

Curriculum Vitae

Patricia J. Culligan

Professor, Civil Engineering & Engineering Mechanics
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Education:

<u>School</u>	<u>Degree</u>	<u>Date</u>
University of Leeds	B.Sc. Hons. (Civil Engineering)	1982
Cambridge University	M.Phil.	1985
Cambridge University	Ph.D.	1989
Université d'Aix-Marseille III	Diplome de Langue, Litterature et Civilization (avec Mention)	1993

Principal Fields of Interest:

Geo-environmental engineering; Porous media flow and transport; Urban sustainability & design.

Career History:

<u>Employer</u>	<u>Position</u>	<u>Beginning</u>	<u>Ending</u>
C.H. Dobbie & Partners	Graduate Engineer	Sept 1982	Apr 1984
Cambridge University	Graduate Research Assistant	May 1984	Feb 1989
City University	Research Fellow	Mar 1989	Nov 1989
University of Western Australia	University Postdoctoral Research Fellow	Dec 1989	Jul 1992
City University, London	Honorary Visiting Research Fellow	Oct 1993	Jun 1994
Massachusetts Institute of Technology	Assistant Professor	July 1994	June 1998
Massachusetts Institute of Technology	Associate Professor	July 1998	June 2003
Columbia University	Associate Professor	July 2003	June 2005
Columbia University	Full Professor	July 2005	present

Professional Registration: Chartered Engineer with the UK Engineering Council (Reg. No. 436148)

Publications: 2 books; 3 book chapters; 32 journal papers; 28 refereed conference papers; 37 other major publications (National Academy Reports; Specialty Publications; Professional Periodicals, etc.)

Theses Supervision: 5 Bachelors; 24 Masters; 10 Doctoral as Supervisor (4 in progress), 14 Doctoral as Reader

Awards Received:

<u>Award</u>	<u>Date</u>
British Institution of Civil Engineers Prize for “outstanding undergraduate work”	1982
University of Western Australia, Postdoctoral Research Fellowship	1989-1992
British Council Academic Links Award for Research Collaboration	1994
Queen’s University, Canada Visiting Scholarship	1995
Jasper and Marion Whiting Foundation Travel Fellowship	1996
University of Western Australia Mosey Visiting Fellowship	1996
Edgerton Career Development Chair	1996
National Science Foundation CAREER Award	1999
Arthur C. Smith Award for contributions to undergraduate life at MIT	1999
Idaho National Environment and Engineering Laboratory, Academic Center for Excellence Faculty Fellowship	2001
Nominated and Invited Participant: Women in Engineering Leadership Institute 2005 Leadership Conference	2005
Columbia Engineering School Distinguished Faculty Teaching Award	2006
Columbia Engineering School Armen and Janette Avanesians Diversity Service Award	2006
Columbia University Presidential Award for Outstanding Teaching	2007
ASCE Journal of Geotechnical and Geo-Environmental Engineering, Editorial Board Member of the Year	2007

Professional Society Membership:

<u>Organization</u>	<u>Since</u>
International Society of Soil Mechanics and Foundation Engineering	1989
American Society of Civil Engineers (full member)	1994
American Society of Engineering Educators	1999
American Geophysical Union	1994
Geological Society of America	2000
New York Academy of Sciences (honorary member)	2006

Editorial Board Membership:

<u>Journal</u>	<u>Beginning</u>	<u>Ending</u>
Electronic Journal of Geotechnical Engineering	May 1996	April 1999
International Journal of Physical Modelling in Geotechnics	April 2000	present
ASCE Journal of Geotechnical and GeoEnvironmental Engineering	Oct 2000	Feb 2007
Associate Editor, AGU Water Resources Research	Jan 2007	present
Associate Editor, Vadoze Zone Journal	Feb 2008	present

Advisory Committees and Directorships:

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
US Universities Committee on Geotechnical Engineering Research (USCGER): MIT Representative	Sept 1994	January 2002
ASCE Geo-environmental Engineering Committee	July 1995	present
International Advisory Board for the Environmental Test Facility/ Station d'Essais de Technologies Environnementales, Memorial University of Newfoundland, Canada	March 1997	Jan 1999
International Advisory Board for Network of European Centrifuges for Environmental Geotechnics Research	July 1998	June 2000
Co-director of NIEHS Community Outreach and Education Program at MIT	Jan 1998	June 2003
Co-director of Research, EPA North-East Hazardous Substance Research Center	March 1998	January 2002
Technical Committee on Centrifuge and Physical Model Testing (TC2), International Society for Soil Mechanics & Geotechnical Engineering	May 1999	present
National Academies National Research Council Committee on Long-Term Institutional Management of DOE Waste Sites	July 2001	June 2003
National Academies National Research Council Committee on Opportunities for Accelerating Characterization and Treatment of Wastes at DOE Nuclear Weapons Sites	October 2003	January 2005
US Universities Committee on Geotechnical Engineering Research (USCGER): Columbia University Representative	Sept 2003	present
US Universities Committee on Geotechnical Engineering Research (USCGER): Education Committee Member	Oct 2003	present
National Academies National Research Council Committee on Management of Certain Radioactive Waste Streams Resulting from Reprocessing Tank Waste at DOE Sites (Congressionally Mandated)	Mar 2005	Mar 2006
New York Academy of Sciences Steering Committee Member for Green Science and Engineering Systems Initiative	May 2006	present
National Academies National Research Council Committee on Development and Implementation of an EM Cleanup Technology Roadmap	Mar 2007	present
Chair, Geo-Institute of ASCE Awards Committee	Aug 2008	present

Organized Conferences and Workshops:

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
Panelist and Contributing Author, DOE/EPA/DuPont International Containment Technology Workshop, August 1995, Baltimore, USA	Aug 1995	
Conference Advisory Board: Polluted & Marginal Land 96', London, England, 2 - 4 July, 1996	Aug 1995	July 1996
Session Chair, International Conference: Centrifuge 98, Tokyo, Japan, 23 –25 Sept, 1998	Sept 1998	
Organizing Committee and Session Chair (2 sessions), Int. Conference on	Sept 1998	July 2002

Physical Modelling in Geotechnics, Newfoundland, Canada, 10 – 12 July, 2002		
Session Leader, Advanced Concept Army Research Office 2001 Centrifuge Workshop, Vicksburg, USA, Jan. 30 – Feb. 1, 2001	Jan 2001	
Co-Chair, 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering and 37th U.S. Rock Mechanics Symposium, Soil & Rock America 2003, Cambridge, USA, June 22 – 26, 2003	June 2000	June 2003
Invited participant, NSF Workshop on the Role Geotechnical Physical Modelling in Education, Newfoundland, Canada	July 2002	
Invited participant, NSF Workshop on Emerging Geoenvironmental Technologies for Pollution Control and Remediation, Sept 18 – 19, 2003	Sept 2003	
Co-organizer and Session Chair: Geocentrifuge Advances in Studying Subsurface Environmental Processes, American Geophysical Union, Fall 2003 Meeting, San Francisco, USA	Dec 2003	
Co-organizer and Session Chair: Advances in Insitu Remediation Technologies, ASCE Geo Frontiers Conference, Austin, Texas, Jan 24 – 26, 2005.	June 2004	Feb 2005
Organizing Committee and Invited Keynote Speaker, International Conference on Physical Modelling in Geotechnics, HKUST, Hong Kong, 4 – 6 August, 2006	July 2004	present
Invited participant and Workshop Leader, 3 rd Annual Conference of The Environmental Consortium of Hudson Valley Colleges and Universities, RPI, 4 – 5 November, 2005.	Nov 2005	
Invited participant and panelist, Princeton Women in Science and Engineering Conference, Princeton, February 10, 2006.	Feb 2006	
Co-organizer and Session Chair: Advances in Waste Containment and Transport, ASCE Geo Denver Conference, Denver, Colorado Feb, 18 th – 21 st 2007.	June 2006	Feb 2007
Member, New York Academy of Sciences, “Green Science” Steering Committee	July 2006	present
Organizing Committee, GeoCongress 2008: The Challenge of Sustainability in the Geo-environment, New Orleans, Louisiana, March 9 – 12 th , 2008	Nov 2006	present
Co-organizer and Session Chair: Coupled Transport Processes, ASCE GeoCongress 2008, New Orleans, Louisiana, March 9 – 12 th , 2008	Feb 2007	present

National Science Foundation Review Panels:

<u>Panel</u>	<u>Date</u>
Unsolicited Proposals: NSF Structures & Mechanics Division	Jan 1998
NSF Engineering Research Centers: Water Resources & Environmental Engineering Division	March 1999
NSF Exploratory Research in Model Based Simulation: Geotechnical Division	June 2000
CAREER Proposals: NSF Civil & Mechanical Systems Division	Nov 2001
CAREER Proposals: NSF Civil & Mechanical Systems Division	Nov 2002
NSF Major Research Instrumentation: Civil & Mechanical Systems Division	March 2004
CAREER Proposals: NSF Civil & Mechanical Systems Division	Sept 2004
Canadian National Research Council: Site Visit for Industrial Chair, Guelph University	Feb 2007
Unsolicited Proposals: NSF Geomechanics and Geotechnical Systems	June 2007
ADVANCE PAID Proposals, NSF Directorate of Human Resources	March 2008

Administrative Responsibilities Within Columbia University:

<u>Responsibility</u>	<u>Beginning</u>	<u>Ending</u>
<i>Department of Civil Engineering & Engineering Mechanics</i>		
Director, Water Resources and Environmental Engineering Concentration	Sept 2003	present
PhD Qualifying Committee	Oct 2003	present
ABET Committee	March 2005	present
Faculty Search Committee in Construction Management	March 2005	March 2006
Graduate Admissions Committee	Dec 2005	Sept 2007
Faculty Search Committee in Experimental Mechanics	Nov 2007	present
<i>School of Engineering and Applied Science (SEAS)</i>		
Chair, SEAS Faculty Development and Diversity Initiatives Committee	Sept 2005	present
Faculty Advisor; Women in Computer Science and Engineering (WICSE)	Sept 2005	Sept 2006
Faculty Advisor, Columbia University Engineers Without Borders	Jan 2005	present
Director, Education Center for Sustainable Engineering	Jan 2008	present
<i>University Wide</i>		
Member, Presidential Advisory Committee on Diversity Initiatives	Sept 2005	present
Member, Faculty Advisory Committee on Undergraduate Studies in Sustainable Development	Feb 2006	present
Selection Committee, Presidential Teaching Awards for Graduate Students	Dec 2006	present
Search Committee, Vice-Provost of Diversity and Faculty Development	Dec 2006	May 2007
Co-Chair, Provost's Task Force on Women & Minorities in Science & Engineering	Sept 2007	present
<i>The Earth Institute at Columbia University</i>		
Co-PI the Earth Institute's ADVANCE Program	Sept 2005	present
Research Associate and Executive Committee Member of the Earth Institute's Urban Design Lab	Sept 2005	present
Search Committee, Director of Center for International Earth Science Information Network (CIESN), Columbia University	Oct 2006	Jan 2007
Member, Earth Institute "Earth Clinic" Steering Committee	Feb 2007	present
Member, Earth Institute Education Committee	Nov 2007	present

Funded Projects (1994 - present)

Summary of Funded Projects 1994 - 2007: (Total Funding: \$9,676,294)

Massachusetts Institute of Technology:

- 1994 Principal Investigator, *Sloan Funds*; Investigation of Transport Phenomena in Porous Media. \$125,000
- 1994 Principal Investigator, *School of Engineering, MIT*; Non-recurring Equipment. \$25,000
- 1994 - 1995 Principal Investigator, *MIT Center for Environmental Health Sciences* Parameters Effecting Contaminant Transport in the Aberjona Watershed; With Emphasis on Wells G and H Site; feasibility study. \$30,000
- 1994 - 1997 Principal Investigator, *NSF Materials Research Science and Engineering Center*, Investigation into Non-wetting Phase Entrapment during Immiscible Fluid Transport in Porous Media. \$165,000
- 1995 - 1996 Principal Investigator, *Centrode Innovacion Tecnologica Mendoza 'XXI* An Investigation into the Remediation of Organic Contaminants Using In-situ Air-Sparging. \$25,000
- 1995 - 2002 Principal Investigator (co-PI, Dr. J. Germaine) *EPA Northeast Hazardous Waste Research Center* Investigation into the Effectiveness of DNAPL Remediation Strategies in Fractured Media. \$290,000
- 1995 - 1997 Principal Investigator, *NIEHS, Center for Environmental Health Sciences*, An Investigation into the Remediation of Organic Contaminants Using In-situ Air Sparging. \$120,000
- 1995 - 1999 Principal Investigator (co-PI, Dr. J. Germaine), *NIEHS, Center for Environmental Health Sciences*, New Approaches for the Laboratory Characterization of Wetland Deposits with Emphasis on Wells G&H Site. \$360,000
- 1996 - 1998 Principal Investigator, *MIT Center for Environmental Health Sciences*, Micro Laser-Induced Breakdown Spectroscopy - A novel chemical analysis tool. \$38,000
- 1998 - 2003 Principal Investigator, *NSF CAREER Award*, The use of the geotechnical centrifuge for physical modeling of geo-environmental and geotechnical problems (including matching funds). \$240,000
- 1999 - 2000 Principal Investigator, *Schlumberger-Doll Research*, Immiscible Flow Processes in Porous Media. \$20,000
- 1999 - 2000 Principal Investigator (co-PIs Prof. A Whittle, Dr. J. Germaine) *Class of '51, '55 and '72 Alumni Funds* Use of the Geotechnical Centrifuge to Integrate Physical Modeling of Large Scale Engineering Problems into CEE Undergraduate Education. \$25,000
- 1999 - 2003 Co-Principal Investigator (co-PI Prof. H Nepf) *NIEHS, Community Outreach and Education Program* Curriculum development and outreach in environmental science for K-12. \$567,000

- 2001 - 2002 Principal Investigator (co-PI Dr. J. Germaine) *Idaho National Engineering and Environmental Laboratory* Colloid Particle Migration in Porous Media: Scale Modeling From Geocentrifuge Experiments Using Materials with Matched Index of Refraction. Seed project. \$65,000
- 2002 - 2003 Co-Principal Investigator (co-PIs Profs. Einstein, Newman, Grimson, Boyce & Dr. Masi) *Cambridge-MIT Institute* Teaching/ Learning of Engineering and Technology. Phase I. \$150,000
- 2002 - 2003 Principal Investigator (co-PI Prof. Harvey) *The City of Boston*, Boston Groundwater Depletion and Foundation Problems. Phase I. \$60,000

Columbia University

- 2004 – 2008 Principal Investigator (collaborator Dr. J. Germaine, MIT) *NSF*, Air-Flow Mechanisms During Insitu Air-Sparging Operations. \$255,000
- 2004 – 2007 Principal Investigator (co-PIs, Profs. Garvin, Hawkinson, Lall, Macapia, McGourty, McGrath, McKee, Orff, Plunz & Themelis) *Columbia University's Academic Quality Fund*, Toward New Urban Ecologies: Integrating Science, Engineering and Design Through Education. \$212,140
- 2004 – 2008 Co-Principal Investigator (PI Prof. McGourty, Co-PIs Profs. Lall, Gong & Castaldi) *NSF*, Reforming Undergraduate Education in Environmental Engineering: Urban Studios as Knowledge Delivery Systems and Vehicles for Service Learning. \$999,494
- 2004 – 2009 Co-Principal Investigator (PI Dr. Bell, Co-PIs Profs Cane, Mutter & Pfirman, Dr. Balstad) *NSF ADVANCE* at the Earth Institute, \$4,200,000
- 2006 – 2007 Principal Investigator. *EPA P3 Program*, Development Plan of a Sustainable Water Management Plan for Sakyikrom, Ghana, Africa. \$10,000
- 2006 – 2007 Principal Investigator, *The Earth Institute at Columbia University: Course Transportation Support: CIEE E3260: Engineering for Developing Communities* trip to Ghana, \$4,800
- 2007 – 2010 Co-Principal Investigator (PI Dr. VanGeen, collaborators Profs Emch (UNC), Mailloux (Barnard) & McKay (Tennessee) *EID- Collaborative Research: Does Arsenic Mitigation in Bangladesh Raise Exposure to Bacterial and Viral Pathogens?* \$1,500,000
- 2007 – 2009 Principal Investigator (co-PIs, Profs. Deodatis, Griffin, Lall, McGourty, Modi, Pfirman & Plunz) *Columbia University's Academic Quality Fund*, An Education Center for Sustainable Engineering. \$190,000.

Publications of *Patricia J. Culligan-Hensley*

(*Student Authors Underlined*)

1. **Books**

- [2] Plunz, R.A and **P.J. Culligan**, “Eco-Gowanus: Urban Remediation by Design”, MSAUD New Urbanisms 8, Columbia GSAPP Architectural Press, 160 pages. ISBN 978-1-883584-46-7
- [1] **Culligan, P. J.**, H. H. Einstein and A. J. Whittle, “Soil and Rock America 2003”, Proceedings of the 12th Panamerican Conference on Soil Mechanics and Geotechnical Engineering and the 39th U.S. Rock Mechanics Symposium, June 22 – 26, 2003, Cambridge, MA, USA, Verlag Gluckauf, Essen, Vol 1 & Vol 2, 2861 pages. ISBN 3-7739-5985-0

2. **Book Chapters**

- [4] **Culligan, P.J.** and F. Pena-Mora, “Interdisciplinary in Engineering”, in the Oxford Handbook on Interdisciplinarity, Oxford University Press, (*in preparation*), 2008. Invited.
- [3] Griffioen, J. W., **P. J. Culligan**, D. A. Barry, and K. Banno, “Centrifuge scaling of unstable infiltration,” in *Recent Research Developments in Soil Science*, Research Signpost, Trivandrum, India. 1997, 29-41. Invited. ISBN 81-271-0046-3
- [2] Parlange, J.-Y., T. S. Steenhuis, R. Haverkamp, D. A. Barry, **P. J. Culligan-Hensley**, W. L. Hogarth, and M. B. Parlange, “Soil properties and water movement,” *Vadose Zone Hydrology: Cutting across disciplines*, Oxford University Press, 1996, 99-129. Invited. ISBN 0-19-510990-2
- [1] **Culligan-Hensley, P. J.**, and C. Savvidou, “Environmental geomechanics and transport processes,” in *Geotechnical Centrifuge Technology*, R. N. Taylor (ed.), Chapman and Hall, London, 196-263, 1995. Invited. ISBN 0-7514-0032-7

3. **Refereed Articles**

- [60] **P. J. Culligan**, “Two-Phase Transport in Porous Media: What Questions Still Remain?”, GeoCongress 2008, Mar 8–13, New Orleans, LA, 16 pages, Invited Keynote Paper, 646-663, 2008.
- [59] O’Keeffe, G., K. E. Schulte, **P. J. Culligan**, F. Montalto and W. R. McGillis, “Design of an Instrumented Model Green Roof Experiment”, GeoCongress 2008, Mar 8 – 13, New Orleans, LA, 1105-1112, 2008.
- [58] Pei, J., J. T. Germaine and **P. J. Culligan**, “An Experimental Method for Visualizing Coupled Particle and Fluid Transport within a Porous Medium”, GeoCongress 2008, Mar 8 – 13, New Orleans, LA, 830-837, 2008.
- [57] Schulte, K. E. S. L. Heng, **P. J. Culligan** and J. T. Germaine , “Intrinsic Sorptivity for Soils with Difference Average Grain Size Diameters”, GeoCongress 2008, Mar 8 – 13, New Orleans, LA, 8 822-829, 2008.
- [56] Garnier, J. , C. Gaudini, S.M. Springman, **P.J. Culligan**, D. Goodings, D. Konig, B. Kutter, R. Phillips, M.F. Randolph, and L. Thoreli , Catalogue of Scaling Laws and Similitude Questions in Geotechnical Centrifuge Modelling *Int. J. of Physical Modelling in Geotech.*” Vol.7(3), 1-24, 2007.

- [55] Schulte, K. E., **P. J. Culligan** and J. T. Germaine , “Intrinsic Sorptivity and Water Infiltration into Dry Soil at Different Degrees of Saturation”, GeoDenver 2007, Feb 18 - 21, 2007, Denver, CO, CD-ROM proceedings, 12 pages, 2007.
- [54] Yoon, J. S., J.T. Germaine and **P.J. Culligan**, “Visualization of Particle Behavior Within a Porous Medium: Mechanisms for Particle Filtration and Retardation During Downward Transport, *Water Resources Research.*, Vol 42, W06417, 2006.
- [53] **Culligan, P.J.** and K. Soga, “Non-Aqueous Phase Liquid Behavior in the Subsurface: Source Zone Characterization, Transport and Remediation”, 6th International Conference on Physical Modeling in Geotechnics, HKUST, Hong Kong, 4 – 6 August, 2006. Invited Keynote Paper, Taylor and Francis, Vol. 1, 29-45, 2006.
- [52] Montalto, F.M and **P. J. Culligan**, “Brooklyn Proper Owner Opinions and the Urban Water Cycle”, 2006 Philadelphia Annual GSA Meeting, Paper no 116-5, 22–25 October 2006.
- [51] **Culligan, P. J.**, V. Ivanova and J. T. Germaine, “Sorptivity and Horizontal Liquid Infiltration into Dry Soil”, *Advances in Water Resources*, 28, 1010-1020. 2005.
- [50] Oates, P. M., C. Castenson, C. F. Harvey, M. Polz, and **P. J. Culligan**, “Shedding light on reactive microbial transport in saturated porous media: Demonstration of a visualization method and conceptual transport model”, *Journal of Contaminant Hydrology*, 77, No. 4, 233-244, 2005.
- [49] **Culligan, P. J.**, Y. Zhu and J. T. Germaine, “Numerical simulation of in situ air-sparging”, American Society of Civil Engineers Geo Frontiers 2005 Conference, Austin, Texas, Jan 24 – 26, CD-ROM proceedings, 10 pages, 2005.
- [48] Mullen, W. G., A. Ashmawy, **P. J. Culligan**, A. De, M. Mauldon, F. Townsend, and A. Welker, “Undergraduate Geotechnical Education 2004”, American Society of Civil Engineers Geo Frontiers 2005 Conference, Austin, Texas, Jan 24 – 26, CD-ROM proceedings, 8 pages, 2005.
- [47] **Culligan, P.J.** “The Integration of Service Learning and Scholarship”, 3rd Annual Conference of The Environmental Consortium of Hudson Valley Colleges and Universities, Civic Engagement and Service Learning for the Environment: The Challenge for Higher Education”, Rensselaer Polytechnic Institute on November 4th & 5th. 2005.
- [46] Toker, N. K., J. T. Germaine, K. J. Sjoblom and **P. J. Culligan**, “A new technique for rapid measurement of continuous SMC curves” *Geotechnique* 54, No.3, 179-186, 2004.
- [45] Toker, N. K., J. T. Germaine, and **P. J. Culligan**, “Comment on cavitation during desaturation of porous media under tension”, *Water Resources Research*; 39(11), 1305, 2003.
- [44] Levy, L.C., **P.J. Culligan** and J.T Germaine, “Modeling of DNAPL behavior in vertical fractures”, *International Journal of Physical Modelling in Geotechnics* , 3(1), 1-19, 2003. Invited.
- [43] Magrin, D., **P.J. Culligan** and J.T. Germaine, “Interfacial tension measurement of a DNAPL using the capillary rise method”, 12th Panamerican Conference Soil Mechanics and Geotechnical Engineering and the 39th US Rock Mechanics Symposium, Soil Rock America 2003, Cambridge, USA 23-26 June, 2003,1561-1568, 2003.

- [42] Yoon, J. S., **P.J. Culligan** and J.T. Germaine, “A visualization technique to investigate the behavior of colloid particles moving in a porous medium”, 12th Panamerican Conference Soil Mechanics and Geotechnical Engineering and the 39th US Rock Mechanics Symposium, Soil Rock America 2003, Cambridge, USA 23-26 June, 2003, 1553-1560, 2003.
- [41] Levy, L.C., **P.J. Culligan** and J.T Germaine, “The Use of the Geotechnical Centrifuge as a Tool to Model DNAPL Migration in Fractures”, *Water Resources Research* 38(8), 34-1-34-12, 2002.
- [40] **Culligan, P. J.**, K. Banno, D.A. Barry and J-Y Parlange, “Preferential flow of a light non-aqueous phase liquid in dry sand”, *ASCE Journal of Geotechnical and Geoenvironmental Engineering* 128(4), 327-337, 2002.
- [39] **Culligan, P.J.**, J. V. Sinfield, W. E. Mass, and D.G. Cory, “Use of NMR relaxation times to differentiate between mobile and immobile pore fractions in a wetland soil”, *Water Resources Research*, 37(3), 837-842, 2001.
- [38] Levy, L.C., W. R. McGillis, J. T. Germaine, **P.J. Culligan**, “Spinning drop tensiometry using a square section sample tube”, *Journal of Colloid and Interface Science*, 234, 442-444, 2000.
- [37] Marulanda, C., **P.J. Culligan** and J.T. Germaine, “Centrifuge Modeling of Air Sparging - A Study of Air Flow Through Saturated Porous Media”, *Journal of Hazardous Materials*, 72, 179-215, 2000.
- [36] **Culligan, P.J.**, D.A. Barry, J-Y Parlange, T.S. Steenhuis and R. Haverkamp, “Infiltration with Controlled Air Escape: Determining Soil Hydraulic Properties from Air Pressure Measurements”, *Water Resources Research*, 36(3), 781-785, 2000.
- [35] Marulanda, C., **P.J. Culligan** and J.T. Germaine, “Study of air-flow through saturated porous media and applications to insitu air sparging”, Int. Symp. On Physical Modelling and Testing in Environmental Geotechnics, La Boule, France, 15-17 May 2000, 165-172, 2000.
- [34] Levy, L.C., K.A. Adams, **P.J. Culligan** and J.T. Germaine, “DNAPL transport in fracture using the centrifuge: Modelling and physical data”, Int. Symp. On Physical Modelling and Testing in Environmental Geotechnics, La Boule, France, 15-17 May 2000, 309-316, 2000.
- [33] **Culligan, P. J.**, and D. A. Barry, “Similitude requirements for modelling NAPL movement with a geotechnical centrifuge”, Proc. Instn Civ. Engrs Geotech. Engng, **131**, July, 152 - 162. 1998. Invited.
- [32] Savvidou, C., and **P. J. Culligan-Hensley**, “Waste and pollution management,” Proc. Instn Civ. Engrs Geotech. Engng, **131**, July, 180 – 186, 1998, Invited.
- [31] Marulanda, C., **P. J. Culligan** & J. T. Germaine, “A study of air flow in air-sparging applications”, Centrifuge ‘98, Kimura, Kusakabe & Tekemura (eds), Balkema, 577 – 582, 1998.
- [30] Levy, L., **P. J. Culligan** & J. T. Germaine, “ Investigation into DNAPL transport in fractures using capillary tubes”, Centrifuge ‘98, Kimura, Kusakabe & Tekemura (eds), Balkema, 607 – 612, 1998.
- [29] Barry, D. A., C. T. Miller, **P. J. Culligan**, and K. Bajracharya, “Analysis of split operator methods for nonlinear and multispecies groundwater chemical transport models,” *Mathematics and Computers in Simulation.* , 43, 331-341. 1997.

- [28] Savvidou, C., **P. J. Culligan**, and D. A. Barry, "Centrifuge modelling of environmental problems", *Proceedings of the International Symposium on Recent Developments in Soil and Pavement Mechanics*, M. Almeida (ed.), Rio de Janeiro, Brazil, 25-27 June 1997. Balkema, Rotterdam, pp. 161-173. 1997. Invited Keynote Lecture.
- [27] **Culligan, P. J.**, D. A. Barry, and J.-Y. Parlange, "Scaling unstable infiltration in the vadose zone," *Canadian Geotechnical Journal*, 34(3), 466-470, 1997.
- [26] **Culligan, P. J.**, C. Savvidou and D. A. Barry, "Centrifuge modelling of contaminant transport," *Electronic Journal of Geotechnical Engineering*, 1 [On-Line]. Available: <http://geotech.civen.okstate.edu/ejge/index.htm>, 1, 1996. Invited.
- [25] Ratnam, S., **P. J. Culligan-Hensley**, and J. T. Germaine, "Modeling the behavior of LNAPLS under hydraulic flushing," *Non-Aqueous phase Liquids (NAPLs) in the Subsurface Environment: Assessment and Remediation, ASCE 1996 National Convention*, Washington D.C., 10-14 November 1996, pp. 595-606. 1996.
- [24] Ratnam, S., **P. J. Culligan-Hensley**, and J. T. Germaine, "LNAPL entrapment under hydraulic flushing," *Proceedings of the Second International Congress on Environmental Geotechnics: IS-Osaka '96*, Japan, 5-8 November 1996.
- [23] Bajracharya, K., D. A. Barry, and **P. J. Culligan**, "Discussion on 'Geo-Environmental Assessment of a Micaceous Soil for its Potential Use as an Engineered Clay Barrier' by A. M. O. Mohamed, R. N. Yong, B. K. Tan, A. Farkas and L. W. Curtis," *Geotechnical Testing Journal*, 19(4): 452-453, 1996.
- [22] Barry, D. A., C. T. Miller, and **P. J. Culligan-Hensley**, "Temporal discretisation errors in split-operator approaches to solving chemical reaction/groundwater transport models," *Journal of Contaminant Hydrology*, 22(1-2), 1-17, 1996.
- [21] Anderson, S. J., D. A. Barry and **P. J. Culligan-Hensley**, "Experimental evaluation of a brine transport model," *Proceedings of the Second International Congress on Environmental Geotechnics: IS-Osaka '96*, Japan, 5-8 November 1996.
- [20] Barry, D. A., S. J. Barry, and **P. J. Culligan-Hensley**, "Algorithm 743: WAPR: A FORTRAN routine for calculating real values of the W function," *Association of Computing Machinery Transactions on Mathematical Software*, 21(2), 172-181, 1995.
- [19] Barry, D. A., **P. J. Culligan-Hensley**, and S. J. Barry, "Real values of the W function," *Association of Computing Machinery Transactions on Mathematical Software*, 21(2), 161-171, 1995.
- [18] Barry, D. A., C. T. Miller, **P. J. Culligan**, and K. Bajracharya, "Split operator methods for reactive chemical transport in groundwater," *Proceedings of the International Conference on Modelling and Simulation 1995: MODSIM95*, University of Newcastle, Newcastle, New South Wales, 27-30 November, Modelling and Simulation Society of Australia, 3, 53-57. 1995. Invited.
- [17] Li, L., D. A. Barry, **P. J. Culligan-Hensley**, and K. Bajracharya, "Mass transfer in soils with local stratification of hydraulic conductivity," *Water Resources Research*, 30(11), 2891-2900, 1994.
- [16] **Culligan-Hensley, P. J.**, and C. Savvidou, "How can geotechnical engineers contribute to environmental engineering research?," *Proceedings of: The Earth, Engineers, and Education: A*

- Symposium in Honor of Robert V. Whitman*, Session 3, Cambridge, Massachusetts, pp. 128-143, 7-8 October 1994. Invited.
- [15] **Hensley, P. J.**, and M. F. Randolph, "Modelling contaminant dispersion in saturated sand," *XIII International Conference on Soil Mechanics and Foundation Engineering*, New Delhi, **4**, 1557-1560, 1994.
- [14] Barry, D. A., **P. J. Hensley**, and D. A. Lockington, "Comment on 'Effect of Sand Lenses on Groundwater Flow and Contaminant Migration' by K. W. E. San and R. K. Rowe," *International Journal for Numerical and Analytical Methods in Geomechanics*, **18**(4), 279-282, 1994.
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- [11] Jewell, C., **P. J. Hensley**, D. A. Barry, and I. Acworth, "Site investigation and monitoring techniques for contaminated sites and potential waste disposal sites," *in Geotechnical Management of Waste and Contamination*, R. Fell, T. Philips, and C. Gerrard (eds.), A. A Balkema, Rotterdam, pp. 3-37, 1993. Invited.
- [10] Li, L., D. A. Barry, **P. J. Hensley**, and K. Bajracharya, "Nonreactive chemical transport in structures soil: The potential for centrifuge modelling," *in Geotechnical Management of Waste and Contamination*, R. Fell, T. Philips, and C. Gerrard (eds.), A. A Balkema, Rotterdam, pp. 425-431, 1993.
- [9] **Hensley, P. J.**, and C. Savvidou, "Centrifuge modelling of environmental geomechanics," *International Conference on The Environmental and Geotechnics: From Decontamination to Protection of the Sub-Soil*, Paris, April 1993.
- [8] Anderson, S. J., **P. J. Hensley**, and D. Smirk, "An investigation into the characteristics of blended bauxite refining residue," *Geotechnical Engineering*, **22**(2), 171-197, 1992.
- [7] **Hensley, P. J.**, and D. A. Barry, "On describing fluid flow in porous media," *Geotechnical Engineering*, **22**(2), 131-143, 1992.
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- [5] **Hensley, P. J.**, and A. N. Schofield, "Accelerated physical modelling of hazardous waste transport," *Geotechnique*, **41**(3), 447-466, 1991.
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4. *Other Major Publications*

National Academy Reports

- [6] National Research Council. “Technical and Strategic Advice for the Department of Energy, Office of Environmental Management’s Development of a Cleanup Technology Roadmap – Interim Report: 16 pages.
- [5] National Research Council. “Tank Waste Retrieval, Processing and On-site Disposal at Three Department of Energy Sites: 201 pages. 2006. *Book: ISBN 0-309-10170-0*
- [4] National Research Council. “Tank Wastes Planned for Onsite Disposal at the Three Department of Energy Sites: The Savannah River Site”, National Academy Press. Washington, DC: 72 pages. 69 pages. 2005.
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- [2] National Research Council. “Long Term Stewardship of DOE Legacy Waste Sites – A Status Report”, National Academy Press. Washington, DC: 68 pages. 2003.
- [1] National Research Council. “Remedial Action at the Moab Site -- Now and for the Long Term. Committee on Long-Term Institutional Management of DOE Legacy Waste Sites: Phase 2”, National Academy Press. Washington, DC: 46 pages. 2002

Professional Periodicals

- [6] Montalto, F., and **P. J. Culligan**, “The Next Step in Green?”, New York Academy of Sciences, *Update*, Special issue July/August 2006.
- [5] **Culligan, P.J.**, G. Mullen, B. Sukumaran, K. Stutter and A. Welker, “Geotechnical Engineering Education: The Present and the Future”, *Geo Strata Magazine*, 17 – 20, January/February 2006.
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- [3] Ratnam, S., **P. J. Culligan-Hensley**, and J. T. Germaine, “Geotechnical centrifuge modelling of LNAPL entrapment in sand samples under hydraulic flushing,” *Geotechnical News*, **14**(3), 22-26, 1996.
- [2] **Culligan-Hensley, P. J.**, C. Savvidou, and D. A. Barry, “Centrifuge modelling of transport processes in soil - Part II,” *Geotechnical News*, **13**(3), 35-39, 1995.
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Published Abstracts

- [13] Joon, J. S., **P. J. Culligan**, J. T. Germaine, “New Insights into Non-Brownian Particle Behavior in Porous Media”, *EOS Trans. AGU*, Fall Meet. Suppl., Abstract H21D-1044, 2004.
- [12] **Culligan, P. J.**, Ivanov, V. M., and J. T. Germaine, “Horizontal Fluid Infiltration: A new measurement device and some observations”, *EOS Trans. AGU Fall Meet. Suppl.*, Abstract H22J 05, 2003.
- [11] Joon, J. S., **P. J. Culligan**, J. T. Germaine, “Understanding subsurface colloid behavior”, *EOS Trans. AGU*, Fall Meet. Suppl., Abstract H22A-0904, 2003.
- [10] Marulanda, C., **P.J. Culligan** and J.T. Germaine, “A study of air-flow through saturated porous media and applications to insitu air sparging”, *EOS Transactions AGU*, **83**(19), H42B, 2002.
- [9] Levy, L. C., **P. J. Culligan**, and J. T. Germaine, “Modeling the migration of DNAPL in fractures”, in *Proceedings: International Symposium on Geotechnical Centrifuge Modelling and Networking, December 8-9, 2001, Hong Kong University of Science and Technology*, edited by C. W. W. Ng, pp. 52-56, Univ. of California, Davis, 2001.
- [8] **Culligan, P. J.**, L. C. Levy, K.A. Adams, and J.T. Germaine, “DNAPL transport and remediation in fractured rock”, GSA Annual Meeting, Abstracts, Vol. 32, No. 7, 2000.
- [7] Levy, L. C., **P. J. Culligan**, J. T. Germaine, “Investigation into DNAPL Transport in Fractures Using Centrifuge Modeling”, *EOS Transactions AGU*, **79**(45), H72A, 1998.
- [6] Levy, L. C., **P.J. Culligan**, J. T. Germaine, “Investigation into the Effectiveness of DNAPL Remediation Strategies in Fractured Rock”, GSA Annual Meeting, Abstracts, Vol. 29, No. 6, 1997.
- [5] Banno, K., **P. J. Culligan**, and D. A. Barry, “Centrifuge modelling of LNAPL behaviour in porous media,” *EOS Transactions AGU*, **77**(46), H31B, 1996.
- [4] Ratnam, S., **P. J. Culligan-Hensley**, and D. A. Barry, “Centrifugal techniques for investigating nonwetting phase entrapment during immiscible fluid transport in porous media,” *EOS Transactions AGU*, **76**(46), F189, 1995.
- [3] Griffioen, W., **P. J. Culligan**, D. A. Barry, and J.-Y. Parlange, “Unstable infiltration and the two-region transport model,” *EOS Transactions AGU*, **76**(46), F179, 1995.
- [2] **Culligan-Hensley, P. J.**, D. A. Barry, and J.-Y. Parlange, “The potential for modelling wetting front instability using a geotechnical centrifuge,” (extended abstract) *Vadose Zone Hydrology: Cutting Across Disciplines*, Kearney Foundation of Soil Science International Conference Proceedings, pp. 27-30, University of California, Davis, September 1995. Invited.
- [1] **Culligan-Hensley, P. J.**, C. Savvidou, and D. A. Barry, “Geotechnical centrifuge modelling: An innovative technique for investigating subsurface transport processes,” *EOS Transactions AGU*, **75**(44), 291, 1994.

Educational and Career Development Publications

- [5] Pfirman, S., P. Balsam, R.E Bell, **P. J. Culligan** J. D. Laird, “Maximizing Productivity and Recognition: Part 2: Collaboration and Networking. *Science Career Development*, 1 February 2008, DOI: 10.1126/science.caredit.a0800016
- [4] Pfirman, S., P. Balsam, R.E Bell, J. D. Laird, **P. J. Culligan**, “Maximizing Productivity and Recognition: Part 1: Publication, Citation and Impact. *Science Career Development*, 2 November 2007, DOI: 10.1126/science.caredit.a0700155

- [3] Castella, F, **P. J. Culligan** and H.M. Nepf, “Groundwater Pollution: Curriculum guide”, Educational Package produced for the Center for Environmental Health Sciences, MIT, 66 pages, August 2002.
- [2] Aref, L., **P.J. Culligan**, H.M. Nepf, “1999 Classroom Activities for Human Health, Pollution and the Environment”, Massachusetts Corporation for Educational Telecommunications, 32 pages. 1999.
- [1] Aref, L., **P.J. Culligan**, H.M. Nepf, “1998 Classroom Activities for Human Health, Pollution and the Environment”, Massachusetts Corporation for Educational Telecommunications, 128 pages. 1997.

Other

- [3] **Culligan, P. J.**, “Use of Centrifuge Testing in Geoenvironmental Engineering”, Proceedings of Advanced Concept ARO 2001 Centrifuge Workshop, Vicksburg, MS, Jan 31st-February 1st 2001, 45 pages.
- [2] *Culligan, P. J.* “Peer Review of Hazardous Waste Identification Rule Risk Assessment, Final Report Task Number 320”, EPA Contract 68-W5-0057, December 1998, pp12.
- [1] Harvey, C., and **P.J. Culligan**, “Final Report to Wrentham Research Group on Contaminant and Remediation Issues at Plainville Landfill”, published by Sea-Change, June 1998. pp 10.

Theses Supervised by *Patricia J. Culligan*

Summary

	<u>Total</u>	<u>Completed</u>	<u>In Progress</u>
Bachelor's	5	5	0
Master's	24	24	0
<u>Doctoral</u>			
As Supervisor	10	6	4
As Reader	13	13	

Bachelor's Theses

- [1] Anderson, S. J., "Chemical properties of amended bauxite residue," University of Western Australia, November 1991.
- [2] Peterson, S., "Subsurface migration and breakdown of a non-aqueous phase organic liquid," University of Western Australia, November 1991.
- [3] Campbell, R., "A study of macroscopic dispersion processes in porous media," University of Western Australia, November 1991.
- [4] Holguin, A., "Spinning Drop Tensiometry for measuring DNAPL interfacial tension", Department of Mechanical Engineering, MIT 1999.
- [5] Bowen, A., "Design of a Bicycle Route for CLIMB, NYC", Department of Earth and Environmental Engineering, Columbia University, May 2007.

Master's Theses

- [1] Ratnam, S., "Geotechnical centrifuge modelling of the behaviour of LNAPLs under hydraulic flushing," SM Thesis, MIT, May 1996.
- [2] Ramsay, W. B., "A modified triaxial permeameter for physical characterisation of parameters affecting contaminant transport through wetland deposits," SM Thesis, MIT, May 1996.
- [3] Jones, K., "An analysis of air sparging/soil vapor extraction systems emphasizing volatilization kinetics in JP-4 jet fuel," M.Eng. Thesis, MIT, May 1996.
- [4] Elias, K., "Source containment at the Massachusetts Military Reservation Main Base Landfill: Design of a hazardous waste landfill cover system," M.Eng. Thesis, MIT, May 1996.
- [5] Banno, K., "Geotechnical centrifuge modelling of immiscible fingering in porous media," SM Thesis, MIT, August 1996.
- [6] Leon, R. M., "Post-closure management of a hazardous waste landfill at the Massachusetts Military Reservation Main Base Landfill," M.Eng. Thesis, MIT, May 1997.
- [7] Guzman, J., "An interactive data base of Preliminary Assessments for cross-site comparison outline," M.Eng. Thesis, MIT, May 1997.
- [8] Lukasiak, A. D., "Graphical interface for existing PA scoresheet," M.Eng. Thesis, MIT, May 1997.
- [9] Kuo, K. N., "Web-based database-enabled executive information system for Preliminary Site Assessment under CERCLA," M.Eng. Thesis, MIT, May 1997.

- [10] Mukhopadhyay, S. R., "Development of a data search engine for surface water pathway criteria list," M.Eng. Thesis, MIT, May 1997.
- [11] Horng, R. T., "An investigation into the application of Magnetic Resonance Imagery (MRI) for the dynamic mapping of immiscible fluid transport in porous media," SM Thesis, MIT August 1997.
- [12] Hwang, G. M., "Mico-LIBS: A novel chemical analysis tool," SM Thesis, MIT, January 1998.
- [13] Chen, E. "Plainville Landfill Operation & Remediation.," M.Eng. Thesis, May 1999.
- [14] Woodoworth, R. "Air-sparging operations at Plainville Landfill, MA.," M.Eng. Thesis, MIT, May 1999.
- [15] Casterton, C. "An Investigation of bioluminescent microbial transport in porous media," SM Thesis, MIT, May 2000.
- [16] Adams, C. "DNAPL transport and remediation in smooth-walled vertical fractures," SM Thesis, MIT, August 2000.
- [17] Alexander, D. "Evaluation of present and emerging MSW landfill technology", SM Thesis, MIT, January 2001.
- [18] Ivanov, V., "Measurements and Interpretation of Wetting Front Infiltration in Soil," SM Thesis, MIT, May 2001.
- [19] Fidalgo, B. "Evaluation and improvement of a modified permeameter to characterize dual-porosity media", SM Thesis, MIT, January 2002.
- [20] Toker, N. K., "Improvements and reliability of the MIT tensiometers and studies on soil moisture characterisation curves", SM Thesis, MIT, January 2002.
- [21] Gostic, R., "An NMR investigation into the influence of wettability on entrapment mechanisms during two phase flow", SM Thesis, MIT, January 2002.
- [22] LeFrancois, S. O. "Ground penetrating radar characterization of wood piles and the water table in Back Bay, Boston", SM Thesis, MIT, May 2003
- [23] Poanessa, M., "A model for predicting air-flow during insitu air-sparging", SM Thesis, MIT, August 2003.
- [24] O'Keeffe, G., "Observations of water balance in a model green roof". SM Thesis, Columbia University, May 2007. Sponsor W.R. McGillis.

Doctoral Theses, Supervisor [4 Theses still in progress]

- [1] Aref, L., "Flow and transport mechanisms in wetland soils." PhD Thesis, MIT, May 1999.
- [2] Marulanda, C., "A study of air flow through saturated porous media and its applications to in-situ air sparging." PhD Thesis, MIT, August 2001.
- [3] Levy, L., "Experimental and theoretical modeling of DNAPL transport in vertical fractured media" PhD Thesis, MIT, January 2003.
- [4] Sik Yoon, J., " Discrete Particle Behavior in Porous Media: Direct Observations of Physical Mechanisms Influencing Particle Behavior". PhD Thesis, MIT, January 2005.
- [5] Zhu, Y. "Experimental and numerical modeling of air-flow mechanisms in porous media". PhD Thesis, Columbia University, August 2006.
- [6] Toker N. K. "Modeling the relation between suction, effective stress and shear strength in partially saturated granular media". PhD Thesis, MIT, May 2007.
- [7] Schulte, K. E. "Defining an Intrinsic Sorptivity for Miller-Similar Materials", PhD Thesis, Columbia University, Expected May 2008.

- [8] Zhao, J. "Fluid Behavior and Transport in Nano-Porous Silica", PhD Thesis, Columbia University, Expected May 2009.
- [9] Teferra, T. Pre-doctoral qualifying exam. Research topic: Probabilistic methods for modeling contaminant transport in porous media.
- [10] Feighery, J. Pre-doctoral qualifying exam. Research topic: Pathogen transport in shallow aquifers

Doctoral Theses, Reader

- [1] Helliwell, E. E., "Modelling transport processes in soil due to hydraulic density and electrical gradients", PhD. Thesis, University of Cambridge, UK, 1994.
- [2] Knight, M. A., "Centrifuge modelling of multiphase flow in the vadose zone", PhD. Thesis, Queen's University, Canada, 1995.
- [3] Ivanova, V., "3D geometric-mechanical model of rock fracture systems." PhD. Thesis MIT, 1998.
- [4] Sinfield, J., "Optical laser for contaminant detection in soils." PhD. Thesis, MIT, 1999.
- [5] Sjoblom, K., "Development of MIT Tensiometer". PhD. Thesis, MIT, 2000.
- [6] Caputo, D. "Characterizing actinide transport and speciation using nuclear magnetic resonance tracer techniques". PhD. Thesis, MIT, 2000.
- [7] Peters, G. P. "Contaminant transport through rigid and deforming porous media", Ph.D. Thesis, School of Engineering, the University of Newcastle, Australia, 2001.
- [8] Zinn, B. "Mass transfer and dispersion processes in connected conductivity structures: Simulation, visualization, delineation and application", PhD. Thesis, MIT, 2003.
- [9] Hellweger, F. L., "Arsenic transformation by phytoplankten: The effect of phosphorous luxury uptake, PhD. Thesis, Columbia University, 2004.
- [10] Kim, Y. S. "Simulation of filtration for suspension transport in porous media", PhD Thesis, MIT, January 2005.
- [11] Bryant, L. "Centrifuge modeling of pipe piles subjected to lateral impact loads", PhD Thesis, Columbia University, July 2006.
- [12] Wu, M.H. "Centrifuge modeling of two-dimensional slope failure", PhD Thesis, Columbia University, July 2006.
- [13] Moraczewski, T, "NMR imaging of expansion flows of suspensions", PhD Thesis, Columbia University, April 2007.
- [14] Wang, J-P., "Large scale shaking table tests of reinforced retaining walls with geocell facing", PhD Thesis, Columbia University, July 2007.

Teaching Experience of *Patricia J. Culligan*

Courses Taught:

<u>Course</u>	<u>Institution</u>	<u>Level</u>	<u>Year</u>
Introduction to Geomechanics*	University of Western Australia	Undergraduate	1991
Waste Containment & Site Remediation Technology	Massachusetts Institute of Technology	Graduate	1996- 2000
Introduction to Geotechnical Engineering	Massachusetts Institute of Technology	Undergraduate	1996-1997
Introduction to Civil Engineering Materials*	Massachusetts Institute of Technology	Undergraduate	1999-2003
Environmental Geotechnics: Sub-module on contaminant transport & remediation	Harvard University	Graduate	2001
Fluid Mechanics*	Columbia University	Undergraduate	2003 - present
Groundwater Contaminant Transport and Remediation	Columbia University	Graduate	2004
Urban Ecology Studio	Columbia University	Graduate/ Undergraduate	2004 – present
Engineering for Developing Communities	Columbia University	Undergraduate	2005 - present
Waste Containment Design and Practice	Columbia University	Graduate	2005
Soil Mechanics*	Columbia University	Undergraduate	2006

* Included a laboratory section

Freshman Advising Seminar:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
The European Union	Massachusetts Institute of Technology	1999
Human Health Pollution & the Environment	Massachusetts Institute of Technology	2000

Master of Engineering Projects:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
A Web-Based System for Preliminary Investigation at Hazardous Waste Sites	Massachusetts Institute of Technology	1999
Investigation of the Groundwater Impacts from the Plainville Landfill	Massachusetts Institute of Technology	2000

Professional Courses:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
Land-Based Waste Disposal	University of Western Australia	1990
Pollutant Transport in Natural Water Systems	Graduate School of Education, Harvard University	2002-2003

Graduate Summer Schools:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
Geophysical Porous Media: Multi-scale science from nano to global scale: Sponsored by NSF CMG program	Purdue University, July 17 – 26 th	2006

Program Management:

<u>Program</u>	<u>Institution</u>	<u>Year</u>
Undergraduate Research Opportunities Program in Civil & Environmental Engineering	Massachusetts Institute of Technology	2000 - 2003
Chi-Epsilon Honor Society	Massachusetts Institute of Technology	2000
Cambridge University and MIT Undergraduate Student Exchange Program in Civil & Environmental Engineering	Massachusetts Institute of Technology	2000 - 2003
Water Resource and Environmental Engineering Concentration; Department of Civil Engineering & Engineering Mechanics	Columbia University	2003 - present
Education Center for Sustainable Engineering	Columbia University	2008 - present