Section 4.0 General Biographical Information

### Section 4.1 Basic Data

#### **PEDRO ARDUINO**

Assistant Professor of Civil and Environmental Engineering  
University of Washington  
263 Wilcox Hall, Box 352700  
Seattle, Washington 98195-2700  
(206) 543-6777  
parduino@u.washington.edu

### Section 4.2 Academic Background

Ph.D.	Georgia Institute of Technology	1996
M.S.C.E	Georgia Institute of Technology	1995
M.S.C.E.	University of Puerto Rico	1993
Civil Engineer (Prof. Degree)	Universidad Nacional de Córdoba	1988

### Section 4.3 Professional History

Assistant Professor, Department of Civil Engineering, University of Washington, Seattle, WA, 1997-present.

Teaching Assistant, College of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA, 93-96.

Research Assistant, College of Civil and Environmental Engineering, Georgia Institute of Technology, Atlanta, GA, 93-96.

Laboratory Instructor, Department of Civil Engineering, University of Puerto Rico, Mayagüez, PR, 90-92.

Research Assistant, Department of Civil Engineering, University of Puerto Rico, Mayagüez, PR, 90-93.

Instructor, Facultad de Ingeniería, Universidad Nacional de Córdoba, Córdoba, Argentina, 88-90.

Research Assistant, Facultad de Ingeniería, Universidad Nacional de Córdoba, Córdoba, Argentina, 88-90.

### Section 4.4 Awards and Honors

Research Fellowship subsidized by SECyT (Science and Technology Department, National University of Córdoba), Córdoba, Argentina, 1988, 1990.

Research Fellowship subsidized by CONICET (National Council for Scientific and Technological Research), Córdoba, Argentina, 1990.

Alfredo Estrada Academic and Student Service Award for Hispanic Graduate Students, Georgia Institute of Technology, Atlanta, GA, 1994, 1995.

Sowers Distinguished Graduate Student Award for outstanding achievements in research activities, academic excellence, and contributions to the Geosystems Engineering program, Georgia Institute of Technology, Atlanta, GA, 1995.

Luther S. Long III Memorial Award in Engineering Mechanics, Georgia Institute of Technology, Atlanta, GA, 1996.

NSF/IFAI Professor Training Course on Geosynthetics, Auburn University, Auburn, AL, 1997.

ADSC Civil Engineering Faculty Workshop, Fort Collins, CO, 2000.

Recognized in Whos's Who in Science and Engineering, Whos's Who in the World, and Whos's Who in America, 2000, 2001, 2002.

Recognized in the 1<sup>st</sup> Edition of Outstanding Intellectuals of the 21<sup>st</sup> Century, 2001.

Chi-Epsilon Faculty Honor Member, May 2001.

Nomination - University of Washington College of Engineering Teaching award (2002).

Nomination - University of Washington Outstanding Teaching award (2002).

## **Section 5.0 Publications**

### **Section 5,1 Refereed Journal Publications**

- Macari, E. J. and P. Arduino, (1995) Overview of 'State-of-the Practice', Modeling of Overconsolidated Clays, *Transportation Research Record No 1479 - Engineering Properties and Practices in Overconsolidated Clays*, pp.51-60.
- Macari, E. J., P. Arduino and S. Weihe S., (1997) Implicit Integration of Elasto-Plastic Constitutive Models for Frictional Materials with Highly Non-Linear Hardening Functions, *International Journal of Mechanics of Cohesive-Frictional Materials*, Vol. 2, pp.1-29.
- Arduino, P., A. Op den Bosch and E. J. Macari (1997) Geotechnical Triaxial Soil Testing within a Virtual Environment, *ASCE Journal of Computing*, Vol. 11, No. 1, pp.44-47.
- Arduino, P. and E. J. Macari (1998) Numerical Modeling of Spread Footings at Bridge-Embankment Interfaces, *Transportation Research Record No 1633*, pp 61-67.
- Wyatt, T., Arduino, P, and Macari, E. J. (2000) Assessment of a Virtual Laboratory for Geotechnical Engineering Education, *Computers in Education Journal, ASEE Computers in Education Division*, Vol. X, No. 2, April-June 2000, pp.27-35.
- Arduino, P. and E. J. Macari (2001) Implementation of a Porous Media Formulation for Geomaterials, *ASCE Journal of Engineering Mechanics*, Vol 127, No. 2, pp 157-166.
- Arduino, P. and E. J. Macari (2001) Numerical Analysis of Geomaterials within the Theory of Porous Media, *ASCE Journal of Engineering Mechanics*, Vol 127, No. 2, pp 167--175.
- Fowler, J. A., Arduino, P., and Holtz, R. D. (2001) Approximate Displacement Influence Factors for Elastic Shallow Foundations - *Discussion*, *ASCE Journal of Geotechnical and Geoenvironmental Engineering*, Vol 127, No 1, pp. 99-100.
- Arduino P., G. R. Miller, and Ayokunle Ogurinde, (2002) Live Modeling of 1-D Wave Propagation in Layered Soil Media, *Computer Applications in Engineering Education*, Vol 9, No. 4, pp. 248-258.

Hoyos, L. R., Macari, E. J., and Arduino, P. (2002) Constitutive Modeling of an Unsaturated Soil under Axisymmetric Stress States using a Suction Controlled Cubical Testing Device, *International Journal of Plasticity*, in press.

Kramer, S. L., P. Arduino, A. Jones, and M. Eberhard (2002), Uncertainty Analysis for a Seismic Warning System, *TRB Transportation Research Record*, in press.

Arduino, P. and E. J. Macari (2002) Closure to: Numerical Analysis of Geomaterials within the Theory of Porous Media, *ASCE Journal of Engineering Mechanics*, in press.

Miller, G., Arduino, P., Jang, J., and Choi, C.H. (2003), Localized Tensor-Based Solvers for Interactive Finite Element Applications Using C++ and Java, *Computers & Structures*, accepted for publication.

Kramer, S. L., P. Arduino, D. Baska, and M. Malgesini, (2003), A Practical Constitutive Model for Free-Field Analysis of Liquefiable Soils, *ASCE Journal of Geotechnical and Geoenvironmental Engineering*, submitted for publication.

### **Section 5.1.2 Refereed Journal Publications in Preparation**

Arduino, P., and Ping Li (2003), Seismic Pile Response and Pile Stiffness in Liquefiable Soils, *TRB Transportation Research Record*, to be submitted for presentation and publication.

Arduino, P., Greg Miller (2003), Live Modeling Methods for the Simulation of Civil Engineering Problems, *Computers & Structures*, to be submitted for publication.

## **Section 5.2 Conference proceedings and other non-journal articles**

### **Section 5.2.1 Fully-Refereed Conference Proceedings**

Macari, E. J. and P. Arduino, Elasto-Plastic Characterization of Granular Materials with Implications for Slope Stability, *Proceedings of the NSF Structures, Geomechanics, and Building Systems Grantee's Conference*, National Science Foundation, San Juan, PR, pp. 26-29, (1992).

Arduino, P., E. J. Macari and M. Gemperline, Load-Settlement Prediction of Footings on Steep Slopes, *Proceedings of the Specialty Conference on Vertical and Horizontal Deformations of Foundations and Embankments – Settlements' 94*, American Society of Civil Engineers, Texas A&M, College Station, TX, pp.1385-1399, (1994).

Arduino, P. and Macari, E. J., Multi-Phase Flow in Deforming Porous Media by the Finite Element Method, *Proceedings of the eleventh Conference in Engineering Mechanics*, American Society of Civil Engineers, Florida Atlantic University Center, Fort Lauderdale, FL, Vol. I, pp 420-425 (1996).

Hoyos, L., Arduino, P. and Macari, E. J., Constitutive Modeling of Partially Saturated Soils, *Proceedings of the 6<sup>th</sup> International Symposium on Plasticity and Its Current Applications*, Juneau, Alaska, pp 311-312, 1997.

- Arduino, P. and Macari, E. J., Numerical Study of Geomaterials in the Light of Modern Theories of Porous Media, *Proceedings of the Biot Conference on Poromechanics*, pp. 3-10, Universite Catholique de Louvain, Louvain-la-Neuve, Belgium, September 1998.
- Hoyos, L. R., Arduino, P. and Macari, E. J., An Implicit Integration Scheme for Modeling Constitutive Behavior of Unsaturated Soils, *Proceedings of the 99 International Conference on Plasticity, Plasticity 99*, Cancun, Mexico, January 1999.
- Wyatt, T. R., Arduino, P. and Macari, E. J., Assessment of a Virtual Laboratory for Geotechnical Engineering, *Proceedings of the 1999 ASEE Annual Conference*, Charlotte, NC, June 20-23 1999, accepted for publication.
- Sfriso, A., Arduino, P. and Macari, E. J., A Constitutive Equation for Sands based on Non-Associative Plasticity and the Stress-Dilatancy Theory, *Proceedings of the 5<sup>th</sup> U.S. National Congress on Computational Mechanics*, University of Colorado at Boulder, Boulder, CO, July 1999.
- Kramer, S. L., and Arduino, P., Constitutive Modeling of Cyclic Mobility and Implications for Site Response, *Proceedings of the 2<sup>th</sup> International Conference on Earthquake Geotechnical Engineering*, Laboratorio Nacional de Engenharia Civil, Lisboa, Portugal, June 21-25, 1999, pp 1029-1034.
- Laureano R. Hoyos, Jr., Pedro Arduino, Emir J. Macari , Experimental and Computational Modeling of Elasto-Plastic Constitutive Behavior of An Unsaturated Soil Under True Triaxial Stress States, *Proceedings of the 15<sup>th</sup> ASCE Conference in Engineering Mechanics*, New York, June 3 – 5, 2002, *in print*

### **Section 5.2.2 Abstract and Non-Refereed Conference Proceedings and Other Non-Journal Articles**

- Arduino, P., *Elasto-Plastic Characterization of Granular Materials*, M.S. Dissertation, Mayagüez, PR, (1992).
- Arduino, P., *Multi-Phase Description of Deforming Porous Media by the Finite Element Method*, Ph.D. Dissertation, Atlanta, GA, (1996).
- Arduino, P., E. J. Macari, S. Weihe and K. Runesson, Numerical Integration Scheme Applied to a Cone-Cap Model, *Proceedings of the Meet'n 93 Conference in Engineering Mechanics*, American Society of Civil Engineers, Charlottesville, VA, (1993).
- Arduino, P. and E. J. Macari, Bearing Capacity of Footings on Steep Slopes, *Proceedings of the Fifth Puerto Rican EPSCoR Annual Conference*, Mayagüez, PR, pp. 14-15, (1993).
- Arduino, P., A. Op den Bosch and E. J. Macari, Simulation of a Cyclic Triaxial Experiment in a Virtual Environment, *Proceedings of the NSF Workshop on Scientific Supercomputing, Visualization, and Animation in Geotechnical Earthquake Engineering and Engineering Seismology*, Carnegie Mellon University, Pittsburgh, PA, (1994).
- Arduino, P., Analytical and Numerical Study of Geomaterials in the Light of Modern Theories of Porous Media, *Proceedings of the NSF Civil and Mechanical Systems Workshop for the*

*Advancement & Retention of Underrepresented & Minority Engineering Educators*, Washington DC, September (1997).

Arduino, P., UW-Sand A New Constitutive Model for Liquefiable Soils, *Proceedings of the NSF Civil and Mechanical Systems Workshop for the Advancement & Retention of Underrepresented & Minority Engineering Educators*, Washington DC, September (1999).

Arduino, P., Numerical Models for Geotechnical Applications, *Proceedings of the NSF Civil and Mechanical Systems Workshop for the Advancement & Retention of Underrepresented & Minority Engineering Educators*, Washington DC, September (2001).

Arduino, P., S. L. Kramer, and D. Baska, UW-Sand – A Simple Constitutive Model for Liquefiable Soils, *Proceedings of the 6<sup>th</sup> U.S. National Conference on Computational Mechanics*, Dearborn, Michigan, August 1-4, 2001.

Arduino, P., S. L. Kramer, and D. Baska, Applications of a Simple Constitutive Model for Liquefiable Soils, *Proceedings of the 2001 ASCE-ASME-SES Joint Applied Mechanics & Materials Summer Conference*, La Jolla, San Diego, June 27-29, 2001.

Hoyos, L., P. Arduino, and E. Macari, "Experimental and Computational Modeling of Elasto-Plastic Constitutive Behavior of An Unsaturated Soil Under True Triaxial Stress States", *15th ASCE Engineering Mechanics Conference (EM2002)*, June 2-5, 2002, Columbia University, New York, NY.

Choi, ChangHo. and P. Arduino, "Implicit Numerical Integration of Constitutive Relations using Object-Oriented Programming", submitted to *16th ASCE Engineering Mechanics Conference (EM2003)*, July 16-18, 2003 University of Washington, Seattle, WA.

Arduino, P., and G. Miller, "Modeling Soil Liquefaction Using a Two-Field Material Point Method", submitted to *16th ASCE Engineering Mechanics Conference (EM2003)*, July 16-18, 2003 University of Washington, Seattle, WA.

### **Section 5.3 Books, Editing and Other Scholarly Papers**

None

### **Section 5.4 Project reports (reports to sponsors)**

Soil-Structure Interaction on Buildings subjected to Seismic Effects, Annual Report SECyT, Córdoba, Argentina, 1990.

Advanced Concepts of Soil Mechanics as Applied to Highway Construction, prepared for the Puerto Rico Transportation Technology Transfer Center (English and Spanish versions), Mayagüez, PR, 1992.

Development and Implementation of a General Constitutive for Partially Saturated Soils, prepared for the Boeing Endowment for Excellence, University of Washington, October 1997.

Elasto-Plastic Constitutive Driver for Geomaterials, final report prepared for the Royalty Research Fund, Grant RRF #1595, University of Washington, October 1999.

Dynamic Stiffness of Piles in Liquefiable Soils, (with S. L. Kramer), *WADOT Report No. WA-RD 514.1*, pp 149, July 2001

Seismic Instrumentation System for Warning and Rapid Recovery – Pilot Study (with M. Eberhard, and S. L Kramer), *WADOT Report No. WA-RD 520.1*, pp. 98, September 2001.

Influence of Long-Duration Motions on Expected Performance (with M. Eberhard), final report prepared for PEER-NSF, *in preparation*.

Evaluation and Characterization of Uncertainty in Geotechnical Parameters (with S. L Kramer), final report prepared for PEER NSF, *submitted*.

## **Section 6.0 Other Scholarly Activity**

### **Section 6.1 Invited Lectures and Seminars**

Arduino, P., “Constitutive Modeling of Soils: Some General Issues and Current Developments”, University of California at Davis, March 12, 1999.

Arduino, P., “Constitutive Modeling of Soils”, Washington State University, March , 2001.

Arduino, P., “Dynamic Stiffness of Piles in Liquefiable Soils”, Washington State Department of Transportation, Olympia, WA, May 30, 2002.

Arduino, P., “Numerical Modeling of Liquefaction and its Effects on Pile Behavior”, University of Massachusetts at Amherst, MA, June 6, 2002

### **Section 6.2 Presentations Given at Conferences**

Macari, E. J. and P. Arduino, Elasto-Plastic Characterization of Granular Materials with Implications for Slope Stability, presented at the NSF Structures, Geomechanics and Building Systems Grantees’ Conference by E. Macari, San Juan, PR, 1992.

Arduino, P., E. J. Macari, S. Weihe and K. Runesson, Numerical Integration Scheme Applied to a Cone-Cap Model, presented at ASCE Meet’n 93 Conference in Engineering Mechanics by E. Macari, Charlottesville, VA, June 1993.

Arduino, P. and E. J. Macari, Bearing Capacity of Footings on Steep Slopes, presented at the Fifth Puerto Rican EPSCoR Annual Conference by P. Arduino, Mayagüez, PR, 1993.

Arduino, P., E. J. Macari and M. Gemperline, Load-Settlement Prediction of Footings on Steep Slopes, presented at the ASCE Specialty Conference on Vertical and Horizontal Deformations of Foundations and Embankments – Settlements’ 94 by P. Arduino, Texas A&M, College Station, TX, June 1994.

Arduino, P., A. Op den Bosch and E. J. Macari, Simulation of a Cyclic Triaxial Experiment in a Virtual Environment, presented at the NSF Workshop on Scientific Supercomputing,

- Visualization, and Animation in Geotechnical Earthquake Engineering and Engineering Seismology by P. Arduino and E. Macari, Carnegie Mellon University, Pittsburgh, PA, 1994.
- Macari, E. J. and P. Arduino, Overview of 'State-of-the Practice', Modeling of Overconsolidated Clays, presented at the annual meeting of the Transportation Research Board by E. Macari, Washington, DC, January 1995.
- Arduino, P. and E. J. Macari, Multi-Phase Flow in Deforming Porous Media by the Finite Element Method, presented at the eleventh ASCE conference in Engineering Mechanics by E. Macari, Florida Atlantic University Center, Fort Lauderdale, FL, May 1996.
- Arduino, P., Analytical and Numerical Study of Geomaterials in the Light of Modern Theories of Porous Media, presented at the NSF Civil and Mechanical Systems Workshop for the Advancement & Retention of Underrepresented & Minority Engineering Educators by P. Arduino, Washington DC, September 1997.
- Arduino, P. and E. J. Macari (1998) Numerical Modeling of Spread Footings at Bridge-Embankment Interfaces, presented at the annual meeting of the Transportation Research Board by P. Arduino, Washington, DC, January 1998.
- Arduino, P. and E. J. Macari, Numerical Study of Geomaterials in the Light of Modern Theories of Porous Media, presented at the Biot Conference on Poromechanics, Universite Catholique de Louvain, Louvain-la-Neuve, Belgium, September 1998.
- Arduino, P., Constitutive Modeling of Soils: Some General Issues and Current Developments, UW Civil Engineering Seminar Series, Nov. 1998.
- Sfriso, A., Arduino, P. and Macari, E. J., "A Constitutive Equation for Sands based on Non-Associative Plasticity and the Stress-Dilatancy Theory, presented at *the 5<sup>th</sup>* U.S. National Congress on Computational Mechanics, University of Colorado at Boulder, Boulder, CO, July 1999.
- Kramer, S. L., and Arduino, P., "Constitutive Modeling of Cyclic Mobility and Implications for Site Response, presented at the 2<sup>th</sup> International Conference on Earthquake Geotechnical Engineering, Laboratorio Nacional de Engenharia Civil, Lisboa, Portugal, June 21-25, 1999.
- Arduino, P., S. L. Kramer, and D. Baska, "UW-Sand – A Simple Constitutive Model for Liquefiable Soils, presented at the 6<sup>th</sup> U.S. National Conference on Computational Mechanics, Dearborn, Michigan, August 1-4, 2001.
- Arduino, P., S. L. Kramer, and D. Baska, "Applications of a Simple Constitutive Model for Liquefiable Soils, presented at the 2001 ASCE-ASME-SES Joint Applied Mechanics & Materials Summer Conference, La Jolla, San Diego, June 27-29, 2001.
- Arduino, P., S. L. Kramer, A. Jones, and M. Eberhard, "Uncertainty Analysis for a Seismic Warning System", presented at the 2002 TRB Meeting, WA-DC January 14-16 2002.
- Hoyos, L., P. Arduino, and E. Macari, "Experimental and Computational Modeling of Elasto-Plastic Constitutive Behavior of An Unsaturated Soil Under True Triaxial Stress States", *presented at the 15th ASCE Engineering Mechanics Conference (EM2002) June 2-5, 2002, Columbia University, New York, NY.*

Choi, ChangHo. and P. Arduino, "Implicit Numerical Integration of Constitutive Relations using Object-Oriented Programming", to be *presented at the 16th ASCE Engineering Mechanics Conference (EM2003), July 16-18, 2003 University of Washington, Seattle, WA.*

Arduino, P., and G. Miller, "Modeling Soil Liquefaction Using a Two-Field Material Point Method", to be *presented at the 16th ASCE Engineering Mechanics Conference (EM2003) July 16-18, 2003 University of Washington, Seattle, WA.*

### Section 6.3 Professional Licenses

P.E., Argentina  
E.I.T, WA state, 1998

### Section 6.4 Professional Society Membership

American Society of Civil Engineers, member (1992-present)  
TAU BETA PI National Engineering Honor Society, member, (1992-present)  
PHI KAPPA PHI National Honor Society, member, (1992-present)  
CHI EPSILON National Civil Engineering honor Society, member (2001-present)

ASCE-EM Inelastic behavior committee member, 2001 - present  
USUCGER Board of Directors member, 2002 - present

### Section 6.5 Reviews Made

Journal or Other	Number
<i>ASCE Journal of Geotechnical Engineering</i>	11
<i>ASCE Journal of Mechanical Engineering</i>	5
<i>IAHR Journal of Hydraulic Research</i>	1
<i>Int. J. of Analytical Methods in Geomechanics</i>	3
<i>1999 PAN-AM Conference in Soil Mechanics and Foundation Engineering</i>	1
<i>1998 ASCE Specialty Conference on Geotech. Earthquake Eng. &amp; Soil Dyn.</i>	2
NSF Proposals 1998	13
NSF Proposals 2001	9
NSF CARREER	1
NSF Proposals PFSMETE 97	20
NSF Proposals PFSMETE 99	15
UW-RRF Proposals	1
<i>Journal of Civil and Environmental Engineering</i>	1
<i>M.J.Murdock Charitable Trust</i>	1

### Section 7.0 Graduate Students

#### Section 7.1 Chaired Doctoral Degrees

ChangHo Choi in progress  
Status: passed qualifying exam.  
Thesis: "Numerical and Experimental Analysis of Gravels"

Demchak Steve in progress  
Status: passed qualifying and general exam.  
Thesis: "Experimental Analysis of Gravels"

## Section 7.2 Chaired Master Degrees

Ryan J. Hoffmeister Dec. 1998  
Thesis: "GIS Study of Earthquake Induced Landslides".

Chang-Ho Choi June, 1999  
Thesis: "Constitutive Driver for Geomaterials".

Mark Miller March, 2000  
Thesis: "Effects of Long-Duration Long-Period Ground Motions on Bridge Foundation System Performance".

Li, Ping June, 2000  
Thesis: "Dynamic Behavior of Piles in Liquefiable Soils".

Jeffrey Fowler June, 2000  
Project: "Development of a web-base site for Geosynthetics".

Fu-Jen Ho Dec., 2000  
Project: "Numerical Study of Bearing Capacity of Shallow Foundations Subjected to Eccentric and Inclined Loads".

Persson, Jenny Feb. 2002  
Thesis: "Numerical Modeling of Geotechnical Problems using Plaxis".

Robarge, Susan May, 2002  
Thesis: "Pile Analysis using OpenSees".

Heller, Erik in progress  
Thesis: "Determination of Coefficient of Consolidation CV for Sands"

Stanley, Alison in progress  
Thesis: "Shear Strength of gravels".

## **Section 7.3 Other Student Supervision (service on graduate degree committees)**

### **University of Washington**

#### **Ph.D. Committees**

Laureano R. Hoyos, Dec. 1998.  
W. Lee, March 2000.  
Dave Baska, May 2002.  
C.H. Wang, in progress.  
F. Saidin, in progress.  
Allan Jones, in progress  
Jong-Jin Park, in progress (GSR)  
Taecil Choi, in progress (external Ga.Tech)

#### **M.S. Committees**

Cynthia Finley, (1997); Jack Mitaim, (1997); Perry R. Cole, (1997); Steve Spencer, (1998); Wendy Burton, (1998); Jorgen Johansson, (1998), Carolyn Cook, (1999); Andre Sidler, (1999), Greg Landau, (2000), Zach Price, (2000); Jared Nelson, (2000); Ogunrinde, Ayokunle (2001); Harney, Michael (2001); Petek, Kathryn (2001), Haggard, Kristina (2001); DeVries, Susan Tonkin (2001), Sarah Paulsen (2002), Nils Lindwall (2002); Matt Malgesini (current).

#### **Advised Undergraduate Students**

Aileen Santiago (1997), Kurt Zimmers (1998), Jesse Beaver (1998), Kip Gatto (1998), Ka-Cheong Mak (1998), Chris Yeargin (1999), Chris Nickerson (1999), Damon Roth (2000), Ben Manfredi (2000), Konrad Craddock (2000), Brian Bennets (2001); Pendo Duku (2001), Yee-Fan Huang(2001), Lindsay Baynes (2001), Jennica Ottenbreit (2001), Paul Spitznas (2002), John Patrick Leuthen(2002), Marek Bednarczyk (2002), Peter Craig (2002), Brad Johnson (2002), Griffin Thornock (2002).

## **Section 8.0 Research Activities**

### **Section 8.1 Sponsored Research (funded and/or pending)**

- 1997-98 Elasto-Plastic Constitutive Driver for Geomaterials, (PI), Royalty Research Fund, University of Washington, \$21,395/11 months, funded.
- 1998-00 Dynamic Stiffness of Piles in Liquefiable Soils, (Co-PI), WADOT, \$90,000, two (2) year, funded.
- 1998-99 Effects of Long-Duration, Long-Period Ground Motions on Bridge Foundation System Performance, (PI), NSF-PEER, \$50,000, one (1) year, funded.
- 1999-00 Alaskan Way Viaduct (AWD) Instrumentation, (Co-PI), WADOT, \$75,000/1 year, funded.
- 1999-01 Influence of Ground-Motion Duration on Expected Performance, (Co-PI), NSF-PEER, \$145,000, two (2) year, funded.

- 1999-00 Evaluation and Characterization of Uncertainty in Geotechnical Parameters, (PI), NSF-PEER, \$59,000, one (1) year, funded.
- 1999-00 An advanced Educational Module to Study Wave Propagation, (PI), NSF-PEER, \$20,000, one (1) year, funded.
- 2000-01 Development of Geotechnical Capabilities in OpenSees, (PI), NSF-PEER, \$90,000/1 year, funded.
- 2001-04 Tridimensional Analysis of Gravels, (PI), NSF Civil and Mechanical Systems, \$105,200/2 years, funded
- 2002-02 "Workshop on submerged floating tunnels" (PI), NSF Civil and Mechanical Systems, \$40,226/1 years, funded
- 2002-03 "Effects of Geotechnical Uncertainties on EDP's" (co-PI), NSF-PEER, \$55,000/1 year, funded
- 2003-05 Simulation of Soil-Foundation-Structure Interaction of Deep Foundations, (PI), WADOT, \$110,000/2 years, pending
- 2003-03 "Development of Instructional Module for Engineering Mechanics" (co-PI), Boeing Grant, \$35,000/1 year, pending
- 2003-06 "Modeling Soil Liquefaction Using a Two-Field Material Point Method" (PI), NSF Civil and Mechanical Systems, \$354,579/3 years, pending
- 2003-06 Application of Live Modeling Methods to the Analysis of Complex Geotechnical Systems" (PI), NSF Civil and Mechanical Systems, \$347,956/3 years, to be resubmitted December 12, 2002

## **Section 8.2 Other Research-Related Activities**

- 2001-present - Development of object-oriented computational tools for civil engineering applications. In cooperation with Prof Greg Miller.

## Section 9.0 Teaching Effectiveness

### Section 9.1 List of all undergraduate and graduate courses taught

#### University of Washington (Quarter System)

Course	Course Title	Quarter	No. of credits	No. of Students	Evaluation
CIVE 436	Foundation Design	W97	3	50	Yes
CESM563	Advanced Foundation Eng.	Sp97	3	11	Yes
CESM561	Seepage and Consolidation	F97	3	9	Yes
CESM503	Materials	W98	3	9	Yes
CESM563	Advanced Foundation Eng.	W98	3	9	Yes
CIVE436	Foundation Design	Sp98	3	45	Yes
CIVE436	Foundation Design	S98	3	25	Yes
CESM561	Seepage and Consolidation	F98	3	14	Yes
CESM563	Advanced Foundation Eng.	W99	3	12	Yes
CESM503	Materials	W99	3	11	Yes
CIVE366	Basic Soil Mechanics	S99	3	72	Yes
CESM562	Shear Strength & Slope Stability	F99	3	5	Yes
CEE503	Materials	W00	3	8	Yes
CEE366	Basic Soil Mechanics	Sp00	4	66	Yes
CEE436	Foundation Design	Sp00	3	32	Yes
CESM561	Seepage and Consolidation	F00	3	9	Yes
CESM562	Shear Strength & Slope Stability	F00	3	9	Yes
CEE503	Materials	W01	3	13	Yes
CEE220	Mechanics of Materials	S01	4	31	Yes
CEE523	Advanced Foundation Eng.	W02	3	4	Yes
CEE503	Materials	W02	3	18	Yes
CEE366	Basic Soil Mechanics	Sp02	4	70	Yes
CEE220	Mechanics of Materials	S02	4	45	Yes

## Section 9.2 Summary of student teaching evaluations

Course	Course Title	Quarter	No. of Resp.	Item 1	Item 3	Item 4	Item 1-4
CIVE 436	Foundation Design	W97	32/50	3.30	3.50	3.30	3.40
CESM563	Advanced Foundation Eng.	Sp97	11/11	3.92	4.00	3.88	3.82
CESM561	Seepage and Consolidation	F97	9/9	4.60	4.94	4.40	4.60
CESM503	Materials	W98	6/9	4.50	4.25	4.50	4.30
CESM563	Advanced Foundation Eng.	W98	9/9	4.25	4.75	4.75	4.50
CIVE436	Foundation Design	Sp98	36/45	4.13	4.24	4.18	4.15
CIVE436	Foundation Design	S98	18/25	4.28	4.60	4.60	4.37
CESM561	Seepage and Consolidation	F98	12/14	3.88	4.12	3.97	3.95
CESM503	Materials	W99	9/11	4.30	4.67	4.50	4.41
CESM563	Advanced Foundation Eng.	W99	11/12	3.79	4.09	3.95	3.91
CIVE366	Basic Soil Mechanics	S99	39/72	4.05	4.55	4.92	4.13
CESM562	Shear Strength & Slope Stability	F99	5/5	4.07	4.18	4.08	4.05
CEE503	Materials	W00	8/8	4.04	4.31	4.50	4.15
CEE366	Basic Soil Mechanics	Sp00	43/66	4.63	5.06	5.11	4.80
CEE436	Foundation Design	Sp00	24/32	4.20	4.79	4.67	4.43
CESM561	Seepage and Consolidation	F00	9/9	4.59	4.62	4.60	4.51
CESM562	Shear Strength & Slope Stability	F00	9/9	4.53	4.68	4.41	4.45
CEE503	Materials	W01	11/13	3.86	4.42	4.07	4.03
CEE220	Mechanics of Materials	S01	20/31	4.44	4.96	4.93	4.66
CEE523	Advanced Foundation Eng.	W02	3/4	3.28	3.30	3.84	3.40
CEE503	Materials	W02	17/18	3.94	4.47	4.11	4.03
CEE366	Basic Soil Mechanics	Sp02	55/70	4.20	4.60	4.30	4.30
CEE220	Mechanics of Materials	S02	27/45	4.10	4.40	4.40	4.20

Item 1 = The course as a whole was:

Item 3 = The instructor's contribution to the course was:

Item 4 = The instructor's effectiveness in teaching the subj. matter was:

Item 1-4 = Combines items 1-4

\*\*Note: Prior to F98, median is reported. Starting F98, *adjusted* median is reported.

### Section 9.3 Supervision of undergraduate independent study

Course	Type	Quarter	No. of Students	Credits
--	Summer Internship	Sm98	2	--
CEE499	PEER scholars course	F98	3	3
CEE499	PEER scholars course	F99	2	3
CEE499	Independent study	Sp99	1	3
CEE499	PEER scholars course	F00	3	3
CEE499	PEER scholars course	F01	3	3
CEE499	Independent study/research	Sp01	2	3
---	Resch. in colab. w/ Burke museum	Sp02	2	--
CEE499	PEER scholars course	F02	3	3

PEER scholar's course = Pacific Earthquake Engineering Research Center course on earthquake engineering (taught in cooperation with different schools from the pacific coast)

## **Section 9.4 Peer evaluation of teaching**

## Section 9.5 Short courses, workshops, and other educational programs

- UW PEER Education Program representative. In charge of developing and monitoring earthquake related PEER education programs at the University of Washington. Four programs are under current development: PEER undergraduate summer internships, PEER undergraduate earthquake engineering scholars course, PEER graduate fellowship, and development of Educational Modules for Earthquake Engineering.
- Chair of PEER fellowship sub-committee.
- In charge of development and instruction of the 1999 PEER scholars course geotechnical component (in coordination with Prof. Steve Kramer ). Seattle, WA, September 10-12, 1999.
- In charge of development and instruction of the 2001 PEER scholars course public policy component (in coordination with Prof. Peter May from UW Political Science Dept.). Seattle, WA, November 10-12, 2001.

## Section 9.6 Other (teaching at other institutions)

### Georgia Institute of Technology (Quarter System)

Course	Course Title	Quarter	No. of Credits	No. of Students	Evalaution
CE 6160	Constitutive Modeling of soils (with E. Macari)	F95	3	9	No
CE 6170	Computational Soil Elasto-Plasticity (with E. Macari)	Spr95	3	7	No

### University of Puerto Rico (Semester System)

Course	Course Title	Quarter	No. of Credits	No. of Students	Evalaution
INCI 4109	Undergraduate Geotechnical Engineering Laboratory	F90	3	30	No
INCI 4139	Undergraduate Geotechnical Engineering Laboratory	Spr90	3	30	No

### Universidad Nacional de Córdoba (Semester System)

Course	Course Title	Quarter	No. of Credits	No. of Students	Evalaution
CE 1001	Numerical Methods in Engineering	F89	3	50	No

## Section 10.0 Service

### Section 10.1 Departmental Service

1997-2002	Department of Civil Engineering, MRI – NSF Special Equipment Committee
1999-2002	Department of Civil Engineering, Scholarships Committee
1999-present	Department of Civil Engineering, Computing committee
1999-present	Department of Civil Engineering, Web-site committee
1999-2000	Department of Civil Engineering, Computational Mechanics search committee member
2001-2002	Department of Civil Engineering, Strategic Planning Committee member

### Section 10.2 College Service

1997-present	College Engineering Faculty Focus Advisory Committee
2001-present	Active Participant of College of Engineering Open-House

### Section 10.3 University Service

In cooperation with Burke museum in the development of display “The Big One” on Earthquakes in the Pacific Northwest; open to the public in February 28, 2002

### Section 10.4 Community Service

None

### Section 10.5 National Service

1997-present	PEER-NSF Education committee member
1997	NSF PFSMETE review panel (Post-doc. fellowships in Science, Math. Eng. and Tech. Education)
1998	NSF CMS review panel
1999	NSF PFSMETE review panel (Post-doc. fellowships in Science, Math. Eng. and Tech..Education)
2001	NSF CMS review panel
2001	Member of Nisqually Earthquake UW Clearinghouse Committee
2001-present	Member of ASCE Engineering Mechanics (EM) Inelastic Behavior and Properties of Materials committee
2002-present	USUCGER (United States University Council on Geotechnical Engineering Research) member of Board of Directors

### Section 10.6 All Other Service

None

### Section 10.7 Consulting Experience

Analysis and Design of six (6) R-C multi story buildings by means of the S-ETABS computer program and Argentine building code. Supervisor: Dr. Carlos A. Bartó and Prof. Carlos Larson, Córdoba, Argentina, 1988-1990.

Soil characterization and foundation analysis for a two story building. Supervisor: Dr. E. J. Macari, and Dr. J. A. Bernal, Mayagüez, PR, 1992.

Soil characterization by means of simple shear tests of a Puerto Rican silty-clay soil.  
Supervisor: Dr. E. J. Macari and Dr. J. A. Bernal, Atlanta, GA, 1994.

Analysis of Foundational Alternatives for Support of Puget Sound Energy Transmissions; with  
Steven K. Kramer, Seattle, WA, 1999.

Expert witness, "Landslide Hazards in West Seattle", State of Washington, 2000.

Evaluation of Embankment Dynamic Lateral Displacements, Port of Seattle Third Run-Way  
project, *Hart Crowser*, Seattle, WA, 2001-02.

Non-linear Free-field Analyses for Liquefiable Soils, Projects: Skookumchuck Dam, Boeing  
Control Tower, Hutchison Career Center (Fairbanks, Alaska), Marysville Water Plant; Kent  
City Hall, *Shannon & Wilson*; Seattle, WA, 2000-02.

Implementation of a Duncan-Chang Hyperbolic constitutive model in FLAC-3D, Tacoma  
Narrows Bridge Project, *Shannon & Wilson*, Seattle, WA, 2002