
Department of Geography and Environmental Sustainability
Assistant Professor of Geography and Environmental Sustainability Search Committee
Sarkeys Energy Center Ste. 510
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February 14, 2024

Dear Committee Chair Purcell and Hiring Committee:

I am writing to apply for the position of Assistant Professor of Geography and Environmental Sustainability at the University of Oklahoma. I am currently performing collaborative, transdisciplinary research with several groups in the School of Meteorology and the College of Engineering at OU. I would be delighted to bring my research experience, mentoring focus, collaborative communicativeness, and commitments to core DEI values to mesh with DGES' three research clusters and commitment to "navigating global change and forging sustainable futures."

My goal is to establish a transdisciplinary research group focusing on grand challenges and wicked problems to ask "how should we act and why should we care?", which is an area of research I think would fit well within the departmental interests of DGES. In the process, I plan to establish a self-sustaining, inclusive research group which communicates findings in scholarly venues and encourages student achievement. As with many projects designed to consider systems as a whole, my efforts are not confined to a single niche. Instead, I approach the following Research Themes which cross disciplines:

RT1 Environmental justice, sustainability, and energy transitions modeled as Wicked Problems;

RT2 Heterogeneity and boundary problems in spatially dispersed 4D networks;

RT3 Methods for transdisciplinary engagement on sustainability attainment issues.

My research experience hails from many sources beyond the traditional path. In addition to my refereed publications (6 in journals, 7 at conferences), obtained research funding (\$150,000+ to date, \$600,000+ under review), I have produced 1 funded entrepreneurial startup (**FF4**), I have privately consulted for 3 companies, I have produced research output for corporate partners (3 technical reports, 6 presentations), and I am currently in talks to license my PhD project to a company monitoring capped wells (**FF8**). I would like to transition from the non-traditional path to an academic one, focusing more on traditional publications. I am motivated to find a professorial research home to act upon and create new avenues to bridge divides between observation and social action on policy issues. I would be especially eager to develop these areas of inquiry at DGES since energy policy drives so much in Oklahoma, my lifelong home. My prior technical training provides the depth in knowledge that I now apply in the breadth of my current endeavors to study entire systems. I developed my technical skills during my PhD from Oklahoma State University where I completed my dissertation research entitled *Development and Applications of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane* including work on greenhouse gas sensor evaluation (**AJ6**) and networking devices for 2D spatial coverage (**AJ4**). This experience allowed my perspectives to grow by performing work within a complex system that sharpened *my understanding of what we sense* through the importance in *how and where it is sensed*. I co-founded the XGEM Big Idea Challenge 1.0 project at OU (**PG1**) to create grassroots research efforts that includes both technical and social sciences at project inception. With XGEM, I guided our research to create high-level, meaningful change—most recently achieving national influence on the Biden administration's GHG monitoring policy. My research observing the world is topic agnostic: my postdoctoral work traded GHG analytes for birds when I developed the LunAero moon tracking robot to monitor nocturnal avian migration (**AJ4**) using unique methods of computer vision to count bird silhouettes across the moon (**AJ3**) which acts as a citizen-science compatible (**FF3**) complement to radar aeroecology (**AJ2**) at the OU Biological Survey. However, each of these analytes are relevant to ongoing sustainability issues.

My teaching and mentoring seeks to impart a similar holistic outlook to my students and mentees by

challenging them to answer big-picture questions in bite-sized parts, then asking them to contextualize what they discovered as experiential learning. To date, I have mentored **18 students**. I leverage my technical breadth to match students with projects based on each individual student's needs, yet each project is contextualized as a piece of my research vision. I adapt my instruction and presentation style to the audience and engage using techniques developed in classical theater training. I implement my current Q&A style for invited classes like **METR 2613** and dialog-style seminars (**PS1**). When instructing 1000 level chemistry courses as a graduate teaching assistant (**info**), my students consistently positively reviewed my instruction style as it prepared each them to think about the material and discover greater understanding of the material's meaning. I have developed custom curricula for the L^AT_EX typesetting language, with scaffolding techniques to ensure that students in portions of the course build upon previous material (**info** and links to materials (1), (2), (3)). All of these skills will prepare mentees and pupils to become engaged, critically thinking citizens who can make policy impacts in a changing world.

My outreach is focused on research outreach, connecting otherwise disparate disciplines across colleges, institutions, and groups far removed from academia to collaborate on truly transdisciplinary projects that are driven by the necessity to address grand challenges. I believe action on issues must acknowledge the binary contradiction: social justice without science and engineering techniques is disarmed; technical solutions without social context is meaningless. In my efforts on major, transdisciplinary projects like XGEM, I learned to achieve convergence through communication and committees by providing tools to social researchers from Philosophy and meaning to the STEM researchers from Engineering, empowering both to succeed by translating the field-specific language of each group. Researching topics related to energy transitions and climate justice in Oklahoma would seemingly put me at odds with industry, however I navigate relationships between academics and industry (**FF1**) and the community (**AG2**) through empathetic understanding of stakeholder drivers, a boon when considering potential outreach to Native American Tribal partners. Academic research alone is insufficient to create change in the world, so I have learned to use tools like environmental entrepreneurship (**FF4**) to address invasive species management and Open Hardware publication of transformative research tools (**AJ5**) to improve technology access. By forming collaborations with researchers, I would be a productive team member on many projects in areas of interest to DGES including heavy metal contamination of wastewater (**AC6**), UAS infrastructure (**PG3**), and public health (**FF5**).

My commitment to equity is rooted in empathy, especially for those with a differential access and experience of power than myself, so I seek to be an advocate and organizer of change rather than a leader. I recognize that achievement of equality must be supported by a person power willing to act equitably but it must be attained by the seeker. I have a record of **training students** from an abundance of backgrounds and experiences. I acknowledge this in my role as a mentor by providing students with the new experiences they need to fill gaps and attain equity with more privileged peers. Likewise, I acknowledge existing inequities in my research by creating new ways to think about wicked problems as Cyber-Physical-Social Systems to incorporate stakeholder inclusion strategies with existing design paradigms (**AC1**). In doing so, we can create new possibilities to address the inequities built into the system, all while acknowledging our own biases. My transdisciplinary communication on convergent efforts like the XGEM Big Idea Challenge, mentioned above, seeks to subvert the traditional order of "hard" and "soft" research to bring both to the table as partners.

This application packet contains this cover letter, my curriculum vitae, and list of references. If you are interested in a traditional packet complete with research, teaching, and DEI statements, I have saved a copy on my website which you may access **through this hyperlink** in the original PDF. Please feel free to contact me at **hone9226@gmail.com** or via my cell number: +1(918)214-2519 with any questions. I would love to speak with you further regarding this position. Thank you for taking the time to review my application packet.

Sincerely,

Wesley T. Honeycutt

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Curriculum Vitae

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BlueNalgene

Career Objectives

Obtain a research faculty role with intent to establish a transdisciplinary group studying holistic applications of sensing as a system for sustainability. Specific objectives include:

- Establish a self-sustaining, inclusive research group supported by federal funding through merits of its scholarly achievement.
- Communicate research through open-source products by way of scholarly publication in open journals, presentations, and public data repositories.
- Encourage collaborative achievement in both transdisciplinary application of sensing strategies and convergent research across partnerships.

Education

Oklahoma State University

Ph.D., Chemistry

Nicholas F. Materer Research Group

Stillwater, OK

2012–2017

Dissertation: *Development and Applications of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane* (LINK)

University of Oklahoma

B.Sc., Chemistry

Robert L. White Research Group

Norman, OK

2006–2011

Thesis: *Methods of Environmental Tobacco Determination by Gas Chromatography* (LINK)

Synthesis of Research Themes (RT)

When approaching grand challenges: How should we act and why should we care?

By treating challenges as systems which may be constrained, we obviate the need to solve them by focusing efforts on producing a range of actionable, achievable policy options.

These research themes are addressed throughout this packet. Click the **RED** hyperlinks for more info.

RT1 : Environmental justice, sustainability, and energy transitions modeled as Wicked Problems. Including:

- Constraining Wicked Problems (**AC1, PS1, FF7**)
- Addressing systems of energy use and sustainability (**PS4, PG1, PG5, FF2**)

RT2 : Heterogeneity and boundary problems in spatially dispersed 4D networks. This means:

- Considering networks for sensing across spatial domains (**AJ4, AJ6 AC3, PG2–PG5, PG8, PP1**)
- Projecting remote sensing across mapped domains (**AJ1, AJ3, AJ5, AC2, AC3, PG2**)
- Treating dimensionality as a boundary problem (**AJ2, AC5, AS3, PG3**)

RT3 : Methods for transdisciplinary engagement on sustainability attainment issues. This entails:

- Novel methods to engage transdisciplinary topics (**FF3, AG1, AG2, PG9**)
 - Transdisciplinary bridging, as in the case of aeroecology (**AJ1–AJ3, AJ5, AC4**)
 - Partnering with industry for social action (**AJ4, AC6, AC7, AS4–AS6, PP1–PP3, FF1, FF8**)
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Peer-Reviewed Publications

Journal Articles.....

AJ1 : Eli S Bridge, **Wesley T Honeycutt**, Angela J. Chen, Riley Miller, and Jeffrey F Kelly. Social Behavior Among Nocturnally Migrating Birds Revealed by Automated Moonwatching. page ukad055, 2024. ISSN 0004-8038. doi: 10.1093/ornithology/ukad055 ([LINK](#))

AJ2 : **Wesley T Honeycutt** and Eli S Bridge. Use of the LunAero Open-Source Hardware Platform to Enhance the Accuracy and Precision of Traditional Nocturnal Migration Bird Counts. page icac053, 2022. ISSN 1540-7063. doi: 10.1093/icb/icac053 ([LINK](#))

AJ3 : **Wesley T. Honeycutt** and Eli S. Bridge. UnCanny: Exploiting reversed edge detection as a basis for object tracking in video. 7(5), 2021. ISSN 2313-433X. doi: 10.3390/jimaging7050077 ([LINK](#))

AJ4 : **Wesley T. Honeycutt**, Taehwan Kim, M. Tyler Ley, and Nicholas F. Materer. Sensor array for wireless remote monitoring of carbon dioxide and methane near carbon sequestration and oil recovery sites. 11(12): 6972–6984, 2021. ISSN 2046-2069. doi: 10.1039/D0RA08593F ([LINK](#))

AJ5 : **Wesley T. Honeycutt**, Alyse V. Heaston, Jeffrey F. Kelly, and Eli S. Bridge. LunAero: Automated “Smart” Hardware for Recording Video of Nocturnal Migration. 7:e00106, 2020. ISSN 2468-0672. doi: 10.1016/j.ohx.2020.e00106 ([LINK](#))

AJ6 : **Wesley T. Honeycutt**, M. Tyler Ley, and Nicholas F. Materer. Precision and Limits of Detection for Selected Commercially Available, Low-Cost Carbon Dioxide and Methane Gas Sensors. 19(14), 2019. ISSN 1424-8220. doi: 10.3390/s19143157 ([LINK](#))

Conference Papers.....

AC1 : Mayank Bhalerao, **Wesley T. Honeycutt**, Ashok Das, Janet K. Allen, and Farrokh Mistree. Framing Wicked Problems Through Evidentiary and Interpretive Analysis. American Society of Mechanical Engineers, 2023. In *ASME 2023 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference*

AC2 : Elizabeth Spicer, Sean Crowell, Feng Xu, Nalini Krishnakutty, Xiao-Ming Hu, Nicole Jacobs, **Wesley T. Honeycutt**, Timothy Miller, Andrew Shearer, Vishnu Kadiyala, Elizabeth N. Smith, Conner J. Flynn, Elizabeth Pillar-Little, Petra Klein, Lucas Livingstone, James H. Flynn, Maria Eugenia Velasco Moreira, Tyler Bell, Evan Keeler, Jenni Kyrouac, and Brian Enmold. Urban and Industrial Carbon-Based Pollutant Monitoring Using EM27/SUNs in Houston, Texas During the Summer 2022 GeoCarb-TRACER Campaign: A Focus on Validation. 2023. In *American Meteorology Society 103rd Annual Meeting*

AC3 : **Wesley T. Honeycutt**. Instrumentation and Monitoring of Rural-Urban Gradients for Carbon Dioxide and Methane for Atmospheric Model Integration and Assimilation; Preliminary Results. 2022. In *American Chemical Society 65th Pentasectional*

AC4 : **Wesley T. Honeycutt** and Eli S. Bridge. Low-cost Open-source Hardware Development for Nocturnal Migration Quantification by ‘Moonwatching’. 2022. In *Society for Integrative & Comparative Biology: Open Source Solutions in Experimental Design*

AC5 : Jamey Jacob, Taylor Mitchell, **Wesley T. Honeycutt**, Nicholas F. Materer, and Peter Clark. Monitoring of Carbon Dioxide and Methane Plumes from Combined Ground-Airborne Sensors. In *Convection and Buoyancy Driven Flows: Environmental*, volume 61 of *Series 20*. APS, 2016. In *69th Annual Meeting of the APS Division of Fluid Dynamics*

AC6 : **Wesley T. Honeycutt**, Hayden Hamby, Allen Apblett, and Nicholas F. Materer. Uptake kinetics of heavy metals from water using a high surface area supported inorganic metal oxide. In *Abstracts of Papers, 247th ACS National Meeting & Exposition, Dallas, TX, United States, March 16-20, 2014*, pages ENVR–272. American Chemical Society, 2014

AC7 : **Wesley T. Honeycutt**, Evgueni B. Kadossov, Allen W. Apblett, and Nicholas F. Materer. Selectivity and kinetic behavior of heavy metal and radionuclides on supported ion-exchange adsorbant. In *Abstracts of Papers, 249th ACS National Meeting & Exposition, Denver, CO, United States, March 22-26, 2015*, pages I+EC–44. American Chemical Society, 2015

General Audience

Popular Press Coverage.....

AG1 : Rebecca Heismann. *Flight Paths: How a Passionate and Quirky Group of Pioneering Scientists Solved the Mystery of Bird Migration a Book by Rebecca Heisman*. HarperCollins, 2023. ISBN 978-0-06-316114-6 ([LINK](#))

AG2 : Charlotte Hu. Using moon shadows to track the transit of birds. 2022 ([LINK](#))

Experience

DOE FECM iM4—University of Oklahoma

Research Associate

Norman, OK

2023–

Conducting research to identify gaps in current practice and theory of methane sensing networks through systematic gap-mapping review, technological comparisons, and organizing field work to evaluate devices on the DOE Fossil Energy and Carbon Management Innovative Methane Measurement, Monitoring, and Mitigation Technologies (iM4) program.

GeoCarb—University of Oklahoma

Senior Research Associate

Norman, OK

2021–2023

Development of custom portable terrestrial column measurement for satellite validation including field campaigns, student mentoring, and personal interface with stakeholder groups and individuals.

X-GEM Project—University of Oklahoma

Research Associate

Norman, OK

2021–2022

Transdisciplinary (electrical engineering, systems engineering, architecture, and social sciences) postdoctoral research on greenhouse gases as well as co-PI leadership responsibilities related to 2021 Big Idea Challenge 1.0 Grant at OU.

Oklahoma Biological Survey—University of Oklahoma

Postdoctoral Research Associate

Norman, OK

2017–2020

Postdoctoral work coordinating part of the OU Aeroecology University Strategic Initiative at OU-OBS. Developed robotics, sensors, and computer vision technology for ecological applications, using Python, C, C++, and CAD.

BNH Technologies LLC.

Owner

Stillwater, OK

2016–

Started company to act as a face of my consulting and technology development projects. Fulfilled multiple consulting contracts through this entrepreneurial venture including gas detector design, 3D modeling of injection molded parts, and Bluetooth refrigerator electronics layout.

Department of Chemistry—Oklahoma State University

Research Assistant

Stillwater, OK

2013–2017

Worked as a research assistant to Prof. Nicholas F. Materer. Primary research was development of a network sensor array for CO₂ and CH₄ monitoring near injection wells. Secondary projects included uranium uptake kinetics on metal oxide sorbents, health implication of aerosols in electronic cigarettes, and peroxide explosives detection.

XploSafe LLC.

Contract Scientist

Stillwater, OK

2013–2013

Subcontract work testing novel sorbent materials.

Department of Chemistry—Oklahoma State University

Teaching Assistant

Stillwater, OK

2012–2013

Taught lab sections of CHEM 1414 “Chemistry for Engineers” and teaching assistance for labs and lectures of CHEM 1314 “Chemistry for Non-Majors” for two semesters each. Received exceptional reviews from students above the departmental average.

Bartlesville Public Schools

Substitute Teacher

Bartlesville, OK

2012–2012

Substitute teacher for Chemistry, Biology, Theater, Speech, and At-Risk classes between previous contract work, ending and starting graduate studies.

Chevron Phillips Chemical Co.

Lab Technician

Bartlesville, OK

2011–2012

Worked in Rheology and Additive Characterization labs in relation to the production of polyethylene and other specialty polymers.

Instruction

Teaching & Curriculum

METR 2613 — Meteorology Instrumentation: Invited as a guest lecturer to OU’s METR 2613 during yearly “demonstration days” to expand the students’ understanding and contextualization of sensor networks by comparison with Oklahoma Mesonet stations ([LINK](#)).

L^AT_EX Workshops: Developed Carpentries-style workshop curriculum for introductory L^AT_EX skills for OU Libraries. Workshop is requested by departments (including math and geography) as well as campus wide research events (RezBaz) through OU Libraries. Asked to instruct the workshop at least once per semester since 2019 ([LINK](#)) ([LINK](#)).

L^AT_EX Intro: Developed a short presentation for OU Libraries to introduce L^AT_EX to students in under an hour. Taught on an as-needed basis since 2018 ([LINK](#)).

TikZ Intro: Developed a short presentation for OU Libraries to introduce TikZ to students in under an hour. Taught since 2020 roughly once per two years ([LINK](#)).

Graduate TA: Taught multiple lab sections including Freshman Chemistry for Non-Majors and Chemistry for Engineers.

CHEM 1314 Chemistry I

CHEM 1414 General Chemistry for Engineers

CHEM 5260 Foundations of Inorganic Chemistry

Substitute: Performed substitute teaching duties at Bartlesville High School in 2012

Chemistry Chemistry I/Honors Chemistry I

Biology Biology I/Honors Biology I

Drama Drama I-IV/Stagecraft

Mentoring

I have acted in a mentoring capacity for extended periods to the following number of students to date:

	Master’s thesis committee member (1)	
Mayank J. Bhalerao	Industrial and Systems Engineering	2022–
	Graduate student mentor; non-committee role (2)	
Elizabeth Spicer	Meteorology	2021–
Meelyn M. Pandit	Biology	2018–2021
	Undergraduate student mentor (14)	
Jet B. Flener	Electrical and Computer Engineering	2024–
Noah A. Schneiderman	Meteorology	2024–
Kathryn Joyce	Aerospace and Mechanical Engineering	2024–
Timi O. Oduleye	Aerospace and Mechanical Engineering	2024–
Daniel T. Hayden	Meteorology	2023–2023
Zainab Sajid	Biochemistry	2023–
Joey Paul Eli Haynes	Computer Science; Southern New Hampshire University	2023–
Harshit Gupta	Mechanical Engineering; Delhi Technological University	2022–
Andrea G. Reyes-Vega	Chemical Engineering	2023–2023
Rachael M. Auth	Meteorology	2022–2023
Lucas J. Livingstone	Petroleum Engineering	2022–2023
Zachary Fruits	Meteorology	2022–2022
Israel T. Lugo	Biology	2018–2020
Alyse V. Heaston	Biology	2018–2019
	High school student mentor (1)	
Ariyana Chadha	Leland High School; San Jose, CA	2023–

Student Products: Posters, Reports, Etc.

The following are non-peer reviewed research products (posters, non-conference presentations, reports for stakeholders, etc.) primarily attributed to students I have mentored:

AS1 : Rachael Auth, Zachary Fruits, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Official Report for Flogistix, 2023

AS2 : Rachael Auth, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Methane Heatmap Distribution Modeling and Visualizations. 2023. In *Flogistix OCAST Internship Presentation*

AS3 : Lucas J. Livingstone, **Wesley T. Honeycutt**, and Elizabeth Spicer. Detecting Fugitive Emissions at Well Sites Using EM27/SUN Data. 2023. In *Society of Petroleum Engineers*

AS4 : Zachary Fruits, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Methane Heatmap Distribution Modeling and Visualizations. 2022. In *Flogistix OCAST Internship Presentation*

AS5 : Zachary Fruits, **Wesley T. Honeycutt**, and Xiao-Ming Hu. Official Report for Flogistix, 2022

AS6 : Lucas J. Livingstone, Lee A. Fithian, and **Wesley T. Honeycutt**. Study of CO2 Behavior in Simulated Urban Canyons. 2022. In *FYRE Research Program Poster Celebration*

AS7 : Alyse V. Heaston, **Wesley T. Honeycutt**, and Eli S. Bridge. Honors Thesis Defense. 2019. In *Biology Undergraduate Thesis Defense*

Presentations

Invited, Plenary, and Seminar Talks.....

PS1 : Constraining Wicked Problems: Oklahoma’s Entangled Energy, Pollution, and Ecological Challenges
(Invited) Seminar given to the SRL@OU “Conversations” Series Jan. 26th, 2024

PS2 : City Planning Systems for Pollution in Urban Canyons ([LINK](#))
(Invited) Seminar given to the SRL@OU “Conversations” Series Sept. 2nd, 2022

PS3 : Low-cost Open-source Hardware Development for Nocturnal Migration Quantification by ‘Moon-watching’ ([LINK](#))
(Invited) Society for Integrative and Comparative Biology 2022 Phoenix, AZ SICB-wide symposium: Open Source Solutions in Experimental Design Jan. 7th, 2022

(Invited) Society for Integrative and Comparative Biology Online Asynchronous Sessions (SICB+) Jan. 3rd–7th, 2022

PS4 : On Sustainability as a Cyber-Physical-Social System ([LINK](#))
(Invited) Seminar given to the SRL@OU “Conversations” Series Sept. 17th, 2021

PS5 : Development and Application of Chemical Sensors for the Detection of Atmospheric Carbon Dioxide and Methane ([LINK](#))
(Seminar) Public Dissertation Defense Apr. 17th, 2017

PS6 : The Degradation Products and Particle Aggregation Properties of Electronic Cigarette Vapor
(Seminar) Proposal Defense/Ph.D. Candidacy Exam Jun. 17th 2014

PS7 : Fractal Aggregate Formation of Aerosols ([LINK](#))
(Seminar) Graduate Student Seminar Mar. 11th 2014

General Talks.....

PG1 : X-GEM: Enhancing Community Sustainability via Greenhouse gas Emission Monitoring: 2021–2023 Big Idea Wrap-Up Meeting
OU Vice President for Research and Partnerships Big Idea Challenge 1.0 Wrap-Up Event Aug. 31st, 2023

PG2 : Instrumentation and Monitoring of Rural-Urban Gradients of Carbon Dioxide and Methane for Atmospheric Model Integration and Assimilation; Preliminary Results ([LINK](#))
ACS 65th Annual Pentasectional Oct. 8th, 2022

PG3 : Drones, Trucks, and Grids: Development of a 4D Terrestrial Sensor Network for Data Assimilation ([LINK](#))
NASA GeoCarb Science Team Meeting terrestrial equipment update May 11th, 2022

PG4 : OU Coding Outreach for Data Education (CODE) Workshop Professional Career Mixer

Offered perspective on non-traditional academic experiences to coding workshop geared towards underrepresented groups.
CODE Workshop 2023 Aug. 4th, 2023
CODE Workshop 2022 Aug. 12th, 2022
CODE Workshop 2021 Aug. 6th, 2021

PG5 : X-GEM: Enhancing Community Sustainability via Greenhouse gas Emission Monitoring
OU Vice President for Research and Partnerships Big Idea Challenge Quarterly Follow-Up Workshop Dec. 7th, 2021

PG6 : EnLink Midstream and XGEM
Presentation given to executives of EnLink Midstream for partnership discussions Feb. 2021

PG7 : OU Biologging Practicum (practical skills discussion workshop/class)
Informal presentation of LunAero design and technical aspects encountered during volunteer phase. Nov. 17th, 2017

PG8 : Discussion of Carbon Dioxide and Methane Concentration Spikes from an Airfield near Stillwater, OK and a Carbon Sequestration Site near Farnsworth, TX ([LINK](#))
ACS 62nd Annual Pentasectional Mar. 25th, 2017

PG9 : Redcedar Products Business Plan Presentation
Baylor 6th Annual New Venture Competition Feb. 25th, 2017
I2E Love's Cup Competition Feb. 17th, 2017

PG10 : Selectivity and Kinetic Behavior of Heavy Metal and Radionuclides on Supported Ion-Exchange Adsorbant ([LINK](#))
ACS 60th Annual Pentasectional Apr. 11th, 2015
ACS 249th Meeting-Uranium in Seawater Mar. 23rd, 2015

PG11 : Uptake Kinetics of Heavy Metals from Water Using a High Surface Area Supported Inorganic Metal Oxide ([LINK](#))
ACS 59th Annual Pentasectional Apr. 12th, 2014

PG12 : Processing Aid Efficiency Evaluation
Chevron Phillips Chemical Co. Nov. 2011

Posters.....

PP1 : Development of a Networked Sensor Array for Gas Microseepage Detection Near Injection Well Sites ([LINK](#))
ACS 61st Annual Pentasectional Apr. 9th, 2016
OSU Chemistry Open House Feb. 20th, 2016
OSU 27th Annual Research Week Feb. 16th, 2016

PP2 : Selectivity and Kinetic Behavior of Heavy Metal and Radionuclides on Supported Ion-Exchange Adsorbant ([LINK](#))
ACS 249th Meeting-SciMix Mar. 23rd, 2015

PP3 : Uptake Kinetics of Heavy Metals from Water Using a High Surface Area Supported Inorganic Metal Oxide ([LINK](#))
ACS 247th Meeting-Environmental Section Mar. 19th, 2014
ACS 247th Meeting-SciMix Mar. 17th, 2014

PP4 : Methods of Environmental Tobacco Determination by Gas Chromatography
University of Oklahoma Chemistry Senior Thesis Presentations May 2011

Accolades.....

Awards.....

Library Partner Award—University of Oklahoma Libraries (for L^AT_EX curriculum) 2019
1st Place: Greater OKC Chamber Healthcare Award—I2E Innovation to Enterprise Mar. 23rd, 2017

1st Place: Baylor Power of Business Award—Baylor New Venture Competition Feb. 25th, 2017
 Honorable Mention: Baylor New Venture Competition Feb. 25th, 2017
 Fellowship: Creativity, Innovation, Entrepreneurship Scholar—Oklahoma State University Aug. 30th, 2016
 1st Place: ACS 61st Annual Pentasectional—American Chemical Society Apr. 9th, 2016
 2nd Place: OSU 27th Annual Research Week—Phi Lambda Upsilon Feb. 16th, 2016

Professional and Honorary Affiliations.....

American Chemical Society Member
 Phi Lambda Upsilon Chemistry Honor Society Member & Officer
 Chemistry Graduate Student Society Member & Officer
 Boy Scouts of America Eagle Scout Rank

Funding (PI or Co-PI only)

FF1 : 2021 — (Co-PI) *Engineering Internships to Develop Regional-Scale Gas Modeling Added Value Product for Flogistix' Vapor Recovery Services*. **OCAST Intern Partnership IP21.2-016; \$32,500 for 2 yrs.**
FF2 : 2021 — (Co-PI) *X-GEM: Enhancing Future Community Sustainability via Greenhouse Gas Emission Monitoring*. **OU Big Idea Challenge: \$75,000/yr.**
FF3 : 2018 — (PI) *LunAero Crowdfunding*. **OU Thousands Strong; \$2,000**
FF4 : 2017 — (PI) *Redcedar Products* - Business Proposal. **direct funding raised: \$10,500 + \$75,000 cost sharing**
FF5 : 2014 — (Co-PI) *The Degradation Products and Particle Aggregation Properties of Electronic Cigarette Vapor* - Approved for funding but below the pay line. **OCAST Health HR14-025; \$135,000**

Proposals Currently Under Review

FF6 : (PI) *Continuous Resolution UAS Soundings for Calibration and Validation of Terrestrial and Spaceborne Remote Sensors* **NASA ROSES A.39; \$298,524** for 3 yrs.
FF7 : (Co-PI) *EAGER: Integrated Policy Design for Public and Private Interests* - Awaiting approval from Program Manager to submit. **NSF EAGER (ENG CMMI/OE); \$300,000** for 2 yrs.
FF8 : (Co-PI) *Methane Sensor Grids for Capped Orphan Well Monitoring* - Private industry collaboration/contract. **Rebellion Energy Solutions; \$50,000 for 2 mos.**

Service and Leadership Roles

Reviewer: EPA Proposals 2023–
Reviewer: MDPI Journals (~1 article/month) 2021–2023
Reviewer: NASA Proposals 2019–
Panelist: What to Expect After Graduate School — NSF Research Traineeship 2017
President: Phi Lambda Upsilon Chemistry Honor Society 2016-2017
President: OSU Chemistry Graduate Students Society 2016-2017
Treasurer: Phi Lambda Upsilon Chemistry Honor Society 2014-2016
Production Assistant: ACS 59th Annual Pentasectional 2014

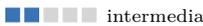
Technical License

ARRL: Amateur Radio License-Technician *Granted 1999*
 FCC Registration No: 0018507079 — KD5HBR
FAA: Remote Pilot/Small Unmanned Aircraft System License *Granted 2022*
 License No: 4638964

Skills Matrix

Projects linked in numbered examples are not exhaustive but reflect what is shareable.

	Level	Skill	Comment (Link to Project)
Language		Arduino-C	<i>Multiple projects based on this platform. (1),(2),(3)</i>
		Bash	<i>Exclusively uses Linux kernels since ca. 2015.</i>
		C	<i>For cases when Arduino is not enough. (1)</i>
		C++	<i>For high-speed and multi-core processing. (1)</i>
		CRBASIC	<i>Specialty variant of BASIC for Cambell Scientific loggers.</i>
		DOS	
		FORTRAN	
		L ^A T _E X	<i>Used for this document, papers, and OSU's dissertation template (1),(2),(3),(4)</i>
		Python	<i>Preferred scripting language. Used in many projects for data processing. (1),(2)</i>
		Processing	<i>A scripting language to create animated graphics.</i>
		R	<i>(1)</i>
CAD		EagleCAD	
		FreeCAD	<i>Preferred 3D GUI CAD program.</i>
		Fusion360	<i>(1),(2),(3)</i>
		KiCAD	<i>Preferred electronics CAD program. (1),(2)</i>
		LibreCAD	<i>Preferred 2D CAD program. (1),(2),(3)</i>
		OpenSCAD	<i>Preferred programmatic 3D CAD program. (1),(2)</i>

 basic knowledge	 extensive project experience
 intermediate knowledge with some project experience	 deepened expert knowledge
	 expert / specialist

References

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RESEARCH STATEMENT

A Holistic Approach to Actionable Digital Information for Sustainable & Just Energy Transitions

RS-1 Overarching Research Goals

With the long-term goal of establishing a self-sustaining, inclusive, transdisciplinary research group to holistically address problems related to sustainable energy transitions, I will leverage my prior experience to pursue topics which ask fundamental research questions. I believe that this is possible by addressing certain Research Themes:

RT1 Environmental justice, sustainability, and energy transitions modeled as Wicked Problems;

RT2 Heterogeneity and boundary problems in spatially dispersed 4D networks;

RT3 Methods for transdisciplinary engagement on sustainability attainment issues.

In my previous research working with a transdisciplinary approach to applied projects, I have demonstrated my commitment to core values and effort being grounded in theoretical bedrock. Now I am ready to build upon this foundation, focusing on more traditional scholarly products, to create new knowledge at the system level to address “big picture” issues by addressing parts of the system networked together as a whole. As I mentioned at the VPRP Big Idea Challenge 1.0 Wrap-Up Event (**PG1**), learning the language of other disciplines allows me to be transdisciplinary glue, able to help others achieve their climate justice, energy transition, and environmental sustainability research goals. I seek to apply my translational capability projects while working to create the high-level connectivity that enables greater knowledge creation.

RS-2 RT1–Environmental Justice, Sustainability, and Energy Transitions Modeled as Wicked Problems

A Wicked Problem is a challenge which arises from multiple, nested stakeholders with conflicting needs and views complicated by many origins. These Wicked Problems are inherently insoluble as they are irreducibly complex, present no options for optimization, have impermanent solutions, and each fix is irreversible. Rather than attempting to find a panacea for environmental justice, sustainability, and energy transitions, these problems may be constrained to reduce the complexity as much as possible to provide stakeholders with options to address, even if we are unable to truly solve, the contextualized problem.

When we constrain a Wicked Problem related to environmental justice, sustainability, or energy transitions, we must think spatially to consider the scale and scope of the problem. For example, energy extraction sites in Oklahoma vary greatly with the transitional phase of the industry. In Oklahoma history, early oil booms extracted from the Cherokee shale in Osage county, much like current wind farms populate the central flyway and panhandle. Today, the legacy of this early production exists as orphan wells in Osage county, and at least one damaged windfarm was abandoned in Guymon recently. While efforts to fix these symptoms are underway, the Wicked Problem which drives energy extraction abandonment remains.

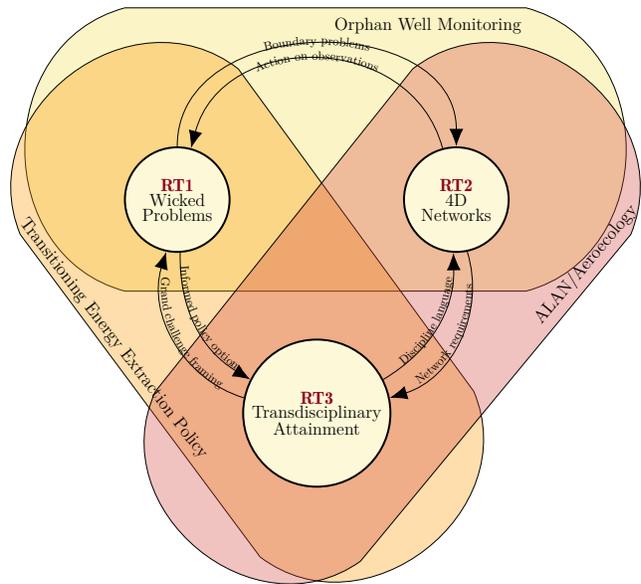


Figure 1: This image conceptually represents connectivity between research themes using example problems of 1) Orphan Well Monitoring, 2) Transitioning Energy Extraction Policy, and 3) ALAN/Aeroecology. Each separate research theme influences its neighbor, as represented by arrows,. For Orphan Well Monitoring: *boundary problem* is a Wicked Problem which incorporates multiple stakeholder influences at a site, while detecting pollution emission necessitates *action on observations* which leads to new Wicked Problems.

Using modeling techniques which assess the drivers of actions across major stakeholder groups *e.g.*, government, industry, and community, we can constrain the system with a framework describing conditions which create similar sites. Assessing the geographic drivers such as access to parts suppliers, production conditions in the region, *etc.*, we can model the system to predict and mitigate risk by proposing policy options to stakeholders.

RS-2.1 Current Partners for RT1

Prof. Janet K. Allen and Prof. Farrokh Mistree This is an early-phase project to model airborne pollution in formerly redlined districts of OKC as a Wicked Problem to propose policy alternatives to the Association of Central Oklahoma Governance. Funding for this project is currently under review (**FF7**) and has yielded a paper (**AC1**) and several opportunities for public outreach (**PS2** and **PS4**).

RS-2.2 Potential Future Partners for RT1

Prof. Lauren E. Mullenbach I would be very interested in partnering with Prof. Mullenbach to study topics of interest to her like urban gentrification, attempting to create models which predict and provide policy alternatives to mitigate future areas of concern.

Prof. Renee McPherson Given her interest on topics related to climate adaptation strategies for Tribal Nations, I believe there exists a potential partnership to assess and constrain the drivers of adaptation urgency or hesitancy in Tribes with differing lands and access to resources.

Prof. Petra Klein During GeoCarb's DOE TRACER campaign to measure atmospheric total-column concentrations of greenhouse gases, I observed intersection of climate justice with industrial zoning challenges in Houston, TX, which I explored in seminars (**PS1**, **PS2**). I would like to partner with her lab to treat the Houston observation as a Wicked Problem to query the relationship between mixed-use zoning and atmospheric pollution exposure.

RS-2.3 Funding Options for RT1

Treating policy problems as Wicked Problems and applying theory from engineering design is a novel approach such that it makes it difficult to obtain traditional funding. Instead, I will first target seed funding for this research theme such as the **NSF EAGER** program, internal programs at OU such as the **VPRP Big Idea Challenge**, and **NGO partnerships**. Similarly, small grants through directorates such as the **NSF Cyber Physical Systems** group will be targeted. As the program gains traction, I will begin to seek funding from agencies interested in the basic research such as **NSF Engineering Design and Systems Engineering** and groups interested in implementation such as the **Robert Wood Johnson Foundation: Evidence For Action** grant or similar (foundation grants are subject to frequent change).

RS-3 RT2–Heterogeneity and Boundary Problems in Spatially Dispersed 4D Networks

There exists a multifaceted gap in measuring time-series information from 3D domains using network sensing architecture. While analytes move in and out of 2D layer from above and below, no models completely capture the system in a manner which reduces complexity. In the case of airborne analytes like greenhouse gases, particulate matter, and birds, the analytes gain lift as influenced by meteorology, which is well represented by flux measurements. However, observing the system flux is a reaction to phenomenon rather than a predictive model. By predicting flux above and below the traditional 2D mapping domain, we can design observational networks that accurately capture the system flux from large areas with minimal observational nodes. More simply, how many sensors will it take to measure 100 km² of land emitting pollution or supports migratory species?

These boundary problems are complicated by the diverse sensing system technologies. For example, if a researcher wishes to monitor emissions from a region, they may use a combination of terrestrial *in situ* sensors, terrestrial remote sensors, and satellite remote sensors. Each of these devices has a unique theory of operation for spatial representation: an *in situ* sensor observes a different segment of space than a remote sensor. While great care is taken to homogenize areal observations between satellites or between terrestrial networks and atmospheric models, heterogeneity tends to increase as measurements cross domains. A 4D understanding of sensor observations and a general model for sensed regions would greatly reduce the heterogeneity of domain-confined sensors.

RS-3.1 Current Partners for RT2

Prof. Binbin Weng and Prof. David Ebert I am currently working on Prof. Ebert’s DOE iM4 grant which stems from our Prof. Weng’s VPRP Big Idea Challenge grant (**FF2**). During this effort, we have identified a potential gap in networked sensing guidance for gas monitoring which does not account for 3D plume ascension when applying 2D sensor networks.

Prof. Nicholas F. Materer—Oklahoma State University My PhD advisor and I are currently commercializing my PhD project for monitoring orphan wells (**FF8**), and the effectiveness of this tool could provide entrepreneurial experience for students working on **RT2**.

RS-3.2 Potential Future Partners for **RT2**

Prof. Chenghao Wang While I am currently working with Prof. Wang on other projects, I would like to grow this partnership with **RT2**. There exists a fantastic opportunity to pair his Urban Layer Canopy Model with sensed observations to rectify the 4D sensing challenge.

Prof. Timothy Filley Prof. Filley has expressed interest in performing research to detect and remediate orphan wells in Oklahoma. As I am currently preparing my technology to assess the effectiveness of remediation efforts, there exists a natural potential to develop synergistic strategies.

Prof. Rebecca Loraamm There exists a potential to pair time-series ecology expertise of Prof. Loraamm with my own interest in monitoring networks for aeroecology, including other researchers I have worked with previously: Prof. Jeffrey F. Kelly and Prof. Eli S. Bridge. I would like to pursue a partnership with her to determine sensing network density for nocturnal aeroecology required to appropriately assess the scale and scope of migratory species behavior.

Prof. David Allen—University of Texas One of the few studies to be done on plume network architecture arose from Prof. Allen’s research as discussed in his recent seminar for the DISC Methane Emissions Lecture Series. However, his focus was on probability of detection for a dense system in 2D. I would like to extend an offer to partner on a project to introduce flux tower observations to his prior work to address the gap in **RT2**.

RS-3.3 Funding Options for **RT2**

Much of the work described in relation to **RT2** has direct climate assessment impact. This means projects associated with it may immediately target broad agency announcements such as those in **DOE Fossil Energy and Carbon Management** and **unsolicited EPA applications** to directly address gaps in their promulgated methods for methane monitoring. Additionally, large scale projects may be applicable to congressional spending bills spearheaded by **Lewis-Burke Associates** as contracted by the VPRP.

RS-4 **RT3**—Methods for Transdisciplinary Engagement on Sustainability Attainment Issues

As a transdisciplinary researcher, my work depends heavily on forming strong partnerships with colleagues. My broad experience allows me to work as the transdisciplinary glue which ties technical and social fields together. Research institutions often tout crossing disciplines to produce stronger results but offer few methods to instruct or advise others on how to create and foster these transdisciplinary projects. I would like to investigate high-level representations of transdisciplinary groups within particular projects and expound upon the general tools used to attain success in that project to create a new methodology of collaboration. Specifically, I would like to investigate the barriers in communication between disparate research silos as learned languages which could be superseded by a new ontology, which can be modeled to increase the likelihood of project cohesion. This high-level research would be conducted across many smaller projects.

RS-4.1 Potential Future Partners for **RT3**

Prof. Laurel C. Smith Attention to important sustainability topics like persistent environmental contamination from abandoned wells spiked as attention was drawn to the Osage headrights murders in Killers of the Flower Moon. I note an opportunity to synergistically address problems by timing research thrusts with other large investments. To act upon this in a predictive fashion, I would like to study environmental action in response to cultural touchstones with a long-term goal of approaching attainment on issues Prof. Smith has worked like Tar Creek.

Prof. Diana Denham I was intrigued by Prof. Denham’s work on interdisciplinary teaching capacity for graduate students, and I am generally interested in her work discerning dilemmas from a post-colonial

perspective. I would be interested in pursuing a more general treatment of her approach to interdisciplinary praxis which extends beyond sustainability contexts while still maintaining those values.

Prof. Jeffrey F. Kelly While I have worked with Prof. Kelly in the past (see **AJ5** and **AJ1**), I would like to look into generalizable methods to guide transdisciplinary project management and participation. My current work includes engineering design theory research related to a topic of interest for Prof. Kelly, Artificial Lights At Night (ALAN), and I would like to engage with him on that topic more directly as a venue for research on convergence strategies.

RS-4.2 Funding Options for RT3

While mechanisms like the **NSF National Research Traineeship** exist and have been secured by researchers like Prof. Kelly, securing funding for a new ontology of collaboration is too ambitious for a new faculty member. Instead, I would seek project-specific funding which builds the research portfolio as a first step. For example, ALAN projects have previously received awards from the **NSF Integrative Organismal Systems** and the **NSF Social and Economic Sciences**. However, considering the intensification of interest in ALAN projects, I expect new mechanisms to open up in this vein. Discussions with program managers at **NSF Civil, Mechanical, and Manufacturing Innovation** lead me to believe that they are interested in applications of engineering tools for policy challenges like ALAN (see **FF7**). Research on the transdisciplinary methods used to make these cross-cutting projects a success should first be determined through project-specific funding mechanisms as an added-value research product.

RS-5 What I Offer My Students

Opportunities to Publish High-Quality Journal Articles I plan to offer my research projects (**RT1–RT3**) to my graduate students as the directors of their own future so they learn how to create knowledge. Taking the role of guide, I will break projects into digestible portions *e.g.*, individual experiments, literature reviews, *etc.*, providing technical expertise, real-world experience, and resources to achieve their goals. I take greater pride in a student’s publication with leading authorship than my own, and I want to reward my students with recognition of their achievements.

Collaborate and Network All of my projects arose from or require significant collaboration and networking, so I will offer my students a seat at the table during collaborative efforts. Whether they go into industry, government, or academia, my students will be prepared to partner with others to achieve greater goals.

Articulate Ideas I will offer my unique experience in theater as a tool to train students on how to effectively articulate their ideas, research methods, and results to any audience. Through dialog and elevator pitches, detailed in **Research Statement**, I will prepare my students to influence their community through action by communicating their expertise.

Create Their Own Path Each of the research themes listed above represents a starting direction to take my research group, and I will engage with future students to establish research paths which meet with their needs. I tailor projects to individual students, and I will help each identify what they believe will grow their experiences.

RS-5.1 What I Offer Stakeholders

I believe that equitable solutions to grand challenges paradoxically must involve equal inclusion across industry, government, and community.

Industries—I have partnered with multiple oil & gas industry companies through studies on GHG emissions. By understanding the drivers of industry action, I can offer continued support which produces value through sustainable action.

Communities—For two years, I have been developing a relationship with the Cheyenne-Arapaho Nation’s Tribal EPA to establish a dialog through sharing technical resources and learning about some of the projects the Tribe is considering. My goal is to form strong working relationships with Tribes built on respect, reciprocity, and transparency.

Government—The DOE Atmospheric Radiation and Measurement Southern Great Plains (SGP) site represents government interest in the environment and energy in OK, and studies centered here act as clearinghouse for policy decisions with the environment. Additionally, I have worked with the Oklahoma governance councils on policy assessment. Through this combination, I want to provide the government with the best information to make just and informed decisions.

TEACHING STATEMENT

TS-1 Teaching Experience

To me, working with students is the most rewarding part of the academic profession. I want to imbue my students and mentees with the same values and challenges I learned from my mentors, guiding them with an empathetic style which tailors to individual student needs.

TS-1.1 Mentoring Experience

To date, I have mentored 18 students (details in **Mentoring**). While some were associated with a paid research position, the vast majority mentored on a voluntary basis without ties to a funded projects through programs like OU's First Year Research Engagement for students in the Honors College. I have committed a large amount of time to *pro bono* mentoring and developing mentorship resources, as I personally believe that student growth and achievement through experiential learning on problem-based projects is the academic pinnacle of social benefit. While many students are advised as in-person experiences, a growing number (8) were remotely mentored including Harshit Gupta (Delhi Technological University), Joey Paul Eli Haynes (Southern New Hampshire University), and Ariyana Chadha (Leland High School), mediated by modern collaborative tools like Zoom.

TS-1.2 Teaching Experience

I have taught a broad spectrum of university courses, including guest lectures for **METR 2613** Meteorology Instrumentation, **CHEM 1314** Chemistry I, **CHEM 1414** General Chemistry for Engineers, and **CHEM 5260** Foundations of Inorganic Chemistry. I have instructed in-person, hybrid, and online-only courses. My teaching experiences range across both academic disciplines and scholar experience levels. Stylistically, I adapt my instruction to the audience based on previous theatrical training. While performance of instruction varies wildly across segments—freshman laboratory courses in person require a different approach than online programming workshops targeted to graduate students—my core teaching values remain constant.

TS-1.3 Curriculum Development Experience

I have developed new curriculum for technology-assisted, active-learning workshop courses including **Introduction to L^AT_EX**, **L^AT_EX Workshops**, and **Introduction to TikZ**, scaffolded in that order to introduce students to progressively challenging topics. These Software Carpentries-style courses are offered through the OU Libraries on a yearly basis for the primary L^AT_EX code-along workshop or as-needed for the introductory sessions. All course materials are open source, and instructors outside the OU system have reported their use at other institutions. My efforts developing this new curriculum were acknowledged by OU with the Library Partner Award in 2019.

TS-2 Purposeful Teaching and Mentoring

Many sources stress the importance of training The Next Generation of Scholars, but fewer of those sources articulate what that education should look like. For students venturing into a world with increasing pressure to perpetually innovate, AI tools hanging like a Sword of Damocles over traditionally stable careers, and a globalized economy in which to compete, we must instruct students in a way which prepares the student to stand out as an irreplaceable, thinking member of their field. I believe that means the following for education:

TS-2.1 Teaching Must Prepare

If the instructor has a responsibility to prepare students, then the postgraduate education system is a service industry. The instructor must perform their duties with empathy to the desires of the pupil and guide the student on a path to achieve those goals. Some students may prioritize career results, some may desire understanding of the world, and still others might arrive at the university completely lost and in search of growth. The latter applies to my own freshman experience. This presents a complicated challenge since students may fail to articulate their needs, let society speak for them, or change priorities as they mature. The instructor must, acting as a guide, carefully select what constitutes preparation for both the student body and the individual mentees they lead, even in the face of large undergraduate classes, conflicting priorities, and the focus on research during mentorship engagement.

Students Teaching Students It is now commonly accepted that students learn better by teaching, as evidenced by constructivist techniques in lab courses, peer-review of essay assignments in writing courses, rubber-duck debugging in the computer sciences, *etc.* From personal experience, I remember far more from lessons I taught to others than I do from lessons taught to me. So, **I encourage students to become teachers from the first lesson.** I ask my students to instruct classmates on it, a practice which lends itself to team-building on a project, presentation experience, and deeper understanding of the topic.

Students Should Become As Equals The university environment should be treated as a stepwise path which prepares the student for, among other practical skills, the equality afforded a colleague. When mentoring, I start with the assumption that **my student is my equal because that is what I am training the student to become:** a student must rise to their excellence. Only one in a place of power can “step down” to equality, thereby subverting traditional hierarchies to invite the student to take initiative on projects, professionally disagree with your assessments, and assume ownership of their future. Abdication of traditional power to meet the student enables equity for students starting from different circumstances (discussed further in DEI-3). I inherited this approach from my PhD advisor who allowed me to pursue an independent project for my candidacy exam based on an academic disagreement, this idea eventually turned into a proposal accepted by OCAST (**FF5**). A mentee grows to independence as the metric for their maturity, and I believe that we must posture as mentors for that outcome from the start.

TS-2.2 Mentoring Should Push Beyond a Single Problem

Higher education should offer means for students to reach beyond the problem, and the university system offers this through mentoring. As students advance, professors should inquire of them: why they are learning and learn why what they learned occurs. While instructing with industry standard tools, an instructor should focus on teaching students the meaning of techniques agnostic to current paradigms. Thus arises the remedy to rote techniques, salient as AI tools gain foothold, through experiential and generative learning.

Experiential Learning: Reflection on Doing I believe that “why?” matters more than “how?,” and I strive to impart that to my students. Environmental Sustainability courses are emergent and their options are more flexible than many other programs, creating an opportunity to unlearn old standbys. Students should both understand why they are learning and learn why what they learned occurs. It is our job as educators to give the curriculum meaning. A student should not learn the rote fact that *heat flows from warm to cold, resisted by insulation reported in R-value* and be satisfied; a student should instead want to learn that *changes in flow from warm to cold should be controlled by the one expending energy—often mediated through increased R-value*. I strive to achieve this by establishing a **progressive dialog of questioning** which asks each student to: **1)** answer a simple question **2)** explain the context of that answer **3)** explain how that knowledge is generalized.

Generative Learning: Transitioning Unconscious-Conscious Connections Walking students through the process of attentive, experiential learning should extend beyond the classroom. My goal for such an experience is that each student learns more about the subject at hand and ingrains that pattern for new problems. I recognize that not all students want to learn like this, so my process takes a subtle approach. By establishing the progressive dialog, my goal is to **elicit the unconscious understanding and bring it to light**. I can only lead the student toward understanding by challenging the way they currently generalize patterns.

TS-2.3 Students Must Learn to Articulate

I firmly believe that communicating ideas to any audience is equally important as performing research. The most influential experiences in my life never came from the lab but instead arise from my theater background. Anchoring my method to achieve student articulation there, I have recently codified in my instruction as a dedicated slide deck titled “Greek Tragedy and the Art of the Narrative” which explores scholarly oration through the lens of Aristotle’s *Poetics* and the comedies of Aristophanes.

Articulation as Outreach One of the potent memories which has stuck in my head for years is the clear memory of a certain poster presentation (**PP1**) at the ACS Pentasectional meeting: A family was touring the posters in which their child was presenting. I hooked them in to come look at my poster (that carnival barker routine gets a lot of use) and the mother demurred, saying she was not a scientist and would never understand it. I invited her over and adjusted my poster discussion to use language more accessible to a lay audience. In her thanking me for my clear explanation, I gained a greater reward than the formal

award I received for the poster. Regardless of academic level, **I want my students to articulate eloquently and accessibly**—thorough enough to win awards but empathetic enough to explain to anyone.

Articulation as Growth I learned how to implement this well with my first undergraduate student at the Oklahoma Biological Survey who was a bright but quiet senior. I required her to deliver an elevator pitch on her own research each week and gave feedback to iteratively improve. At the end of the semester I asked her to shadow me at a departmental gathering and afterwards told she me about how confident she felt when explaining her research and answering questions while socializing with professors and scientists in the department as an emerging equal. Use of the **elevator pitch to iteratively improve articulation** allows students practice to a safe and friendly audience.

TS-3 Courses at University of Oklahoma

TS-3.1 Existing Courses I am Capable of Teaching

I am qualified and willing to teach courses offered through OU's GEOG Environmental Sustainability program requested for applicants to this position:

GEOG 3233 Principles of Sustainability,
GEOG 4523 Life Cycle Analysis, and
GEOG 4583/GEOG 5583 Energy Systems and Sustainability.

Additionally, I am qualified and willing to teach other courses offered by the department including:

GEOG 1203 Global Environmental Issues,
GEOG 3443 Environment and Society,
GEOG 4343/GEOG 5343 Climate, History, and Society,
GEOG 4953 Capstone, and
GEOG 5433 Sustainability: Theory and Practice.

TS-3.2 New Courses I Would Like to Create

I would like to introduce one or more courses beyond what is already offered by the department:

Fundamentals of Environmental Monitoring This would be a graduate-level course dedicated to teaching sensing systems and practices for *in situ* sample collection. Modeled after METR 2613 Meteorology Instrumentation, students learn about commercially-available technology, discuss siting challenges, and learn basics of spatial data assimilation with a final project to assemble a sensor station (at a very simple technical level) and monitor data from a real-world situation.

Green Transitions This discussion course for upper-level undergraduates would explore “green” alternatives to processes and the challenges of implementing them. Beyond energy transitions, students would come out of the course understanding how changes to processes *e.g.*, switching to green industrial solvents, fly ash additives to concrete, etc., would impact the social, economic, and ecological realms.

Sustainable Entrepreneurship This practical course for upper-level undergraduates ideally would be partnered with the Price College of Business or the Center for the Creation of Economic Wealth to guide students to develop a sustainability business within Oklahoma. Guided by my experience as an entrepreneur during my graduate studies, students would learn both startup skills (business model canvas, acquiring capital, etc.) and Oklahoma industry priorities, ultimately entering their startup in one of the many regional business model competitions as a final project.

DIVERSITY, EQUITY, & INCLUSION STATEMENT

DEI-1 Perspective

As my research interests have taken me on journeys across traditional disciplinary boundaries, I have had the opportunity to collaborate with a wide breadth of individuals coming from numerous backgrounds, each with something to contribute, teaching me in the process. I've come to learn a little about how the diversity of experience improves the collective. Similarly, I learned how to bring others to equality through equity as I encountered more people with different experiences than me. I have been fortunate by the place where I started my journey, so I am obligated to provide tools to help others reach their own success all while ensuring that these tools for growth do not come from a place that shames. By both recognizing the diversity of culture, experience, background, etc. and enabling others to equitably achieve, we allow room for inclusion—the boon of sharing space to improve each other.

DEI-2 DEI in Research

I am especially cognizant of the challenges to research given my intent to work *with* Tribal Nations, historically marginalized neighborhoods, and other underrepresented groups of people. In growing the opportunities for partnerships with these groups, I recognize the reciprocal nature of mutual consent: I can advertise tools to them but they must request the partnerships. Many American subcultures have a justified suspicion of “white folks in white coats” who want to perform research *on* their people. I intend to grow my research efforts through mutual consent and commitment to equal and equitable engagement, as well as advancing and advocating for the needs and wants of the community.

Engagement of mutually consensual research practices can only survive on action, not words. At times, this may mean standing tall to greater powers than myself to support others. When I invite students to gather at my home for research, I speak forthrightly about expectations of a safe academic environment and act accordingly *e.g.*, by inviting students as groups. By speaking candidly about the power dynamics involved in research, my voice sets the tone for their future expectations. When power issues arise beyond my control, I assert my expectations to advocate for my students: I have acted as a mandatory reporter to the Institutional Equity Office on an issue which achieved policy change at the institutional level. While drastic, such reporting served to strengthen the bond with external research partners through mutual respect.

DEI-3 DEI in Teaching

We as instructors must recognize that our students are not ourselves. I avoid teaching “if I love it you can love it.” So too must instructors rid themselves of the notion that “if I learned it you should learn it.” Students will never have the same experience as an instructor who lived through a different time and place than them, thus we cannot assume students learned what we learned from such a vastly different set of experiences.

While I choose students without regard for race, gender, class, or other demographic, I recognize that students will have different experiences, requiring equitable treatment to achieve inclusion. Students are agents of potential rather than pre-existing skill sets. I remember one student who casually mentioned that her father taught all of her brothers how to solder without teaching her since soldering was “a guy thing.” She recounted this story as if it was a natural fact of the world, as if everyone might experience it. On the contrary, I learned to solder long ago and take the skill for granted. I instantly reconfigured my original mentoring plans for that day and we went to the electronics bench. In the remainder of our time that day, she learned to solder through-hole parts and learned advanced techniques to solder surface-mount parts which requires microscopic precision and care. To achieve equity for my students, I set aside my plans to specially instruct someone from differing experience. In that moment, I taught empowerment, not soldering; she *can* and *did* learn.