Curriculum Vitae

Signature Candice M. Duncan Date 10/21/2021

I. PERSONAL INFORMATION

Candice M. Duncan
Department of Environmental Science and Technology (ENST)
College of Agriculture and Natural Resources (AGNR)
University of Maryland, College Park (UMD)

1461 Animal Science/Agricultural Engineering Building, College Park, MD 20724
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I.A. Academic Appointments at UMD

August 1, 2021 – present	Assistant Professor
January 3, 2017 – July 2021	Lecturer

I.B. Other Employment

II. TEACHING

2016	Adjunct Faculty, Earth and Env'l Science, Stevenson University (MD)
2014	Adjunct Instructor of Environmental Science, ITT Tech. Institute (AZ)
2000	Teaching Assistant of Organic Chemistry Lab, UNC-Greensboro (NC)
1999 – 2000	Teaching Assistant of General Chemistry Lab, UNC-Greensboro (NC)

PROFESSIONAL/RESEARCH

2013 – 2014	Research Analyst, University of Arizona
2008 – 2012	Graduate Research Associate, University of Arizona
2008 – 2009	Student Contractor, U.S. Environmental Protection Agency (NC)
2006 – 2008	Graduate Student Employee, North Carolina Central University
2004 – 2006	Student Contractor, U.S. Environmental Protection Agency (NC)
2003 (intern)	Environmental Careers Organization (ECO) intern, US EPA (NC)

II.A. Educational Background

2014 Ph.D. Environmental Science University of Arizona
Dissertation title: Innovative Methods for Characterizing Chlorinated Volatile Organic Compounds in the Vadose Zone; Advisor: Dr. Mark L. Brusseau

2008 M.S. Earth Science N.C. Central University
Thesis title: The Analysis of Selected Pyrethroid Pesticides in an Environmental Sample using High Pressure Liquid Chromatography Diode Array Detection (HPLC-DAD) with Liquid Chromatography/ Tandem Mass Spectrometry (LC/MS/MS) Verification: A Post-Column Derivatization Approach; Advisor: Dr. James Starr

2005 B.S. Environmental Science N.C. Central University *(Summa Cum Laude)*

2003 B.S. Biology University of NC at Greensboro

II.B. Continuing Education

COURSES

2021-2022 Cohort of ADVANCE faculty through the ADVANCING Faculty Diversity Program sponsored by the Office of Faculty Affairs

College of Agriculture and Natural Resources New Faculty Orientation Program & Tour, August, 2019

Northeast Regional Teaching Workshop – Teaching and Learning with Generation Z, University of Connecticut, July 2019

Technology to Increase Engagement in the Classroom Course, The Teaching and Learning Transformation Center at the University of Maryland College Park, College Park, MD. March, 2017

Strategic Environmental Research & Development Program (SERDP) and The Environmental Security Technology Certification Program (ESTCP) Partners in Environmental Technology Technical Symposium and Workshop Short Course – Field Methods to Distinguish between Vapor Intrusion and Indoor Sources of VOCs, Washington, D.C. December 2011

The University of Arizona, Sealed Source Protection Course, Tucson, AZ. July 2009
ECO Internship Professional Development: Toastmaster's International: Success in Communication Series, Speechcrafters, RTP, NC. June 2003

II.C. Professional Certifications, Licenses, and Memberships

American Geophysical Union (AGU) member since 2010
Soil Science Society of America (SSSA) member since 2017
Compliance Solutions Occupational Trainers, Inc. 8-hour HAZWOPER 29 CFR 1910.102(e) Refresher course, Tucson, AZ. August 2009
Compliance Solutions Occupational Trainers, Inc. 40-hour HAZWOPER 29 CFR 1910.102(e) Training, Phoenix, AZ. September 2008
Accelerated Solvent Extraction Dionex SLCTC Training Course – Methods Development, Operations and Troubleshooting, Salt Lake City, UT. November 2003

III. RESEARCH, SCHOLARLY, CREATIVE and/or PROFESSIONAL ACTIVITIES

III.A. Chapters

III.A.1. Books

Whitacre, D.M. (2012). Chiral Pesticides: Identification, Description, and Environmental Implications. In Reviews of Environmental Contamination and Toxicology (Vol. 217, pp. 1-74). Spring New York, NY. ISSN 0179-5953, ISBN 978-1-4614-2328-7. DOI 10.1007/978-1-4614-2329-4 (106 citations)

III.B. Refereed Journals

III.B.1. Refereed Journal Articles (n=12; IF = Impact Factor)

Journal	Publication Year	# of articles	Total citations	5-yr. IF
Journal of Contaminant Hydrology	2015, 2014, 2013	4	53	2.3

Environmental Science and Technology	2011	1	43	7.9
Science of the Total Environment	2017	2	5	6.4
Environmental Chemistry	2017	1	2	1.9
Transport in Porous Media	2014	1	2	2.6
Nature's Scientific Reports	2019	1	2	4.6
Water, Air and Soil Pollution	2014	1	1	2.0
Environmental Justice	2011	1	2	1.0

15. **Candice M. Duncan**, Vicky Oliver, Akua A. Asa-Awuku. What's in your Grave Soil? Reimagining Soil Chemistry Through Trace Metal Analysis of Grave Samples. *Frontiers Women in Soil Science: Special Issue (solicited manuscript in preparation)*

14. **Candice M. Duncan**. Implications of the per- and polyfluoroalkyl substance (PFAS) substitute, GenX, on environmental water systems: A review. *Frontiers in Water (solicited manuscript in preparation)*

13. **Candice M. Duncan**, Mark L. Brusseau, Kenneth C. Carroll, Christian D. Johnson. Vapor Intrusion Estimation Tool for Unsaturated Source in the Vadose Zone. *Journal of Contaminant Hydrology (in preparation)*

12. Clinton, C.K., **Duncan, C.M**., Shaw, R.K. *et al.* 2019. Identification of trace metals and potential anthropogenic influences on the historic New York African Burial Ground population: A pXRF technology approach. *Sci Rep* **9,** 18976.
https://doi.org/10.1038/s41598-019-55125-7

11. **Candice M. Duncan**, Jon Mainhagu, Dan Lin, Mark L. Brusseau. 2018. Analysis of trichloroethene vapour in soil-gas samples using solid-sorbent tubes with gas chromatography/mass spectrometry. *Environmental Chemistry*, https://doi.org/10.1071/EN17161

10. **Candice M. Duncan**, Jon Mainhagu, Kayla Virgone, Denise Moreno Ramirez, Mark L. Brusseau. 2017. Application of phytoscreening to three hazardous waste sites in Arizona. *Science of the Total Environment,* 609, p. 951- 955.

9. **Candice M. Duncan**, Mark L. Brusseau. 2017. An assessment of correlations between chlorinated VOC concentrations in tree tissue and groundwater for phytoscreening applications. In press, *Science of the Total Environment.* https://doi.org/10.1016/j.scitotenv.2017.10.235

8. J. Mainhagu, **C. Morrison**, M.L. Brusseau. 2015. Using vapor phase tomography to measure the spatial distribution of vapor concentrations and flux for vadose-zone VOC sources. *Journal of Contaminant Hydrology*, 177-178 (2015), p. 54-63.

7. M.L. Brusseau, J. Mainhagu, **C. Morrison**, K.C. Carroll. 2015. The vapor-phase multi-stage CMD test for characterizing contaminant mass discharge associated with VOC sources in the vadose zone: Application to three sites in different lifecycle stages of SVE operations. *Journal of Contaminant Hydrology,* Volume 179, 2015, Pages 55-64, ISSN 0169-7722, https://doi.org/10.1016/j.jconhyd.2015.05.006

6. G.R. Monger, **Candice Morrison Duncan**, and M.L. Brusseau. 2014. Using a Gas-Phase Tracer Test to Characterize the Impact of Landfill Gas Generation on Advective-Dispersive Transport in the Vadose Zone. *Water, Air and Soil Pollution* (2014) 225:2226.

5. J. Mainhagu, **C. Morrison**, M. Truex, M. Oostrom, M. L. Brusseau. 2014. Measuring spatial variability of vapor flux to characterize vadose-zone VOC sources: Flow-cell experiments. *Journal of Contaminant Hydrology*, 167: 32-43.

4. M. Musielak, M. L. Brusseau, M. Marcoux, **C. Morrison**, M. Quintard. 2014. Determination of Chlorinated Solvent Sorption by Porous Material—Application to Trichloroethene Vapor on Cement Mortar. *Transport in Porous Media*, Volume 104, Issue 1, pp 77-90.

3. M.L. Brusseau, D.E. Matthieu III, K.C. Carroll, J. Mainhagu, **C. Morrison**, A. McMillan, A. Russo, and M. Plaschke. 2013. Characterizing long-term contaminant mass discharge and the relationship between reductions in discharge and reductions in mass for DNAPL source areas. *Journal of Contaminant Hydrology*, 149 (2013) p.1-12

2. M.L. Brusseau, K.C. Carroll, T. Allen, J. Baker, W. DiGuiseppi, J. Hatton, **C. Morrison**, A. Russo, and J. Berkompas. 2011. Impact of In Situ Chemical Oxidation on Contaminant Mass Discharge: Linking Source-Zone and Plume-Scale Characterizations of Remediation Performance. *Environmental Science and Technology*. 45(12): p5352-5358.

1. J.J. Bang, Y.B. Anderson, S.F. DeLauder, R. Malhotra, P. Egeghy, R. Williams, D. Whitaker, and **C. Morrison**. 2011. Ambient Concentration Levels of Volatile Organic Compounds and Aldehydes in Moncure, North Carolina: An Environmental Justice Case Study. *Environmental Justice*. 4(2): p91-99.

III.C. Published Conference Proceedings

C. Clinton, **C. Duncan**, H. Jackson, F. Jackson. 2019. Geospatial distribution of trace metals found in the 17th and 18th Century New York African Burial Ground grave soil samples using XRF technology. *88th Annual Meeting of the American Association of Physical Anthropologists*, 168, p. 45.

III.D. Conferences, Workshops, and Talks

III.D.1. Invited Talks

2021 Panelist. Panel Title: "Minding the Gap: Cultivation the Next Generation of Diverse Agricultural and Environmental Justice Activist". Annual Taking Nature Black Conference, *Held Virtually by the Audubon Naturalist Society*

III.D.2. Refereed Conference Presentations

2017 *Candice M. Duncan, Presentation on "Qualitative Elemental Composition of Select New York African Burial Ground Grave Soil Samples", ASA, CSSA, and SSSA International Meeting, Tampa, FL.*

2011 *Candice Morrison (for Kenneth Carroll). Presentation on "Assessing Performance and Closure for Soil Vapor Extraction: Integrating Vapor Discharge and Impact to Groundwater." Partners in Environmental Technology Technical Symposium & Workshop, Washington Hilton (Washington, D.C.)*

2011 *Candice Morrison (for Mark L. Brusseau). Presentation on "The Impact of In-situ Chemical Oxidation on Contaminant Mass Discharge: Linking Source-Zone and Plume-Scale Characterizations of Remediation Performance", Partners in Environmental Technology Technical Symposium & Workshop, Washington Hilton (Washington, D.C.)*

III.D.3. Refereed Abstracts

2021 *AGU Conference abstract title: Non-Traditional Geoscience can Save the Earth too! Abstract ID# 839272*

2017 *AGU Conference abstract title: Application of Phytoscreening to Three Hazardous Waste Sites in Arizona*

2017 *ASA, CSSA, & SSSSA International Annual Meeting title: Qualitative Elemental Composition of Select New York African Burial Ground Grave Soil Samples. Abstract ID# 107951.*

2012 *AGU Conference abstract title: Contaminant Mass Discharge and Mass Removal Behavior for a DNAPL Field Site.*

2011 *AGU Conference abstract title: Characterizing Vapor Fluxes for Organic-Liquid Sources in the Vadose Zone. Abstract id. H41A-1003.*

2010 *AGU Conference abstract title: Characterizing Organic-Liquid Sources in the Vadose Zone. Abstract id. H41A-1073.*

III.D.4. Refereed Panels

2020 *Phase 1 EPA 17th Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet (EPA-G2020-P3-Q2 – Safe and Sustainable Water Resources)*

2019 *EPA 16th Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet (EPA-G2019-P3-Q2 – Safe and Sustainable Water Resources)*

III.D.5. Symposia

2016 *Candice M. Duncan. Presentation on "Profile and Elemental Determination of Soil collected from the New York African Burial Ground Site", W. Montague Cobb Research Laboratory Symposium, Howard University (Washington, D.C.)*

III.D.6. Colloquia

2012 *Presentation on "Innovative Methods for Characterizing Contaminant Sources in the Vadose Zone", UA Superfund Research Program Colloquium, University of Arizona (Tucson, AZ)*

III.D.7. Other

2011 *Presentation on "Vapor Phase Tomography for Characterizing Organic-Liquid Sources in the Vadose Zone", University of Arizona, SWES Department Earth Day (Tucson, AZ)*

2007 *Presentation on "HPLC Analysis on Ambient Air Aldehyde Levels in an Environmental Justice Community." North Carolina Central University's 2nd Annual Graduate Research Day, North Carolina Central University (Durham, NC)*

2005 *Presentation on "Analysis of Nitrogen-containing species using Gas Chromatography-Nitrogen Chemiluminescence Detection." Gas Technology Institute HBCU Summer Intern Program, Gas Technology Institute (Des Plains, IL)*

2004 *Presentation on "Analysis of Selected Pyrethroid Pesticides using Reverse Phase High Pressure Liquid Chromatography." Joint Carolinas and Southeast SETAC (Society of Environmental Toxicology and Chemistry) Meeting, Kennesaw State University (Kennesaw, GA)*

III.D.8. Departmental Seminar

2020 *Presentation on "Introduction of the P.E.A.R.L.S. Program (Providing Educational Access to Research & Learning in geoscienceS) for non-traditional geoscience majors, women, under-served, and underrepresented minorities", Environmental Science and Technology Departmental Seminar, University of Maryland (College Park, MD)*

2017 *Presentation on "Remediation Techniques on Contaminated Soil and Subsequent Groundwater", Environmental Science and Technology Departmental Seminar, University of Maryland (College Park, MD)*

2016 *Presentation on "Innovative Characterization Methods: VOCs in the Vadose", Environmental Science and Technology Departmental Seminar, University of Maryland (College Park, MD)*

III.E. Completed Creative Works

III.E.1. Websites

2021 PEARLS website; https://agnr.umd.edu/student-opportunities/pearls

2021 ENST Senior Integrative Experience website; documents submitted to departmental webmaster for content upload; https://enst.umd.edu/undergraduate/current-students/senior-integrative-experience

III.F. **Sponsored Research and Programs – Administered by the Office of Research Administration (ORA)**

III.F.1. Grants

2021 *UMD Office of the Senior Vice President & Provost and Division of Research: Independent Scholarship Research & Creativity Award (pending)*
Title: What's in your Grave Soil? Reimagining Soil Chemistry Through Trace Metal Analysis of Grave Samples
Award amount: $10,000
Dates: January 1, 2022 – December 31, 2023

2021 *Johnson & Johnson Women in STEM2D Initiative (pending)*

Title: Detecting the Undetectable: Closing the Void in Air Sampling of Per- and polyfluoroalkyl substances (PFAS)
Award amount: $149,992
Dates: March 1, 2022 – February 28, 2025

2021 *National Science Foundation*
Title: Summer Opportunities in Agricultural Research & the Environment: Strategic Work in Applied Geoscience (SOARES: SWAG)
Award amount: $450,239
Dates: September 1, 2021 through August 31, 2024
Investigators: Evelyn Cooper (PI) and Candice Duncan (co-PI-50% effort)

2021 *U.S. Department of Agriculture, National Institute of Food and Agriculture, Agriculture and Food Research Initiative (USDA NIFA AFRI)*
Title: Agriculture, Food Systems, and Climate Change in the Chesapeake Bay: A University of Maryland REEU
Award amount: $500,000
Dates: February 1, 2021 through January 31, 2026
Investigators: Evelyn Cooper (PI), Candice Duncan (1/10 key persons; 5% effort)

2020 *National Science Foundation*
Title: GP-GO: Providing Educational Access to Research and Learning in Geosciences (P.E.A.R.L.S.)
Award amount: $384, 413
Dates: September 1, 2020 through August 31, 2023 (estimated)
Investigators: Akua Asa-Awuku (PI), Candice Duncan (Co-PI-34% effort), Ebony Terrell Shockley (Co-PI)

III.G. Gifts, and Funded Research not administered by ORA

III.G.1. Other

2020 *UMD Office of Sustainability Fund*
Title: Phytoremediation using Aquaponics Technology
Award Amount: $2,000
Dates: May 7, 2020 through May, 31, 2021 (pending COVID19 restrictions)
Investigators: Candice Duncan (PI) and Jose-Luis Izursa (co-PI)

III.H. Research Fellowships, Prizes and Awards

2021 *Audubon Naturalist Society Environmental Champions Award*

2020 *Bahram Momen Distinguished Service Award (Non-Tenure Track); UMD-CP Departmental Award*

2018 *Excellence in Teaching Award (Non-Tenure Track); UMD-CP Departmental Award*

2008–12 *Alfred P. Sloan Foundation Minority Ph.D. Program in Mathematics, Science and Engineering Scholar (National Action Council for Minorities in Engineering, Inc.), University of Arizona*

2008 *Pfizer Graduate Travel Award in Analytical Chemistry (2008)*

2006-08 *National Science Foundation-Louis Stokes Alliance for Minority Participation Bridge to Doctorate (NSF-LSAMP BD) Research Fellow, North Carolina Central University*

IV. TEACHING, EXTENSION, MENTORING AND ADVISING

IV.A. Courses Taught

2021 *AGNR 320: Introduction to Geosciences (3 enrolled)*
ENST 489/472: SIE Project (1 enrolled)
2020 *ENST 421: Soil Chemistry (6 enrolled)*
ENST 489/472: SIE Project (2 enrolled)
2019 *ENST 421: Soil Chemistry (6 enrolled)*
2018 *ENST 421: Soil Chemistry (13 enrolled)*
2017 *ENST 421: Soil Chemistry (8 enrolled)*

IV.A.1. Course or Curriculum Development

2021 *Development of Environmental Analytical Instrumentation course, offered Fall 2022*
2020 *Created AGNR 320: Introduction to Geosciences, offered Spring 2021*

IV.B. Advising: Research or Clinical

IV.B.1. Undergraduate

2021 *Advising – 3 students*
2020 *Advising – 10 students*
2019 *Advising – 5 students*
2018 *Advising – 9 students*
2017 *Advising – 5 students*

IV.B.2. Master's

2020 *MS thesis committee member of Laurel Taylor Roswall, Advisor: Dr. Gurpal Toor, Dept. of Environmental Science and Technology; Title: Quantification of Water Extractable Phosphorus Pools in Soil and Manure to Accurately Predict Phosphorus Loss (conferred 2021)*

2017 *MS thesis committee member of Ousmane Insa Sibo, Advisor: Dr. Ahmet Aydilek, Dept. of Civil and Environmental Engineering; Title: Leaching of Contaminants from Recycled Asphalt Pavement used in Highway Construction (conferred 2018)*

IV.B.3. Doctoral

2016 *PhD dissertation committee member of Carter Clinton, Howard University, Advisor: Dr. Fatimah Jackson, Department of Biology (conferred 2021)*

IV.C. Professional and Extension Education

IV.C.1. Guest Lectures

2017-20 *ENST 423 lecture titled: Organic Contaminants: Source, Impacts and Remediation*

IV.D. Contribution to Learning Outcomes Assessment

2020 *ENST 489 Senior Integrative Experience Learning Outcome Assessment made available in person was converted and updated to a google form for virtual presentation accessibility*

V. SERVICE AND OUTREACH

V.A. Editorships, Editorial Boards, and Reviewing Activities

V.A.1. Reviewing Activities for Agencies and Foundations

2020 *Peer Reviewer: Nature's Publication Scientific Reports*
2019 *Panel Reviewer: EPA 2020 Phase I 17th Annual P3 Awards: A National Student Design Competition for Sustainability Focusing on People, Prosperity and the Planet (P3) Program*
2018-19 *Peer Reviewer: Science of the Total Environment, Groundwater Monitoring & Remediation*
2012 *Fellowship: Greater Research Opportunities for Undergraduate (GRO) (P1-4 & Q1-2)*

V.B. Committees, Professional & Campus Service

V.B.1. Campus Service – Department

2020 – present *Senior Integrative Experience Coordinator (i.e. Capstone Coordinator)*
2017 - 20 *Search Committee*
2017 - present *Diversity and Mentoring Committee*
2017 – present *Professional Track Faculty Committee*
2018 - 19 *Faculty Review and Salary Committee*
2018 – 19 *Awards Committee*

V.B.2. Other Non-University Committees, Memberships, Panels, etc.

2020-present *STEM Fair judge for Eleanor Roosevelt High School, Greenbelt, MD*
2012 *Career panelist for Women in Science and Engineering (WISE) at the Expanding Your Horizons (EYH) Conference*
2012 *Career panelist for Women in Science and Engineering (WISE) at the Expanding Your Horizons (EYH) Conference*
2012 *Mentor scientist for AZ Project WET's Water Investigation Program at UA Water Resources Research Center*
2010-11 *National Black Graduate Student Association Judicial Committee member*
2009-10 *Black Graduate Student Association President, University of Arizona (UA)*

V.C. Non-Research Presentations

V.C.1. Outreach Presentations

2017-20 *Presenter at New Hope Academy Career Day – STEM demonstration to groups of 1-5, 6-9, and 10-12 grade students*

V.D. Community & Other Service

2019 *Coordinator of Career Day at New Hope Academy, Landover Hills, M.D.*
2019-20 *Served as member of Board of Directors at New Hope Academy, Landover Hills, M.D.*
2017 – present *Coordinator of faith-based Scholarship given annually to college-bound assembly members*

V.E. Advisee Awards and Recognition

2018 *Carter Clinton; Award as Top Presenter Graduate Student Division of Sigma Xi National Conference*

2017 *Carter Clinton; Award as Top Presenter Graduate Student Division of Sigma Xi National Conference*