WENDY H. YANG

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EDUCATION

Harvard University	Environmental Science & Public Policy	B.A., 2003
University of California, Berkeley	Environmental Science, Policy & Management	Ph.D., 2010

APPOINTMENTS

2010-2013	Post-Doctoral Scholar, Department of Environmental Science, Policy, and Management, University of California, Berkeley
2013-2019	Assistant Professor, Departments of Plant Biology and Geology, UIUC
2014-present	Affiliate, Program in Ecology, Evolution, and Conservation Biology (PEEC), UIUC
2015-2019	Assistant Professor, Institute for Sustainability, Energy, and Environment (iSEE), UIUC
2017-present	Affiliate, Carl R. Woese Institute for Genomic Biology (IGB), Center for Advanced Bioenergy and Bioproducts Innovation (CABBI), UIUC
2019-present	Affiliate, IGB, Genomic Ecology of Global Change, UIUC
2019-2023	Associate Professor, Departments of Plant Biology and Geology, UIUC
2020-2023	Associate Professor, Center for Digital Agriculture (CDA), UIUC
2022-present	Leader of Sustainability Theme, CABBI
2023-present	Associate Professor, iSEE, UIUC
2023-present	Professor, Department of Plant Biology, iSEE, and CDA, UIUC

HONORS & RECOGNITIONS

2014	National Great Rivers Research and Education Center, Faculty Fellow
2017	UIUC College of Liberal Arts & Sciences (LAS), Lincoln Excellence for Assistant Professors (LEAP) Scholar (2017-2019)
2017	*Biogeochemistry,* Excellence in Reviewing Award
2017	UIUC List of Teachers Ranked As Excellent By Their Students, IB 452: Ecosystem Ecology
2018	Ecological Society of America, Early Career Fellow (2018-2022)
2019	UIUC College of LAS, I.C. Gunsalus Scholar, 2019-2020
2019	*Global Biogeochemical Cycles* Top 20 Downloaded Papers in 2017-2018
2019	UIUC List of Teachers Ranked As Excellent By Their Students, IB 452: Ecosystem Ecology
2021	UIUC LAS Dean's Award for Excellence in Undergraduate Teaching
2021	UIUC LAS Impact Award for special contributions during the COVID-19 pandemic
2022	UIUC List of Teachers Ranked As Excellent By Their Students, IB 452: Ecosystem Ecology
2023	UIUC College of LAS, Dean's Distinguished Professorial Scholar

RESEARCH PROGRAM

The structure and function of ecosystems are changing due to anthropogenic factors such as climate change, nitrogen deposition, land use and cover change, and species invasion. I aim to improve understanding of soil, microbial, and plant dynamics to better predict, mitigate, and adapt to the effects of these global environmental changes. As an ecosystem ecologist and biogeochemist, I use observational and experimental studies in the field and laboratory to study mechanisms driving greenhouse gas emissions and soil chemical transformations in natural and managed ecosystems. I innovate stable isotope approaches to quantify poorly-constrained nutrient transformation rates, integrate biogeochemistry and microbial ecology to elucidate controls on microbially mediated biogeochemical processes, and test mechanistic hypotheses to reveal the context dependency of controls on carbon and nitrogen cycling. An integral part of my research program is preparing the next generation of scientists to tackle the major challenges of global environmental change within the following major themes:

- improving understanding of soil emissions of nitrous oxide, a potent greenhouse gas
- investigating anaerobic biogeochemical processes in non-flooded soils

- elucidating how plant-soil-microbe interactions alter ecosystem carbon and nitrogen cycling

FUNDED RESEARCH

Center for Advanced Bioenergy and Bioproducts Innovation, $147,500,000 ($3,630,852 to Yang). 2022-2027. DOE (**Co-I** with Leakey A as Lead I)

Collaborative Research: Isotopic fingerprinting of nitrous oxide emissions from the US Corn Belt, 2021-2023, $360,970. NSF Division of Atmospheric and Geospace Sciences, Atmospheric Chemistry Program (**Co-PI** with Yu Z as Lead PI)

"System of Systems" Solutions for Commercial Field-level Quantification of Soil Organic Carbon and Nitrous Oxide Emission for Scalable Applications (SYMFONI), 2021-2024, $6,950,000. DOE ARPA-E SMARTFARM Phase II (**Co-PI** with Guan K as Lead PI)

AI Institute: Artificial Intelligence for Future Agricultural Resilience, Management, and Sustainability (AIFARMS), 2020-2025, $20,000,000 (~$70,000 to Yang). NSF Artificial Intelligence Institutes (**Senior personnel** with Adve V as Lead PI)

Managing the maize microbiome for sustainable nutrient retention in Illinois agricultural soils, 2020-2022, $253,664. Illinois Nutrient Research and Education Council (**Co-PI** with Kent A as Lead PI)

Integration of novel wireless in-field sensors and machine learning for smart precision agriculture, 2020-2021, $50,000. UIUC Center for Digital Agriculture seed grant (**Co-PI** with Lu Y as Lead PI)

Mining ancient genomes for mechanisms to improve nutrient retention in maize agroecosystems, 2020-2024, $750,000. USDA NIFA Agricultural Microbiomes Program Area (**Co-PI** with Kent A as Lead PI)

Novel probe of oxygen and its isotopes for millimeter-scale measurements of soil dynamics, 2020-2021, $1,500,000 ($224,646 to UIUC). DOE Small Business Innovation Research Phase II (**Co-I** with Shorter J as Lead I)

Novel probe of oxygen and its isotopes for millimeter-scale measurements of soil dynamics, 2019, $225,000 ($17,394 to UIUC). DOE Small Business Innovation Research Phase I (**Co-I** with Shorter J as Lead I)

Dimensions: Collaborative Research: The role of microbial biodiversity in controlling nitrous oxide emissions from soils, 2018-2023, $1,988,881 ($691,453 to UIUC). NSF Division of Environmental Biology, Dimensions of Biodiversity Program (**UIUC Lead PI** with Konstantindis K as overall Lead PI)

Towards management of dissimilatory nitrate reduction to ammonium for nitrate retention in agricultural soils, 2018-2021. $475,353. Illinois Nutrient Research and Education Council (**Co-PI** with Kent A as Lead PI)

Unraveling the paradox of dissimilatory nitrate reduction to ammonium in upland soils, 2017-2019. $150,000. NSF Division of Environmental Biology, Ecosystem Science Cluster (Lead PI)

Center for Advanced Bioenergy and Bioproducts Innovation, $115,000,000 ($3,057,073 to Yang). 2017-2022. DOE (**Co-I** with Leakey A as Lead I)

Transforming the Midwest U.S. with woody polycultures for food production and ecosystem service enhancement, 2017-2020. $495,000. USDA NIFA Agroecosystem Management Program (**Lead PD**)

Garlic mustard (Alliaria petiolata) -- a "triple-threat" to forest health 2017-2019. $72,820. USDA NIFA (Senior Personnel with Yannarell A as Lead PD)

Dissimilatory nitrate reduction to ammonium: An unexplored microbial pathway for nitrate retention in agricultural soils, 2016-2018. $100,000. USDA NIFA Exploratory Program (**Lead PD**)

Exploring the importance of iron redox cycling in driving biogeochemical processes in terrestrial ecosystems, 2016-2018. $20,405. UIUC Campus Research Board (**Sole PI**)

Dissimilatory nitrate reduction to ammonium: An unexplored microbial pathway for nitrate retention in agricultural soils, 2016-2017. $124,645. Illinois Nutrient Research and Education Council (**Co-PI** with Kent A as Lead PI)

Assessing controls on soil carbon storage as an ecosystem service provided by woody polyculture systems. $9,976. 2015-2016. UIUC School of Integrative Biology Joseph B. Hawkes Award. (**Sole PI**)

Trait-based nutrient limitation: Drivers of belowground carbon and nitrogen cycling response to

nitrogen deposition in a tropical montane forest. $27,450. 2014-2015. UIUC Campus Research Board (**Sole PI**)

Multifunctional woody polyculture for sustainable food production. $500,000. 2014-2017. UIUC Institute for Sustainability, Energy, and Environment (**Co-PI** with Lovell ST as Lead PI)

PEER-REVIEWED PUBLICATIONS

Underline denotes directly supervised postdoctoral scholar, student, or other mentee/trainee
^ Denotes directly supervised postdoctoral scholar
† Denotes directly supervised graduate student
†† Denotes graduate student supervised via M.S. or Ph.D. committee
¥ Denotes directly supervised undergraduate student

Authorship Statement: There are multiple authorship conventions in the field of biological sciences. First author is typically the person who collected the data and prepared the first draft, and the last author is typically the senior scientist on the paper.

1. **Liu WH**, Bryant DM, Hutyra LR, Saleska SR, Hammond Pyle E, Curran DC, Wofsy SC (2006) Woody debris contribution to the carbon budgets of selectively-logged and maturing mid-latitude forests. *Oecologia*, **148,** 108-117.
2. Sack L, Melcher P, **Liu WH**, Middleton E, Pardee T (2006) How strong is intra-canopy leaf plasticity in temperate deciduous trees? *American Journal of Botany*, 93, 829-839.
3. Cusack DF, Chou WW, **Yang WH**, Harmon ME, Silver WL, the LIDET Team (2009) Controls on long-term root and leaf litter decomposition in neotropical forests. *Global Change Biology*, 15, 1339-1355.
4. Burgin AM, **Yang WH**, Silver WL, Hamilton S (2011) Beyond C and N: How the microbial energy economy couples elemental cycles in diverse ecosystems. *Frontiers in Ecology and the Environment*, 9, 44-52.
5. **Yang WH**, Teh YA, Silver WL (2011) A test of a field-based ^{15}N-nitrous oxide pool dilution technique to measure gross N_2O production in soil. *Global Change Biology*, 17, 3577-3588.
6. **Yang WH**, Herman DJ, Liptzin D, Silver WL (2012) A new approach for removing iron interference from soil nitrate analysis. *Soil Biology and Biochemistry*, 46, 123-128.
7. **Yang WH**, Silver WL (2012) Application of the N_2/Ar technique to measuring soil-atmosphere N_2 fluxes. *Rapid Communications in Mass Spectrometry*, 26, 1-11.
8. **Yang WH**, Weber KA, Silver WL (2012) Nitrogen loss from soil through anaerobic ammonium oxidation coupled to iron reduction. *Nature Geoscience*, 5, 538-541.
9. **Yang WH**, Teh YA, Silver WL (2013) Measuring gross N_2O production in soil: a reply to Welland Butterbach-Bahl. *Global Change Biology*, 19, 985-987.
10. **Yang WH**, McDowell AC, Brooks PD, Silver WL (2014) New high precision approach for measuring ^{15}N-N_2 gas fluxes from terrestrial ecosystems. *Soil Biology and Biochemistry*, 69, 234-241.
11. **Yang WH**, Traut BH, Silver WL (2015) Microbially mediated nitrogen retention and loss in a salt marsh soil. *Ecosphere*, 6, http://dx.doi.org/10.1890/ES14-00179.1.
12. **Yang WH**, Liptzin D (2015) High potential for iron reduction in upland soils. *Ecology*, **96**, 2015-2020.
13. **Yang WH**, Silver WL (2016) Gross nitrous oxide production drives net nitrous oxide fluxes across a salt marsh landscape. *Global Change Biology*, 22, 2228-2237.
14. **Yang WH,** Silver WL (2016) Net soil-atmosphere fluxes mask gross production and consumption of nitrous oxide and methane in a managed ecosystem. *Biogeosciences,* 13, 1705-1715.
15. **Yang WH**, Ryals RA, Cusack DF, Silver WL (2017) Cross-biome assessment of gross soil nitrogen cycling in California ecosystems. *Soil Biology & Biochemistry*, 107, 144-155.
16. **Yang WH**, McNicol G, Teh YA, Wood TE, Silver WL (2017) Revising the classical conceptual model of peatland methane dynamics. *Global Biogeochemical Cycles*, **31,** 1435–1453. [selected

by editors to be featured in *Eos* Research Spotlight, which highlights exciting new research from American Geophysical Union (AGU) journals]

17. †† Wolz WJ, DeLucia EH, Branham BE, ^ Eddy WC, Keeley K, Revord RS, Wander MM, **Yang WH**, Lovell ST (2018) Production agroforestry: a transformative solution for temperate agriculture. *Global Change Biology,* Article GCB13986.
18. ¥ Edwards J, Pittelkow C, Kent A, **Yang WH** (2018) Dynamic biochar effects on soil nitrous oxide emissions and underlying microbial processes during the maize growing season. *Soil Biology & Biochemistry*, 122, 81-90.
19. † Krichels AH, DeLucia EH, Sanford R, Chee-Sanford J, **Yang WH** (2019) Historical soil drainage mediates the response of soil greenhouse gas emissions to intense precipitation events. *Biogeochemistry*, 142, 425-442.
20. ¥ Suriyavirun N, † Krichels AH, Kent AD, **Yang WH** (2019) Microtopographic differences in soil properties and microbial community composition at the field scale. *Soil Biology & Biochemistry*, 131, 71-80.
21. ¥ Portier EF, Silver WL, **Yang WH** (2019) Effects of an invasive perennial forb on gross soil nitrogen cycling and nitrous oxide fluxes depend on phenology. *Ecology*, 100, e02716.
22. ¥ Cannon J, Sanford R, Connor L, **Yang WH**, Chee-Sanford J (2019) Optimization of PCR primers to detect phylogenetically diverse *nrfA* genes associated with nitrite ammonification. *Journal of Microbiological Methods*, 160, 49-59.
23. ¥ Cannon J, Sanford R, Connor L, **Yang WH**, Chee-Sanford J (2019) Sequence alignments and validation of PCR primers used to detect phylogenetically diverse *nrfA* genes associated with dissimilatory nitrate reduction to ammonium (DNRA). *Data in Brief*, 25, Article 104016.
24. † Krichels AH and **Yang WH** (2019) Dynamic controls on field-scale soil nitrous oxide hot spots and hot moments across a microtopographic gradient. *Journal of Geophysical Research-Biogeosciences*, 124, 3618-3634.
25. Shan J, Chen S, Chee-Sanford JC, **Yang WH**, Sanford RA, Chen J, Yan X (2019) Impact of triclosan and triclocarban on denitrification and N_2O emissions in paddy soil. *Science of the Total Environment,* 695, Article 133782.
26. Brewer T, Aronson EL, Arogyaswamy K, Billings SA, Botthoff JK, Campbell AN, Dove NC, Fairbanks D, Gallery RE, Hart SC, Kaye JP, King GM, Lohse KA, Maltz MR, Mayorga E, † O'Neill C, Owens SM, Packman AI, Pett-Ridge J, Plante AF, Richter DD, Silver WL, **Yang WH**, Fierer N (2019) Ecological and genomic attributes of novel bacterial taxa that thrive in subsurface soil horizons. *mBio*, 10, e01318-19.
27. Hanisch PE, Drager K, **Yang WH**, Tubaro P, Suarez AV (2019) Intra- and inter-specific variation in trophic ecology of "predatory" ants in the subfamily Ponerinae. *Ecological Entomology,* 45, 444-455.
28. Orellana LH, Hatt JK, Chourey K, Hettich RL, **Yang WH**, Chee-Sanford JC, Sanford RA, Loffler FE, and Konstantinidis KT (2019) Comparing DNA, RNA and protein levels for measuring microbial dynamics in soil microcosms amended with nitrogen fertilizer. *Scientific Reports*, 9, 17630.
29. † Krichels AH, ¥ Sipic E, **Yang WH** (2019) Iron redox reactions can drive microtopographic variation in upland soil carbon dioxide and nitrous oxide emissions. *Soil Systems, 3,* 60
30. Heath KD, Podowski JC, Heniff S, Klinger CR, Burke PV, Weese DJ, **Yang WH**, Lau JA (2020) Light availability and rhizobium variation interactively mediate the outcomes of legume-rhizobium symbiosis. *American Journal of Botany*, 107, 229-238.
31. Almaraz M, Wong M, **Yang WH** (2020) Looking back to look ahead: A vision for soil denitrification research. *Ecology,* 101, Article e02917.
32. Chee-Sanford JC, Connor L, † Krichels A, **Yang WH**, Sanford RA (2020) Hierarchical detection of diverse Clade II (atypical) *nosZ* genes using new primer sets for classical- and multiplex PCR array applications. *Journal of Microbiological Methods*, 172, Article 105908.
33. ^ von Haden AC, **Yang WH**, DeLucia EH (2020) Soils' dirty little secret: Depth-based comparisons can be inadequate for quantifying changes in soil organic carbon and other mineral soil properties. *Global Change Biology, 26, 3759-3770.*

34. †† Paul RF, Cai Y, Peng B, **Yang WH**, Guan K, DeLucia EH (2020) Spatiotemporal derivation of intermittent ponding in a maize-soybean landscape from Planet Labs CubeSat images. *Remote Sensing*, 12, Article 1942.
35. Zeri M, **Yang WH**, Cunha-Zeri G, Gibson C, Bernacchi C (2020) Nitrous oxide fluxes over establishing biofuel crops: characterization of temporal variability using cross-wavelet analysis. *Global Change Biology-Bioenergy*, 12, 756-770.
36. Moore CE, Berardi D, Betes-Blanc E, DeLucia EH, Dracup EC, † Egenriether S, Gomez-Casanovas N, Hartman M, Hudiburg T, Kantola I, Masters M, Parton W, Van Allen R, ^ von Haden A, **Yang WH**, Bernacchi CJ (2020) The carbon and nitrogen cycle impacts of reverting perennial switchgrass to an annual maize crop rotation. *Global Change Biology-Bioenergy,* 12, 941-954.
37. Dove NC, Arogyaswamy K, Billings SA, Bothoff JK, Carey CJ, Cisco C, DeForest JL, Fairbanks D, Fierer N, Kaye JP, Lohse KA, Maltz MR, Mayora E, Pett-Ridge J, **Yang WH**, Hart SC, Aronson EL (2020) Continental-scale patterns of extracellular enzyme activity in the subsoil: an overlooked reservoir of microbial activity. *Environmental Research Letters*, 15, 1040a1.
38. Moore CE, ^ von Haden AC, ^ Burnham MB, Kantola I, Gibson CD, Blakely BJ, Dracup EC, Masters MD, **Yang WH**, DeLucia EH, Bernacchi CJ (2020) Ecosystem-scale biogeochemical fluxes from three bioenergy crop candidates: how energy sorghum compares to maize and miscanthus. *Global Change Biology-Bioenergy*, 13, 445-458.
39. Yadav P, Antony-Babu S, Hayes E , Healy OM , Pan D , **Yang WH**, Silver WL, Anderson CL, Voshall A, Fernando SC , Moriyama EN, Herr JR , Weber KA (2021) Complete high-quality genome of *Geobacter* sp. strain FeAm09, a moderately acidophilic soil bacterium. *Microbiology Resource Announcements,* 10, e00979-20.
40. McNicol G, Yu Z, Berry C, Emery N, Soper FM, **Yang WH** (2021) Tracing plant-environment interactions from organismal to planetary scales using stable isotopes. A mini review. *Emerging Topics in Life Sciences,* Article ETLS20200277.
41. Shan J, Sanford RA, Chee-Sanford J, † Ooi S, Löffler FE, Konstantinidis KT, **Yang WH** (2021) Beyond denitrification: the role of microbial diversity in controlling nitrous oxide reduction and soil nitrous oxide emissions. *Global Change Biology,* 27, 2669-2683.
42. † Seyfried GS, Dalling JW, **Yang WH** (2021) Effects of mycorrhizal type on leaf litter decomposition depend on litter quality and environmental context. *Biogeochemistry,* 155, 21-38.
43. ^ von Haden AC, ^ Burnham MB, **Yang WH**, DeLucia EH (2021) Comparative establishment and yield of bioenergy sorghum and maize following pre-emergence waterlogging. *Agronomy Journal,* 113, 5602–5611.
44. † Seyfried GS, Canham CD, Dalling JW, **Yang WH** (2021) The effects of tree-mycorrhizal type on soil organic matter properties from neighborhood to watershed scales. *Soil Biology & Biochemistry*, 161, Article 108385.
45. York L, Trusiak A, Cumming J, Bonito G, * von Haden A, Kalluri U, Tiemann L, Andeer P, Blanc-Betes E, Diab J, Favela A, Germon A, Gomez-Casanovas N, † Hyde C, Kent A, Ko DK, Lamb A, Missaoui A, Northen T, Pu Y, Ragauskas A, Raglin S, Scheller H, Ware A, Washington L, **Yang W** (2022) Bioenergy Belowground: challenges and opportunities for phenotyping roots and the microbiome for sustainable bioenergy crop production. *The Plant Phenome Journal*, 5, e20028.
46. ^ Burnham M, Simon S, Lee DK, Kent A, DeLucia E, **Yang WH** (2022) Intra- and inter-annual variability of nitrification in the rhizosphere of field-grown bioenergy sorghum. *Global Change Biology Bioenergy,* 14, 393-410.
47. † Edwards J, **Yang WH**, Yannarell A (2022) Soil microbial communities are not altered by garlic mustard in recently invaded central Illinois forests. *Ecosphere,* 13:e3967.
48. ^ Eddy WC and **Yang WH** (2022) Improvements in soil health and soil carbon sequestration by an agroforestry for food production system. *Agriculture, Ecosystems, and Environment,* 333, 107945.
49. † Egenriether S, Sanford R, **Yang WH**, Kent AD (2022) Nitrogen cycling microbial diversity and operational taxonomic unit clustering: when to prioritize accuracy over speed. *Frontiers in Microbiology*, 13, 730340.

50. Li Z, Guan K, Zhou W, Peng B, Jin Z, Tang J, Grant RF, Nafziger E, Margenot AJ, Gentry LE, DeLucia EH, **Yang WH**, Cai Y, Qin Z, Archontoulis S, Fernández FG, Yu Z, Lee DK, Yang Y (2022) Assessing the impacts of pre-growing-season weather conditions on soil nitrogen dynamics and crop productivity in the U.S. Midwest. *Field Crops Research*, 284, 108563.
51. Hartman M, ^ Burnham M, Parton W, Finzi A, DeLucia EH, **Yang WH** (2022) In silico evaluation of plant nitrification suppression effects on agroecosystem nitrogen loss. *Ecosphere*, 13, e4292.
52. † Seyfried G, Corrales Osorio A, Kent A, Dalling J, **Yang WH** (2022) Watershed-scale variation in potential fungal community contributions to ectomycorrhizal biogeochemical syndromes. *Ecosystems*, https://doi.org/10.1007/s10021-022-00788-z
53. Lau J, Hammond MD, Schmidt JE, Weese DJ, **Yang WH**, Heath KD (2022) Contemporary evolution rivals the effects of rhizobium presence on community and ecosystem properties in experimental mesocosms. *Oecologia*, https://doi.org/10.1007/s00442-022-05253-1
54. † Edwards JD, Cook AM, Yannarell AC, **Yang WH** (2022) Accelerated gross nitrogen cycling following garlic mustard invasion is linked with abiotic and biotic changes to soils. *Frontiers in Forests and Global Change,* 5, 1050542, https://doi.org/10.3389/ffgc.2022.1050542.
55. Blanc-Betes E, Gomez-Casanovas N, **Yang WH**, Chandrasoma J, Clark T, Kent A, Pett-Ridge J, Rabinowitz J, Raglin S, Schwender J, Shen Y, Van Allen R, ^ von Haden A. Accelerating the development of a sustainable bioenergy portfolio through stable isotopes. Accepted, *Global Change Biology-Bioenergy*
56. † Seyfried G, Midgley M, Phillips R, **Yang WH**. Refining the role of nitrogen mineralization in mycorrhizal nutrient syndromes. *Biogeochemistry,* https://doi.org/10.1007/s10533-023-01038-7
57. Guan K, Jin Z, Peng B, Tang J, DeLucia E, West P, Jiang C, Wang S, Kim T, Zhou W, Griffis T, Liu L, **Yang WH**, Qin Z, Yang Q, Margenot A, ^ Stuchiner ER, Kumar V, Bernacchi C, Coppess J, Novick KA, Gerber J, Jahn M, Khanna M, Lee DK, Chen Z, Yang SJ. A scalable framework for quantifying field-level agricultural carbon outcomes. *Earth-Science Reviews,* 104462

BOOKS EDITED

Wymore A, **Yang WH**, Silver WL, Chorover J, McDowell WH., eds. (2022) Biogeochemistry of the Critical Zone (Springer International Publishing, Switzerland)

CHAPTERS IN BOOKS

1. **Yang WH**, Hall SJ, McNicol G (2021) Chapter 20: Global Gases. In: *Principles and Applications of Soil Microbiology.* (Eds.: Gentry T, Furhmann JJ, Zuberer DA) New York, Elsevier.
2. Wymore A, **Yang WH**, Silver WL, McDowell WH, Chorover J. (2022) Introduction to Biogeochemistry of the Critical Zone. In: *Biogeochemistry of the Critical Zone* (Eds.: Wymore A, Yang WH, Silver WL, Chorover J, McDowell WH) Springer International Publishing, Switzerland.

DIVERSITY, EQUITY, AND INCLUSION SERVICE

- **iBio: Introduction to Research in Integrative Biology**. Career success in the natural sciences requires not only skills in the laboratory or the field but also an understanding of how to navigate different potential career paths. In 2018, I developed this 10-week summer program that complements summer independent research experiences for undergraduates with professional development workshops and a research symposium so that students can learn how to explore their career options, prepare to competitively apply for their dream jobs, and practice the written and oral skills needed for any job. I run this program annually (with the exception of 2020 due to COVID-19) for a total of 79 students, most of whom come from under-represented groups in STEM who may otherwise have less access to informal mentorship that often provides this training.

- **Research Internship in Sustainable Bioenergy (RISE)**. In 2021, I co-founded this 10-week summer undergraduate research internship funded through the Center for Advanced Bioenergy and Bioproducts Innovation (CABBI). This program targets first generation college students and students from historically marginalized groups in STEM to provide access to independent

research experience and professional development as a means to help develop a more diverse STEM workforce. Removing financial barriers is critical to making participation in science an option for people from all socioeconomic statuses, so RISE offers generous stipends and covers housing and travel expenses so that students can more freely choose these programs over other summer jobs. This program has thus far benefited 16 students and will run annually for the duration of CABBI funding by DOE, at least through 2027.