

Curriculum Vitae

Patricia J. Culligan

Robert A. W. and Christine A. Carlton Professor of Civil Engineering
 Chair, Department of Civil Engineering and Engineering Mechanics
 Founding Associate Director, Columbia University Data Science Institute
 Faculty Member, The Earth Institute at Columbia University
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Education

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

Principal Fields of Interest

Water Resources; Porous media flow and transport; Geo-environmental engineering; Urban sustainability & Smart Cities

Career History

<u>Employer</u>	<u>Position</u>	<u>Beginning</u>	<u>Ending</u>
Columbia University	Chair, Dept. Civil Engineering & Engineering Mechanics	July 2019	present
Columbia University	Associate Director (Founding), Data Science Institute (DSI)	July 2012	June 2017
Columbia University	SEAS Vice-Dean for Academic Affairs	Jan 2010	July 2012
Columbia University	Full Professor	July 2005	present
Columbia University	Associate Professor	July 2003	June 2005
M.I.T	Associate Professor	July 1998	June 2003
M.I.T	Assistant Professor	July 1994	June 1998
City University, London	Honorary Visiting Research Fellow	Oct 1993	Jun 1994
University of Western Australia	University Postdoctoral Research Fellow	Dec 1989	Jul 1992
City University	Research Fellow	Mar 1989	Nov 1989
Cambridge University	Graduate Research Assistant	May 1984	Feb 1989
C.H. Dobbie & Partners	Graduate Engineer	Sept 1982	Apr 1984

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

Publications 7 books; 7 book chapters; 117 refereed articles; 42 other major publications (National Academy Reports; Professional Periodicals, etc.).

Theses Supervision 6 Bachelors; 26 Masters; 22 Doctoral as Supervisor (5 in progress); 34 Doctoral as Reader.

Research Funding Funding as Columbia University faculty member [2003 – 2019] \$20,862,000 (\$12,511,000 as PI).

Academic Leadership/ Management Founding Associate Director, Columbia University's Data Science Institute; Vice-Dean of Academic Affairs for Columbia's School of Engineering & Applied Science (SEAS); Founder of SEAS Office of Faculty Development and Diversity; Co-Chair of Provost's Task Force on Women and Minorities in Science and Engineering; Founder of SEAS Education Center for Sustainable Engineering; Graduate of Harvard University's 2009 Management Development Program.

Awards and Honors Received

<u>Award/ Honor</u>	<u>Date</u>
Patricia J. Culligan Data Science Graduate Student Achievement Award for the Valedictorian Student in Columbia University’s M.S. in Data Science Program named in my honor	2018
G.A. Leonards Lecturer, Purdue University	2017
Robert A. W. and Christine A. Carlton Endowed Chair	2016
Columbia University’s Great Teacher Award	2015
Norma Slepecky Memorial Lecturer, Syracuse University	2014
Women in Science and Engineering Award for Leadership in Sustainability, University of Wisconsin, Madison	2013
Elected to the Board of Governors, ASCE Geo-Institute	2011
Plenary Speaker, National Academies <i>Frontiers of Engineering Education</i>	2011
Plenary Speaker, American Society of Civil Engineers Annual Geo-Institute Conference	2008
ASCE Journal of Geotechnical and Geo-Environmental Engineering, Editorial Board Member of the Year	2007
Columbia University Presidential Award for Outstanding Teaching	2007
Plenary Speaker, Sixth International Conference on Physical Modeling in Geotechnics	2006
Columbia Engineering School A. & J. Avanesians Diversity Service Award	2006
Columbia Engineering School Distinguished Faculty Teaching Award	2006
Invited Participant, Women in Engineering Leadership Institute (WELI) 2005 Leadership Conference	2005
Idaho National Environment and Engineering Laboratory, Academic Center for Excellence (ACE) Faculty Fellowship	2001
Arthur C. Smith Award for contributions to undergraduate life at MIT	1999
National Science Foundation CAREER Award	1999
Edgerton Career Development Chair	1996
University of Western Australia Mosey Visiting Fellowship	1996
Jasper and Marion Whiting Foundation Travel Fellowship	1996
Queen’s University, Canada Visiting Scholarship	1995
British Council Academic Links Award for Research Collaboration	1994
University of Western Australia, Postdoctoral Research Fellowship	1989-92
British Institution of Civil Engineers Prize for “outstanding undergraduate work”	1982

Service to the U.S. National Academies of Science, Engineering and Medicine

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
Chair, Committee on Independent Assessment of Science and Technology Needs for the DOE’s Defense Environmental Clean-Up Program (Congressionally Mandated Committee)	Dec 2017	Apr 2019
Review coordinator: “ <i>Waste Management and Disposition: Proceedings from a Workshop</i> ”	Mar 2017	May 2017
Invited Expert, GAO Meeting on the DOE’s Treatment of Hanford Low Activity Tank Waste (hosted by National Academies)	May 2016	June 2016

Chair, Board of Earth Sciences and Resources Committee on Geological and Geotechnical Engineering	April 2014	Jan 2016
Member, National Academies National Research Council Workshop Planning Committee on Best Practices for Risk Informed Remedy Selection, Closure and Post-Closure Control of Contaminated Sites	May 2013	July 2014
Member, Nuclear and Radiation Studies Board	April 2008	Dec 2013
Member, National Academies National Research Council Committee on Development and Implementation of an EM Cleanup Technology Roadmap	Mar 2007	Mar 2009
Member, New York Academy of Sciences Steering Committee for Green Science and Engineering Systems Initiative	May 2006	Sept 2008
Member, National Academies National Research Council Committee on Management of Certain Radioactive Waste Streams Resulting from Reprocessing Tank Waste at DOE Sites (Congressionally Mandated Study)	Mar 2005	Mar 2006
Member, National Academies National Research Council Committee on Opportunities for Accelerating Characterization and Treatment of Wastes at DOE Nuclear Weapons Sites	Oct 2003	Jan 2005
Member, National Academies National Research Council Committee on Long-Term Institutional Management of DOE Waste Sites	July 2001	June 2003

Editorial Board Membership

Associate Editor, <i>Vadoze Zone Journal</i>	Feb 2008	Sept 2011
Associate Editor, <i>AGU Water Resources Research</i>	Jan 2007	Jan 2011
Editorial Board Member, <i>International Journal of Physical Modelling in Geotechnics</i>	April 2000	July 2010
Editorial Board Member, <i>Electronic Journal of Geotechnical Engineering</i>	May 1996	April 1999

Service to Professional Associations (all by invitation only)

<u>Activity</u>	<u>Beginning</u>	<u>Ending</u>
Organizing Committee, 2nd U.S. National Science Foundation's Sustainable Smart Cities International Workshop, Egypt, June 8-14 th , 2019	Sept 2018	May 2019
Organizing Committee, 1st U.S. National Science Foundation's Sustainable Smart Cities International Workshop, Alexandria, Egypt, May 8-11 th , 2017	Jan 2017	June 2017
Member, Board of Governors, ASCE Geo-Institute	Sept 2011	Sep 2014
Organizing Committee, 17 th International Sustainable Development Research Conference, Columbia University, May 8 – 10 th , 2011	Sept 2010	May 2011
Member, Nominations and Elections Committee, Geo-Institute of ASCE	Feb 2009	Feb 2010
Organizing Committee, ISSMGE International Conference on Physical Modelling in Geotechnics, Zurich, Switzerland, June 2010	Jan 2009	July 2010
Member, ASCE Huber Award Selection Committee	Jan 2009	Jan 2011
Member, ASCE Paper Awards Committee	Jan 2008	Jan 2011
Chair, Geo-Institute of ASCE Awards Committee	Aug 2007	July 2010
Organizing Committee, ASCE GeoCongress 2008: The Challenge of Sustainability in the Geo-environment, New Orleans, LA, Mar 9 – 12 th , 2008	Nov 2006	Feb 2008
Organizing Committee, ISSMGE International Conference on Physical Modelling in Geotechnics, HKUST, Hong Kong, 4 – 6 August, 2006	July 2004	Aug 2006

Co-Chair, ISSMGE 12th Panamerican Conference on Soil Mechanics & Geotechnical Engineering and 37th U.S. Rock Mechanics Symposium, Soil & Rock America 2003, Cambridge, USA, June 22 – 26, 2003	June 2000	June 2003
Member, Technical Committee on Centrifuge and Physical Model Testing (TC2), International Society for Soil Mechanics & Geotechnical Engineering	May 1999	July 2010
Member, International Advisory Board for Network of European Centrifuges for Environmental Geotechnics Research	July 1998	June 2000
Member, ASCE Geo-environmental Engineering Committee	July 1995	present
Organizing Committee, ISSMGE International Conference on Physical Modelling in Geotechnics, Newfoundland, Canada, 10 – 12 July, 2002	Sept 1998	July 2002

Administrative Responsibilities Within Columbia University

<u>Responsibility</u>	<u>Beginning</u>	<u>Ending</u>
<i>University Wide</i>		
Member, Provost's Committee on Institutional Research	Sept 2017	present
Member, Provost's Cross Campus Interdisciplinary Working Group	June 2017	present
Chair, Internal Review Committee for School of Journalism	Oct 2017	May 2018
Member, Committee on Global Thought	May 2017	present
Member, Selection Committee for Presidential Teaching Awards	Feb 2016	May 2018
Advisory Board, Center for Science and Society	Nov 2014	present
Member, School of Continuing Education Executive Committee	Aug 2013	July 2016
Member, Review Committee for Provost's Diversity Grants	April 2013	present
Member, Committee on Admissions and Financial Aid (CAFA)	Sept 2012	July 2013
Associate Director, Institute for Data Sciences	July 2012	June 2017
Co-Chair, Provost's Task Force on Faculty Development	Nov 2008	April 2009
Member, SEAS Dean's Search Committee	Sept 2008	March 2009
Co-Chair, Provost's Task Force on Women & Minorities in Science & Engineering	Sept 2007	Sept 2009
Selection Committee, Presidential Teaching Awards for Graduate Students	Dec 2006	May 2009
Search Committee, Vice-Provost of Diversity and Faculty Development	Dec 2006	May 2007
Member, Faculty Advisory Committee on Undergraduate Studies in Sustainable Development	Feb 2006	present
Member, Presidential Advisory Committee on Diversity Initiatives	Sept 2005	April 2009
<i>The Earth Institute at Columbia University</i>		
Member, Leadership Committee	Sept. 2018	present
Member, Nomination Committee for Associate Chair of Faculty	Sept. 2015	June 2017
Co-Director, Urban Design Lab	Sept. 2012	June 2017
Member, Search Committee for Sustainability in the Build Environment Lecture in Discipline position, School of General Studies	Mar 2012	May 2012
Organizing Committee & Plenary Speaker, The Green Roof Science Symposium, Columbia University, April 17 th 2012	Sept 2011	April 2012

Chair, Ad Hoc Committee on Lamont Professor Nominations	Oct 2010	Nov 2010
Earth Institute Faculty Member	June 2009	present
Member, Interdisciplinary Research Grants Committee	Sept 2018	present
Member, Earth Institute Practice Committee	Jan 2009	June 2010
Member, Earth Institute Education Committee	Nov 2007	present
Member, Earth Institute “Earth Clinic” Steering Committee	Feb 2007	June 2012
Selection Committee, Earth Institute Post-doctoral Fellows	Oct 2004	Sept 2008
Co-PI the Earth Institute’s ADVANCE Program	Sept 2005	Aug 2010
<i>School of Engineering and Applied Science (SEAS)</i>		
Member, Executive Committee	July 2019	present
Member, Task Force on NYC Women in Technology (NYC WIT)	May 2018	present
Member, Task Force on MS and Executive Programs	Sept 2013	Jan 2014
Member, Search Committee for SEAS Director of Facilities	April 2012	July 2012
Chair, Search Committee for Department Chair of Biomedical Engineering	Nov 2010	May 2011
Vice-Dean of Academic Affairs	Jan 2010	July 2013
Director, Education Center for Sustainable Engineering	Jan 2008	June 2010
Faculty Advisor, Columbia University Engineers Without Borders	Jan 2005	July 2009
Co-Chair, SEAS Faculty Development & Diversity Initiatives Committee	Sept 2005	Dec 2009
Faculty Advisor; Women in Computer Science and Engineering (WICSE)	Sept 2005	Sept 2006
<i>Department of Civil Engineering & Engineering Mechanics</i>		
Chair, Department	July 2019	present
Co-Chair, Search Committee in Smart Cities	Oct 2018	present
Member, Faculty Search Committee	Oct 2015	May 2016
Chair, Faculty Search Committee	Oct 2013	May 2014
Graduate Admissions Committee	Sept 2009	present
Faculty Search Committee in Experimental Mechanics	Nov 2007	June 2008
Graduate Admissions Committee	Dec 2005	Sept 2007
Faculty Search Committee in Construction Management	Mar 2005	March 2006
ABET Committee	Mar 2005	Sept 2009
PhD Qualifying Committee	Oct 2003	present
Director, Water Resources and Environmental Engineering Concentration	Sept 2003	present

Recent Funded Projects (2004 – present only)

- 2018 - 2020 Co-Principal Investigator (PI Kymissis) EAGER SitS: Signaling the Health Of Tree-pit Soil (SHOTS), NSF, \$276,000.00
- 2018 - 2021 Principal Investigator (collaborative proposal with Stanford and Georgia Tech) CPS: Medium: Collaborative Research: Building Information, Inhabitant, Interaction and Intelligent Integrated Modeling (BI⁵M), NSF, \$240,000.00 (CU portion)
- 2016 – 2019 Principal Investigator (Co-PIs McKeown, Meinrenken & Mehmani) Reducing plug-load electricity footprint of residential buildings through low-cost, non-intrusive sub-metering and personalized feedback technology, DOE Collaborative Agreement \$1,530,000.00.
- 2016 – 2017 Co-Principal Investigator (PI Fuchs) Stopping Trash Where it Starts, New York City Department of Environmental Protection, \$100,000.00
- 2016 – 2019 Principal Investigator Coastal SEES: Developing High Performance Green Infrastructure Systems to Sustain Coastal Cities, Supplement for *NSF Connected Communities Initiative*, \$139,846.00
- 2015 – 2020 Co-Director (Director, Ramaswami - U. Minnesota, Co-Director, Russell - Georgia Tech), SRN: Integrated Urban Infrastructure Solutions for Environmentally Sustainable, Healthy and Livable Cities, NSF Collaborative Agreement \$12,000,000.00 (CU portion \$2,500,000.00)
- 2015 – 2019 Co-Principal Investigator (PI Lu – Colorado School of Mines Co-PI Burns – Georgia Tech), Workshop on Geotechnical Fundamentals in the Face of New Challenges, \$68,819.00
- 2015 – 2017 Principal Investigator, Quantifying and modeling the long-term performance of urban green roofs for stormwater in New York City, EPA \$43,996.00
- 2014 – 2016 Co-Principal Investigator (PI McKeown), Interface of the Natural Sciences and Data Sciences, Sloan Foundation and Gordon & Betty Moore Foundation, \$705,000.00
- 2013 – 2019 Principal Investigator (Co-PIs Becker, Gerrard, McGillis & Plunz), Coastal SEES: Developing High Performance Green Infrastructure Systems to Sustain Coastal Cities, NSF \$2,999, 838.00
- 2012 – 2017 Principal Investigator (Co-PI Simon), Sustainable Engineering Graduate Scholars Program, NSF \$594,990.00.
- 2010 – 2013 Principal Investigator (Co-PIs Gaffin; McGillis), Quantifying the Quantity and Quality of Runoff from Urban Green Roofs, *EPA*, \$100,000.00.
- 2010 – 2014 Principal Investigator, Saturated Particle Transport in Porous Media: An Investigation into the Influence of Flow Direction and Particle Size Distribution, *ARO*, \$236,149.00.
- 2010 – 2011 Co-Principal Investigator (PI Gaffin, co-PI McGillis), Direct Green Roof Storm Water Mitigation Measurement at Con Edison Green Roof Facility at 43-82 Vernon Boulevard, Queens, New York, *Con-Edison*, \$69,907.00.
- 2009 – 2011 Co-Principal Investigator (PI Blaustein, co-PIs Orff, Plunz & Sclar), The Accra Millennium Cities Initiative, *Private-Donor*, \$400,000.00.
- 2009 – 2013 Principal Investigator (co-PIs, Gaffin and McGillis): Quantifying the fundamental behavior of green roofs in an urban environment, *NSF* \$476,020.00.
- 2009 - 2016 Principal Investigator (co-PIs, Beauregard, Deodatis, Modi & Plunz): IGERT: Solving Urbanization Challenges by Design – A New PhD Program Between Architecture & Engineering, *NSF*, \$2,959,994.00.

- 2009 Principal Investigator, *Earth Institute Internship Support*, \$7,200.00.
- 2008 – 2010 Principal Investigator, (co-PIs, Keeley, Plunz, Vlachopoulos, Rosenweig, Gaffin, McGillis): Neighborhood Green Infrastructure: Planning for climate change adaptation in Harlem’s 125th Street corridor, *Earth Institute Earth Clinic Seed Funding*, \$29,620.00.
- 2008 – 2009 Co-Principal Investigator (PI Taylor, co-PIs Plunz, Siegal of UT Austin): Coupling technology and organizational dynamics to induce energy efficient behavior, *Earth Institute Cross-Cutting Initiative Grant*, \$31,985.00.
- 2008 – 2009 Principal Investigator, *Earth Institute Course Field Travel Support*, \$4,800.00.
- 2007 – 2008 Principal Investigator, *Earth Institute Summer Internship Support*, \$6,200.00
- 2007 – 2010 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.
- 2007 – 2011 Co-Principal Investigator (PI Dr. VanGeen, collaborators Profs Emch (UNC), Mailloux (Barnard) & McKay (Tennessee) *NIH EID- Collaborative Research: Does Arsenic Mitigation in Bangladesh Raise Exposure to Bacterial and Viral Pathogens?* \$1,500,000.
- 2006 – 2007 Principal Investigator, *The Earth Institute at Columbia University: Course Transportation Support: CIEE E3260: Engineering for Developing Communities trip to Ghana*, \$4,800.
- 2006 – 2007 Principal Investigator. *EPA P3 Program*, Development Plan of a Sustainable Water Management Plan for Sakyikrom, Ghana, Africa. \$10,000.
- 2004 – 2010 Co-Principal Investigator (PI Dr. Bell, Co-PIs Profs Cane, Mutter & Pfirman, Dr. Balstad) *NSF ADVANCE* at the Earth Institute, \$4,200,000.
- 2004 – 2009 Co-Principal Investigator (PI Prof. McGourty, Co-PIs Profs. Lall, Gong & Castaldi) Reforming Undergraduate Education in Environmental Engineering: Urban Studios as Knowledge Delivery Systems and Vehicles for Service Learning. *NSF*, \$999,494.
- 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 Principal Investigator (collaborator Dr. J. Germaine, MIT) *NSF*, Air-Flow Mechanisms During Insitu Air-Sparging Operations. \$255,000.

Publications of *Patricia J. Culligan-Hensley* (excluding under review)

(Student & Post-Doc 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 Mechaincs 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. **National Academy Press Books**

- [5] “Independent Assessment of Science and Technology for the Department of Energy’s Defense Environmental Cleanup Program”, The National Academies Press, Washington, D.C., 2019. *ISBN 10: 0-309-48775-7*
- [4] “Analysis of Cancer Risks in Populations Near Nuclear Facilities, Phase I”, The National Academies Press, Washington, D.C., 2012. *ISBN-10: 0-309-25571-6*
- [3] “Advice of the Department of Energy’s Cleanup Technology Roadmap: Gaps and Bridges”, The National Academies Press, Washington, D.C., 2009. *ISBN 0-309-13231-2*
- [2] “Tank Waste Retrieval, Processing and On-site Disposal at Three Department of Energy Sites”: The National Academies Press, Washington, D.C. 2006. *ISBN 0-309-10170-0*
- [1] “Improving the Characterization and Treatment of Radioactive Wastes for the Department of Energy’s Accelerated Site Cleanup Program”, The National Academies Press, Washington, D.C. 2005. *ISBN 0-309-09299-X*

3. **Book Chapters**

- [7] El-Sadr W. M., J. Wasserheit, B. Wiener, A. Howard, C. Hankins, **P. J. Culligan**, K. Harripersaud, “Implementation Science and translational public health”, in Oxford Textbook of Global Public Health 6th Edition, Oxford University Press (in-press)
- [6] **Culligan, P.J.**, Whittle A.J. and J. K. Mitchell, “The role of geotechnics in addressing new world problems”, in *Geotechnical Fundamentals for Addressing New World Challenges*, 2019, Springer, *ISBN 978-3-030-06248-4*
- [5] Plunz, R. and **Culligan, P.**, “Group-form and urban infrastructure resilience: New York City as an example”, in *Cities in the 21st Century*, Routledge, 192-204. 2016. Invited, *ISBN 978-1-138-11964-2*
- [4] **Culligan, P.J.** and F. Pena-Mora, “Interdisciplinary in Engineering”, in the *Oxford Handbook on Interdisciplinarity*, Oxford University Press, 2010, 147-160, Invited. *ISBN 978-0-19-923691-6*
- [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,” in *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*

4. *Refereed Articles in Journals*

- [79] **Culligan, P. J.** Green Infrastructure and Urban Sustainability: A Discussion of Recent Advances and Future Challenges Based on Multi-Year Observations in New York City, *Science and Technology for the Built Environment*, 2019
- [78] **Shetty, N., R. Hu, B. J. Mailloux, D.Y Hsueh, W. R. McGillis, M. Wang, K. Chandran, P. J. Culligan,** Studying the effect of bioswales on nutrient pollution in urban combined sewer systems, *Science of the Total Environment*, Vol 665, 15 May 2019, Pages 944-958, <https://doi.org/10.1016/j.scitotenv.2019.02.121>
- [77] **Shetty, N. R. Hu, J. Hoch, B. Mailloux, M. Palmer, D. Menge, K. McGuire, W. McGillis, P. Culligan,** Quantifying Urban Bioswale Nitrogen Cycling in the Soil, Gas and Plant Phases, *Water* 2018, 10(11), 1627; <https://doi.org/10.3390/w10111627>
- [76] Irwin, E.G., **P. J. Culligan,** M. Fischer-Kowalski, K. Lavender Law, R. Murtugudde, S. Pfirman, "Bridging Barriers to Advance Global Sustainability, *Nature Sustainability*, 2018, 1(7), 324-326, <https://doi.org/10.1038/s41893-018-0085-1>
- [75] **Abrol, S., A. Mehmani,** M. Kerman, C.J. Meinrenken, **P. J. Culligan,** Data-Enabled Building Energy Savings (D-E-BES), *Proceedings of the IEEE*, Vol. 106, issue 4, April 2018. DOI: 10.1109/JPROC.2018.2791405
- [74] **Elliott, R.M., E. R. Adkins, P.J. Culligan,** M. I. Palmer, Stormwater Infiltration Capacity of Street Tree Pits: Quantifying the Influence of Different Design and Management Strategies in New York City, *Ecological Engineering*, Vol. 111, February 2018, pp 157-166: <https://doi.org/10.1016/j.ecoleng.2017.12.003>
- [73] Cooper, C., L. Larson, K.K Holland, **R. Gibson, D. Farnham, D. Hsueh, P. Culligan,** W.R. McGillis, Contrasting the Views and Actions of Data Collectors and Data Consumers in a Volunteer Water Quality Monitoring Project: Implications for Project Design and Management, *Citizen Science: Theory and Practice*, 2017. 2(1), p.8. DOI: <http://doi.org/10.5334/cstp.82>
- [72] Roman, A., A. Braga, **N. Shetty, P.J. Culligan,** Design and Modeling of an Adaptively Controlled Rainwater Harvesting System., *Water*, 2017, 9(12), 974; doi:10.3390/w9120974
- [71] **Farnham, D.J., R. A Gibson, D. Y. Hsueh, W. R. McGillis, P. J. Culligan,** N. Zain, R. Buchanan, Citizen science based water quality monitoring: Constructing a large database to characterize the impacts of combined sewer overflow in New York City, *Science of The Total Environment*, Volume 580, 15 February 2017, Pages 168–177.
- [70] **Elliott R.M., R. A. Gibson, T. B. Carson, D. E. Marasco, P. J. Culligan,** W.R. McGillis, Green Roof Seasonal Variation: Hydrologic Behavior of Thick and Thin Extensive Systems in New York City, *Environmental Research Letters*, 11(7), 074020, 2016.
- [69] **Hakimdavar, R., P. J. Culligan, A. Guido,** W.R. McGillis, The Soil Water Apportioning Method (SWAM): An approach for long-term, low-cost monitoring of green roof hydrologic performance, *Ecological Engineering*, 93, 2017-220, 2016.
- [68] Ramaswami, A. A. G. Russell, **P. J. Culligan,** K. R. Sharma, E. Kumar, Meta-principles for developing smart, sustainable, and healthy cities, *Science*, Vol 352, Issue 6288, pp 940-943, 2016.
- [67] **Whittinghill, L.J., D. Hsueh, P. Culligan,** R. Plunz, Stormwater performance of a full scale rooftop farm: Runoff water quality, *Ecological Engineering*, 91, 195-206, 2016.
- [66] **Liu, P.C., B. J. Mailloux, A. Wagner, J. Magyar, P.J. Culligan,** Can varying velocity conditions be one possible explanation for difference between laboratory and field observations of bacterial transport in porous media? *Advances in Water Resources*, 88, 97-108, 2016.
- [65] **D. E. Marasco, P. J. Culligan,** W. R. McGillis, Evaluation of common evapotranspiration models based on measurements from two extensive green roofs in New York City, *Ecological Engineering*, 84, 451-462, 2015

- [64] McGillis, W. R., D. Hsueh, Y. Zheng, M. Markowitz, F. Fevrin, W. Noel, J. E. Thys, J. Paine, Z. A. Wang, K. Hoering, R. Hakimdavar, **P. J. Culligan**, Carbon Transport in Rivers of Southern Haiti, *Journal of Applied Geochemistry*, DOI: 10.1016/j.apgeochem.2015.09.004, 2015.
- [63] Carson, T. B., M. Keeley, D. Marasco, W. R. McGillis, **P. Culligan**, Assessing methods for predicting green roof rainfall capture: A comparison between full-scale observations and four hydrologic models, *Urban Water Journal*, DOI:10.1080/1573062X.2015.1056742, 2015.
- [62] Zhang, B., C. Dong, Q. Zhou, X. Chen, **P. J. Culligan**, Q. Zhao, T. Xu, S Hui. Experimental Study on Laminar Flame Speed of Natural Gas/Carbon Monoxide/Air Mixtures, *Energy Sources, Part A: Recovery, Utilization, and Environmental Effects*, 37(6), 576-582, 2015.
- [61] Hakimdavar, R., **Culligan, P. J.**, Finazzi, M., Barontini, S., Ranzi, R. Scale dynamics of extensive green roofs: Quantifying the effect of drainage area and rainfall characteristics on observed and modeled green roof hydrologic performance, *Ecological Engineering*, 73, 494-508, 2014.
- [60] Toker, N. K., J. T. Germaine, **P. J. Culligan**, Effective Stress and Shear Strength of Moist Uniform Spheres, *Vadose Zone Journal*, Vol. 13 (5), doi:10.2136/vzj2013.07.0129, 2014.
- [59] Marasco, D.E., B. N Hunter, **P. Culligan**, S.R. Gaffin and W. R. McGillis, Quantifying Evapotranspiration from Urban Green Roofs: A Comparison of Chamber Measurements with Commonly Used Predictive Methods, *Environmental Science & Technology*, Volume: 48, Issue: 17 Pages: 10273-10281, 2014.
- [58] Ackerman, K., M. Conard, **P. Culligan**, R. Plunz, M.P. Sutto and L. Whittinghill, Sustainable Food Systems for Future Cities: The Potential of Urban Agriculture, *The Economic and Social Review*, Vol. 43 (2), pp 189-206, 2014.
- [57] Xu X., **P. J Culligan**, J. E Taylor, Energy Saving Alignment Strategy: Achieving energy efficiency in urban buildings by matching occupant temperature preferences with a building's indoor thermal environment, *Applied Energy*, Vol 123, pp 209-219, 2014.
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- [9] Burns, S. E., **P. J. Culligan**, N. Lu, J. C. Santamarina, A. Wayllace, NSF Workshop on Geotechnical Fundamentals: How Researchers Can Contribute to Today's Real-World Challenges, *ASCE Geo Strata Magazine*, March/ April 2017.
- [8] **Culligan, P. J.**, Green Roofs and Urban Stormwater Management, *ASCE Geo Strata Magazine*, March/ April 2011.
- [7] **Culligan, P. J.**, Urban Climate Change at the Crossroads: Efficiency + Decentralization = Urban Water Sustainability? *Domus 930 Intersections Climate Change*, Bossi, Plunz & Sutto (eds.), Editoriale Domus, Milan, Italy, November 2009.
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Published Abstracts

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- [20] Wang, S., W.R. McGillis, **P. J. Culligan**, Cost-effective, Insitu Field Measurements for Determining the Water Retention Quantification on Behavior of Individual Right-of-Way Bioswales, *AGU Fall Meeting Abstracts 2017/12*.
- [19] Hakimdavar, R., **P. J. Culligan**, A. Guido, Understanding green roof spatial dynamics: results from a scale based hydrologic study and introduction of a low-cost method for wide-range monitoring, *EGU General Assembly 2014*, held 27 April - 2 May, 2014 in Vienna, Austria, id.14840, 2014.
- [18] Finazzi, M. R. Hakimdavar, S. Barontini, R. Ranzi, **P. J Culligan**, Spatial scale effects on hydrologic modeling of extensive green roofs in New York City, *EGU General Assembly 2013*, held 07-12 April, 2013 in Vienna, Austria, p.13047, 2013.
- [17] McGillis, W.R., G Jacobson, **P Culligan**, S Gaffin, T Carson, D Marasco, D Hsueh, C Rella, Surface emissions of heat, water and GHGs from a NYC greenroof, *EGU General Assembly 2012*, held 22-27 April, 2012 in Vienna, Austria, p.12895, 2012.
- [16] Knappett, P. S., L. D., McKay, A. Layton, M. M. Hasan, D. Williams, M. L. Serre, K. M. Ahmed, **P. J. Culligan**, L. Band, B. J. Mailloux, A. Ferguson, J. Feighery, V. Escamilla, M. Emch, Y. Akita, E. Perfect, R. W. Gentry, A. van Geen, Transport of fecal-derived microorganisms from latrine ponds to aquifers in Bangladesh, *EOS Trans. AGU*, Fall Meet. Suppl., Abstract H42B-01, 2009.

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- [14] Akita, Y., J. Leber, P. S. K. Knappett, J. Feighery, L. E. Band, M. E. Emch, B. J. Mailloux, **P. J. Culligan**, A. C. Layton, L. D. McKay, A. van Geen, M. L. Serre, Spatial Analysis of the Distribution of Bacterial Pathogen Indicators Across Shallow Aquifers in Bangladesh, *Epidemiology: Volume 19 - Issue 6 - p S205*, 2008.
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- [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] Yoon, 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.
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- [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, Invited, September 1995.
- [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 Publications

- [4] **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.

- [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

- [4] **Culligan, P. J.**, T. Carson, J. K. Peterson, M. Odlin and W. R. McGillis, Quantifying Stormwater Runoff from Green Roofs in an Urban Environment, NSF CMMI Research and Innovation Conference 2011, *Engineering for Sustainability and Prosperity*, Jan 4 – 7, 2001. Atlanta, GA.
- [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	6	5	1
Master's	26	26	0
<u>Doctoral</u>			
As Supervisor	22	17	5
As Reader	34	34	0

Current research group: 5 PhD students, 2 post-doctoral scholars, 4 undergraduate research assistants

Doctoral Theses, Supervisor

- [22] Li, L. “Building energy and infrastructure monitoring and modeling”, Co-advised with Prof. Raimondo Betti, Columbia University, pre-qualifying exam.
- [21] Zhao, H. “New urban environmental monitoring systems”, Columbia University, pre-qualifying exam.
- [20] Markowitz, M. “Air-quality measurement and analysis for New York City”, pre-qualifying exam.
- [19] Wang, S. “Modeling the Impact of Green Infrastructure from the Individual to the City Scale”, expected May 2020.
- [18] Hu, R. “Microbial Communities and Functionality in Green Infrastructure”, Co-Advised with Prof. Kartik Chandran, expected May 2020.
- [17] Shetty, N. “New York City’s Green Infrastructure: Impacts on Nutrient Cycling and Improvements in Performance”, PhD Thesis, Columbia University, Feb 2017.
- [16] Liu, P.C. “Experimental and Numerical Investigations into Fundamental Mechanisms Controlling Particle Transport in Saturated Porous Media”, PhD Thesis, Columbia University, Aug 2016.
- [15] Hakimdavar, R. “Quantifying the Hydrological Impact of Re-greening Across Various Spatial Scales”, PhD Thesis, Columbia University, Feb 2016.
- [14] Elliott, R. “Vegetated Infrastructure for Urban Stormwater Management: Advances in Understanding, Modeling and Design”, PhD Thesis, Columbia University, Aug 2015.
- [13] Carson, T. “Evaluating Green Roof Stormwater Management in New York City: Observations, Modeling and Design of Full-Scale Systems”, PhD Thesis, Columbia University, May 2014.
- [12] Marasco, D. “Alternative Metrics of Green Roof Hydrologic Performance: Evapotranspiration and Peak Flow Reduction”. PhD Thesis, Columbia University, May 2014.
- [11] Jain, R. “Building Eco-Informatics: Examining the Dynamics of Eco-Feedback Design and Peer Networks to Achieve Sustainable Reductions in Energy Consumption” Co-advised Prof. J. Taylor Virginia Tech, PhD Thesis, Columbia University, August 2013.
- [10] Xu, X. “Leveraging Human-environment Systems in Residential Buildings for Aggregate Energy Efficiency and Sustainability”, (Co-advised Prof. J. Taylor VirginiaTech, PhD Thesis, Columbia University, July 2013.
- [9] Feighery, J. “A Combined Field and Laboratory Investigation into the Transport of Bacterial Indicator Microorganisms Through a Shallow Drinking Water Aquifer in Bangladesh”, PhD Thesis, Columbia University, August 2013.

- [8] Zhao, J. “Nano-Porous Energy Absorption System (NEAS) and Nanofluidics”, PhD Thesis, Columbia University, September 2010.
- [7] Schulte, K. E. “Processes for liquid infiltration in dry soil”, PhD Thesis, Columbia University, May 2008.
- [6] Toker N. K. “Modeling the relation between suction, effective stress and shear strength in partially saturated granular media”. PhD Thesis, MIT, May 2007.
- [5] Zhu, Y. “Experimental and numerical modeling of air-flow mechanisms in porous media”. PhD Thesis, Columbia University, August 2006.
- [4] Sik Yoon, J., " Discrete Particle Behavior in Porous Media: Direct Observations of Physical Mechanisms Influencing Particle Behavior". PhD Thesis, MIT, January 2005.
- [3] Levy, L., “Experimental and theoretical modeling of DNAPL transport in vertical fractured media” PhD Thesis, MIT, January 2003.
- [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.
- [1] Aref, L., “Flow and transport mechanisms in wetland soils.” PhD Thesis, MIT, May 1999.

Doctoral Theses, Reader

- [34] Yuan, S. “Methods and Pathways for Electricity Sector Transitions, PhD Thesis, Columbia University, January 2019.
- [33] Torres, M., “Reduction of Uncertainty in Post-Event Seismic Loss Estimated Using Observation Data and Bayesian Updating, PhD Thesis, Columbia University, May 2017.
- [32] Hess, A.J. “Rain Garden Evapotranspiration Accounting”, PhD Thesis, Villanova University, March 2017.
- [31] Waite, M. “Analysis of Energy Infrastructure Serving a Dense Urban Area: Opportunities and Challenges for Wind Power, Building Systems and Distributed Generation, PhD Thesis, Columbia University, August 2016.
- [30] Spyridaki, A. “Response Variability of Statically Determinate Beam Structures Following Non-Linear Constitutive Laws and Analytical Identification of Progressive Collapse Modes of Steel Frames, PhD Thesis, Columbia University, May 2016.
- [29] Sideri, J. “Distributed Damage Effect on Progressive Collapse of Structures and Variability Response Functions in 2D Elasticity Stochastic Problems”, PhD Thesis, Columbia University, May 2016.
- [28] Brotto, A.C. “Production Pathways and Emissions of Nitrogenous Greenhouse Gas from Engineered Biological Nitrogen Transformation Processes Through Systems Biology”, PhD Thesis, Columbia University, May 2016.
- [27] Lopeman, M. “Extreme Storm Surge Hazard Estimation and Windstorm Vulnerability Assessment for Quantitative Risk Analysis, PhD Columbia University, May 2015.
- [26] Fricker, K. J. “Magnesium Hydroxide Sorbents for Combined Carbon Dioxide Capture and Storage in Energy Conversion Systems, PhD Columbia University, August 2014.
- [25] Song, X. “ The Application Of Insurance As A Risk Management Tool For Alternative Dispute Resolution (ADR) Implementation In Construction Disputes, PhD Columbia University August 2013.
- [24] Tang, A. “Leveraging Policy for Renewable Energy Development in Industrialized Countries and Emerging Markets, PhD Columbia University May 2013.
- [23] Chen, J. “Simulating Network Structure, Layering Multi-layer Network Systems and Developing Network Block Configuration Models to Understand and Improve Energy Conservation in Residential Buildings”, PhD Columbia University May 2013.

- [22] Lu, H., "Structural and functional microbial ecology and denitrifying bacteria using different organic carbon sources", PhD Thesis, Columbia University, September 2011.
- [21] Park, H., "Microbial ecology, activity and abundance of aerobic and anaerobic ammonium oxidizing bacteria in engineering drinking water and wastewater systems", PhD Thesis, Columbia University, September 2010.
- [20] Yin, J., "Mechanical self-assembly: Science and applications", PhD Thesis, Columbia University, September 2010.
- [19] Ahn, J. H., "Nitrous oxide emissions from wastewater treatment processes: Molecular biology through National Inventory Development", PhD Thesis, Columbia University, August 2010.
- [18] Liu, L., "Nanofluidics and applications in energy conservation", PhD Thesis, Columbia University, August 2010.
- [17] Aziz, Z., "Hydrology and arsenic distribution in shallow aquifers of Bangladesh", PhD Thesis, Columbia University, August 2010.
- [16] Albro, M., "Solute transport in porous deformable media: Active uptake in dynamically loaded tissue and molecular partitioning in the cellular cytoplasm", PhD Thesis, Columbia University, December 2009.
- [15] Lewis, T. W., "Theoretical effects of consolidation on solute transport in soil barriers", PhD Thesis, The University of Newcastle, Australia, February 2009.
- [14] Wang, J-P., "Large scale shaking table tests of reinforced retaining walls with geocell facing", PhD Thesis, Columbia University, July 2007.
- [13] Moraczewski, T., "NMR imaging of expansion flows of suspensions", PhD Thesis, Columbia University, April 2007.
- [12] Wu, M.H. "Centrifuge modeling of two-dimensional slope failure", PhD Thesis, Columbia University, July 2006.
- [11] Bryant, L. "Centrifuge modeling of pipe piles subjected to lateral impact loads", PhD Thesis, Columbia University, July 2006.
- [10] Kim, Y. S. "Simulation of filtration for suspension transport in porous media", PhD Thesis, MIT, January 2005.
- [9] Hellweger, F. L., "Arsenic transformation by phytoplankten: The effect of phosphorous luxury uptake, PhD. Thesis, Columbia University, 2004.
- [8] Zinn, B. "Mass transfer and dispersion processes in connected conductivity structures: Simulation, visualization, delineation and application", PhD. Thesis, MIT, 2003.
- [7] Peters, G. P. "Contaminant transport through rigid and deforming porous media", Ph.D. Thesis, School of Engineering, the University of Newcastle, Australia, 2001.
- [6] Caputo, D. "Characterizing actinide transport and speciation using nuclear magnetic resonance tracer techniques". PhD. Thesis, MIT, 2000.
- [5] Sjoblom, K., "Development of MIT Tensiometer". PhD. Thesis, MIT, 2000.
- [4] Sinfield, J., "Optical laser for contaminant detection in soils." PhD. Thesis, MIT, 1999.
- [3] Ivanova, V., "3D geometric-mechanical model of rock fracture systems." PhD. Thesis MIT, 1998.
- [2] Knight, M. A., "Centrifuge modelling of multiphase flow in the vadose zone", PhD. Thesis, Queen's University, Canada, 1995.
- [1] Helliwell, E. E., "Modelling transport processes in soil due to hydraulic density and electrical gradients", PhD. Thesis, University of Cambridge, UK, 1994.

Master's Theses

- [26] Finazzi, M., "Spatial Scale Effects on Hydrologic Modeling of Extensive Green Roofs in New York City", MS Thesis University of Brescia (Italy), September 2012 (co-advisor).
- [25] Peterson, K., "Observations of the hydrological performance of green roofs". SM Thesis, Columbia University, January 2010.
- [24] O'Keeffe, G., "Observations of water balance in a model green roof". SM Thesis, Columbia University, May 2007. Sponsor W.R. McGillis.
- [23] Poanessa, M., "A model for predicting air-flow during insitu air-sparging", SM Thesis, MIT, August 2003.
- [22] LeFrancois, S. O. "Ground penetrating radar characterization of wood piles and the water table in Back Bay, Boston", SM Thesis, MIT, May 2003.
- [21] Gostic, R., "An NMR investigation into the influence of wettability on entrapment mechanisms during two phase flow", 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.
- [19] Fidalgo, B. "Evaluation and improvement of a modified permeameter to characterize dual-porosity media", SM Thesis, MIT, January 2002.
- [18] Ivanov, V., "Measurements and Interpretation of Wetting Front Infiltration in Soil," SM Thesis, MIT, May 2001.
- [17] Alexander, D. "Evaluation of present and emerging MSW landfill technology", SM Thesis, MIT, January 2001.
- [16] Adams, C. "DNAPL transport and remediation in smooth-walled vertical fractures," SM Thesis, MIT, August 2000.
- [15] Casterton, C. "An Investigation of bioluminescent microbial transport in porous media," SM Thesis, MIT, May 2000.
- [14] Woodoworth, R. "Air-sparging operations at Plainville Landfill, MA.," M.Eng. Thesis, MIT, May 1999.
- [13] Chen, E. "Plainville Landfill Operation & Remediation.," M.Eng. Thesis, May 1999.
- [12] Hwang, G. M., "Mico-LIBS: A novel chemical analysis tool," SM Thesis, MIT, January 1998.
- [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.
- [10] Mukhopadhyay, S. R., "Development of a data search engine for surface water pathway criteria list," 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.
- [8] Lukasiak, A. D., "Graphical interface for existing PA scoresheet," 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.
- [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.
- [5] Banno, K., "Geotechnical centrifuge modelling of immiscible fingering in porous media," SM Thesis, MIT, August 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.

- [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.
- [2] Ramsay, W. B., "A modified triaxial permeameter for physical characterisation of parameters affecting contaminant transport through wetland deposits," SM Thesis, MIT, May 1996.
- [1] Ratnam, S., "Geotechnical centrifuge modelling of the behaviour of LNAPLs under hydraulic flushing," SM Thesis, MIT, May 1996.

Bachelor's Theses

- [6] Silberstein, J. E., "Impact of Barnard's LEED-Certified Buildings on Student Productivity and Well-Being, Columbia University, May 2019.
- [5] Bowen, A., "Design of a Bicycle Route for CLIMB, NYC", Department of Earth and Environmental Engineering, Columbia University, May 2007.
- [4] Holguin, A., "Spinning Drop Tensiometry for measuring DNAPL interfacial tension", Department of Mechanical Engineering, MIT 1999.
- [3] Campbell, R., "A study of macroscopic dispersion processes in porous media," 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.
- [1] Anderson, S. J., "Chemical properties of amended bauxite residue," University of Western Australia, November 1991.

Teaching Experience of *Patricia J. Culligan*

Courses Taught:

<u>Course</u>	<u>Institution</u>	<u>Level</u>	<u>Year</u>
Freshman Design: Civil Engineering	Columbia University	Undergraduate	2012, 2018/19
Hydrosystems Engineering (joint with EAEE)	Columbia University	Undergraduate	2012
Advanced Issues in Development Planning (joint with GSAPP)	Columbia University	Graduate	2010
Fluid Mechanics*	Columbia University	Undergraduate	2003 - 2008
Urban Ecology Studio (joint with GSAPP)	Columbia University	Graduate/ Undergraduate	2004 – 2017
Engineering for Developing Communities	Columbia University	Undergraduate	2005 - present
Soil Mechanics*	Columbia University	Undergraduate	2006
Groundwater Contaminant Transport and Remediation	Columbia University	Graduate	2004
Waste Containment Design and Practice	Columbia University	Graduate	2005
Environmental Geotechnics: Sub-module on contaminant transport & remediation	Harvard University	Graduate	2001
Introduction to Civil Engineering Materials*	Massachusetts Institute of Technology	Undergraduate	1999-2003
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 Geomechanics*	University of Western Australia	Undergraduate	1991

* Included a laboratory section

Freshman Advising Seminar:

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

Master of Engineering Projects:

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

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 ^a	2006

High School Summer Programs:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
Sustainable Urbanization: New Designs for the future city	Columbia University	2013 -17

Professional Courses:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
Pollutant Transport in Natural Water Systems	Graduate School of Education, Harvard University	2002-03
Land-Based Waste Disposal	University of Western Australia	1990

Design Challenges:

<u>Title</u>	<u>Institution</u>	<u>Year</u>
Urban Works India Design Challenge	Columbia University	2018 - present

Educational Program Management:

<u>Program</u>	<u>Institution</u>	<u>Year</u>
Director, Sustainable Engineering Graduate Scholars Program	Columbia University	2012 - 2017
Director, IGERT Program: Solving Urbanization Challenges by Design	Columbia University	2009 - 2016
Director, Education Center for Sustainable Engineering	Columbia University	2008 - 2010
Director, Water Resource and Environmental Engineering Concentration; Department of Civil Engineering & Engineering Mechanics	Columbia University	2003 - present
Supervisor, Undergraduate Research Opportunities Program in Civil & Environmental Engineering	Massachusetts Institute of Technology	2000 - 2003
Supervisor, Cambridge University and MIT Undergraduate Student Exchange Program in Civil & Environmental Engineering	Massachusetts Institute of Technology	2000 - 2003
Faculty Advisor, Chi-Epsilon Honor Society	Massachusetts Institute of Technology	2000