

# MCKENZIE M. BURNS

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## EDUCATION

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**University of Wisconsin—Madison, Madison, WI** **September 2020-Present**  
Ph.D. in Civil and Environmental Engineering (Expected 2025)  
Ph.D. Minor in Applied Bioelectrochemical Processes  
Research area: resource recovery from wastes via bioelectrochemical systems.

**Delta Certificate in Research, Teaching, and Learning** **May 2021-Present**  
Internship in evidenced-based teaching practices  
Capstone project: Impacts of a group Jigsaw activity on thoughts and attitudes towards chemistry in engineering undergraduates

**Bucknell University, Lewisburg, PA** **August 2016-May 2020**  
Bachelor of Science in Environmental Engineering, Magna Cum Laude  
Minor in French and Francophone Studies

**SKEMA Business School, Sofia Antipolis, France** **January-June 2019**  
Semester abroad through IES Abroad (Program: Nice; Business, Sustainability and Development).

## PROFESSIONAL EXPERIENCE

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**Graduate Research Assistant** **September 2020-Present**  
*Department of Civil and Environmental Engineering, UW-Madison*  
Doctoral candidate conducting research on resource recovery using electrochemical and membrane-based technologies.

**Lecturer** **January-May 2024**  
*Department of Civil and Environmental Engineering, UW-Platteville*  
Principle Instructor for ENV ENGR 3340, Introduction to Environmental Engineering

**Graduate Teaching Assistant** **September-December 2020, 2022**  
*Department of Civil and Environmental Engineering, UW-Madison*  
Primary TA for CEE 320, Introduction to Environmental Engineering

## RESEARCH EXPERIENCE

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**Ammonia Recovery from Organic Nitrogen in Dairy Manure via Microbial Fuel Cells** **November 2020-Present**  
*Department of Civil and Environmental Engineering, UW-Madison*  
*Advisor: Dr. Mohan Qin; Topic of Doctoral Dissertation*  
Operate a microbial fuel cell for ammonia recovery from the organic nitrogen fraction of synthetic and real dairy manures.

**Electrosorptive Treatment of Bioreactor Effluent**

**December 2022-Present**

*Department of Civil and Environmental Engineering, UW-Madison*

*Advisor: Dr. Mohan Qin, in collaboration with Dr. Daniel Noguera*

Design and operate an electrosorption cell for recovery of products from bioreactor effluent, including ammonium, lactic acid, and sodium.

**Analysis of Products from Hydrothermal Liquefaction**

**May 2017-May 2020**

*Department of Civil and Environmental Engineering, Bucknell University*

*Advisor: Dr. Deborah Sills; **Topic of Undergraduate Honors Thesis***

Analysis of the aqueous and oil products from the hydrothermal liquefaction (HTL) of organic wastes in an effort to elucidate HTL reaction pathways and optimize valuable product output.

**PUBLICATIONS AND PRESENTATIONS**

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**Publications**

Tang, H., **Burns, M.**, and Qin, M. (2024). "Effects of chloride transport on bioelectrochemical remediation of nitrate contaminated groundwater". *Chemical Engineering Journal*, *Under Review*.

**Burns, M.**, Tang, H., Larson, R. and Qin, M. (2024). "Bioelectrochemically-assisted ammonia recovery from dairy manure". *Water Research*, 252, <https://doi.org/10.1016/j.watres.2024.121243>

**Burns, M.** and Qin, M. (2023). "Ammonia recovery from organic nitrogen in synthetic dairy manure via a microbial fuel cell". *Chemosphere*, 325, <https://doi.org/10.1016/j.chemosphere.2023.138388>

Liu, Y., Li, Z., Zhang, Y. **Burns, M.**, and Zhao, N. (2022). "Extracellular electron transfer in electroactive anaerobic granular sludge mediated by the phenothiazine derivative". *Journal of Power Sources*, 527, <https://doi.org/10.1016/j.jpowsour.2022.231212>

Wang, K., Ma, Q., **Burns, M.**, Sudibyo, H., Sills, D., Goldfarb, J., and Tester, J. (2020). "Impact of Feed Injection and Batch Processing Methods in Hydrothermal Liquefaction". *The Journal of Supercritical Fluids*, 164, <https://doi.org/10.1016/j.supflu.2020.104887>

**Oral Presentations**

\* indicates presenter(s)

**Burns, M.\*** and Qin, M. (2024, April). "Mitigating water quality impacts of manure with bioelectrochemical systems for resource recovery". Poster Presentation, *Graduate Research Showcase, UW-Madison Day at the Capitol*, Madison, Wisconsin.

Beaudet, A.\*, Napierala, E.\*, and **Burns, M.** (2024, April). "Microbial fuel cell ammonia recovery for livestock manure". Poster Presentation, *UW-Madison Undergraduate Research Symposium*, Madison, Wisconsin

Gorr, O.\*, Rehn, V.\*, and **Burns, M.** (2024, April). "Electrosorption cell for lactate recovery". Poster Presentation, *UW-Madison Undergraduate Research Symposium*, Madison, Wisconsin

**Burns, M.\*** and Qin, M. (2023, August). "Mitigating water quality impacts of manure with bioelectrochemical systems for resource recovery". Oral Presentation, *Electrified Water Treatment Processes Symposium, Division of Environmental Chemistry, American Chemical Society Fall 2023 Meeting*, San Francisco, California.

**Burns, M.\*** and Qin, M. (2023, June). “Ammonia recovery from dairy manure in bioelectrochemical systems towards sustainable manure processing”. Poster Presentation, *American Association of Environmental Engineering and Science Professors Research and Education Conference*, Boston, Massachusetts.

Gulotta, V.\*, Hoetama, R.\*, Petitjean, A.\*, and **Burns, M.** (2023, April). “Microbial fuel cell nitrogen recovery under various conditions”. Poster Presentation, *UW-Madison Undergraduate Research Symposium*, Madison, Wisconsin.

**Burns, M.\*** and Qin, M. (2022, June). “Ammonia recovery from organic nitrogen in synthetic dairy manure via bioelectrochemical systems (BES)”. Poster Presentation, *American Association of Environmental Engineering and Science Professors Research and Education Conference*, St. Louis, Missouri.

**Burns, M.\*** (2021, September). “Integrating microbiology and electrochemistry for sustainable fertilizer production: A resource recovery approach to microbial fuel cells”. Oral Presentation, *Midwest Women in Science Conference*, held virtually. **Awarded Best Oral Presentation.**

**Burns, M.\*** and Sills, D. (2020, May). “Aqueous and Oil Products from Hydrothermal Liquefaction of Manure Digestate”. Undergraduate honors thesis defense, *Bucknell University*, Lewisburg, Pennsylvania.

**Burns, M.\*** and Sills, D. (2019, May). “Aqueous and oil products from hydrothermal liquefaction of manure digestate”. Poster Presentation, *American Association of Environmental Engineering and Science Professors Research and Education Conference*, Phoenix, Arizona.

**Burns, M.\*** and Sills, D. (2018, October). “Aqueous phase products from hydrothermal liquefaction of manure digestate”. Poster Presentation, *American Institute of Chemical Engineers National Conference*, Philadelphia, Pennsylvania. **Awarded Second Place in Undergraduate Poster Competition.**

**Burns, M.\*** and Sills, D. (2017, September). “Aqueous and oil phase products from hydrothermal liquefaction of waste biomasses”. Poster Presentation, *Naval Academy Science and Engineering Conference*, Annapolis, Maryland.

## TEACHING AND MENTORING EXPERIENCE

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### Lecturer, Environmental Engineering

January-May 2024

*Department of Civil and Environmental Engineering, UW-Platteville*

- Principle instructor for ENV ENGR 3340, Introduction to Environmental Engineering, a junior and senior level course of ~60 undergraduate students.
- Facilitate course content, including lecture and laboratory activities, around introductory concepts in environmental engineering, including water, air and soil chemistry; toxicity and risk; mass balance analysis; groundwater hydrology; water and wastewater treatment; surface water quality; solid and hazardous waste management; air pollution control.

**Teaching Assistant and Intern, Environmental Engineering**

**September-December  
2020, 2022**

*Department of Civil and Environmental Engineering, UW-Madison*

- Primary TA and teaching intern for CIV ENGR 320, Introduction to Environmental Engineering, a sophomore and junior level course of ~50-70 undergraduate students.
- Develop and implement a new course module on groundwater contamination and remediation technologies, including a 50-minute lecture, a group project with a peer-teaching and group problem solving component, and a summative exam question. *Completed as part of internship in evidenced-based teaching practices.*
- Facilitate 2-hour problem solving/discussion session once weekly.
- Support student learning via facilitation of office hours (weekly) and Q&A/review sessions (as needed).
- Develop written solutions and grading rubrics for problem sets, quizzes, and exams.
- Oversee grading of student problem sets, quizzes, and exams.
- Provide input, feedback, and support for the primary course instructor.

**Graduate Student Research Mentor**

**May 2022-Present**

*Department of Civil and Environmental Engineering, UW-Madison*

- Principle research mentor and advisor to undergraduate students conducting research on resource recovery using electrochemical and membrane-based technologies.

<i>Abigail Monahan</i>	<i>Skidmore College '23 B.S. Chemistry</i>	<i>Summer 2022</i>	<i>Freshwater@UW REU Program</i>
<i>Rachel Hoetama</i>	<i>UW-Madison '25 B.S. in Chemical and Biological Engineering</i>	<i>Fall 2022 - Spring 2023</i>	<i>Independent project for Intro Biology 152</i>
<i>Virginia Gulotta</i>	<i>UW-Madison '23 B.A. in Environmental Science</i>	<i>Fall 2022 - Spring 2023</i>	<i>Research for course credit</i>
<i>Ava Petitjean</i>	<i>UW-Madison '24 B.S. in Civil and Environmental Engineering</i>	<i>Spring 2023</i>	<i>Research for course credit</i>
<i>Lauren Cortright</i>	<i>UW-Madison '25 B.S. in Biology</i>	<i>Summer 2023</i>	<i>Research intern</i>
<i>Jiatong Tang</i>	<i>UW-Madison '24 B.S. in Environmental Engineering</i>	<i>Fall 2023</i>	<i>Research for course credit</i>
<i>Ethan Napierala</i>	<i>UW-Madison '25 B.S. in Environmental Engineering</i>	<i>Fall 2023 - Spring 2024</i>	<i>Research for course credit</i>
<i>Andrew Beaudet</i>	<i>UW-Madison '25 B.S. in Environmental Engineering</i>	<i>Summer 2023 - Present</i>	<i>Research intern</i>
<i>Katie Mangus</i>	<i>UW-Madison '25 B.S. in Chemistry</i>	<i>Summer 2023 - Present</i>	<i>Research for course credit</i>

<i>Valerie Rehn</i>	<i>UW-Madison '26 B.S. in Environmental Engineering</i>	<i>Fall 2023 - Present</i>	<i>Research for course credit</i>
<i>Olivia Gorr</i>	<i>UW-Madison '26 B.S. in Environmental Engineering</i>	<i>Fall 2023- Present</i>	<i>Research for course credit</i>
<i>David Xiong</i>	<i>UW-Oshkosh '26 B.S.</i>	<i>Summer 2024</i>	<i>Freshwater@UW REU Program</i>

**Teaching Assistant, Civil and Environmental Engineering August-May 2018**

*Department of Civil and Environmental Engineering, Bucknell University*

- Primary TA and grader for CEEG 340, Environmental Engineering, a sophomore and junior level course of ~40 undergraduate students.
- Primary TA and grader for ENGR 101, Engineering Graphics, a freshman level course of ~30 undergraduate students.
- Graded and provided educational feedback and commentary on class and laboratory assignment submissions.
- Worked with students on an as-requested basis to provide additional tutoring and academic support.
- Attended laboratory periods to provide additional support to faculty and students while teaching/completing assignments.
- Guided students through the engineering design process in relation to semester-long projects.

**HONORS AND AWARDS**

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**Student Research Grant Competition Conference Presentation Award August 2023**  
*Graduate School, UW-Madison*

**Becker Travel Supplement June 2022, 2023**  
*Department of Civil and Environmental Engineering, UW-Madison*

**Environmental Research and Education Foundation Scholarship August 2021-Present**  
*Environmental Research and Education Foundation (EREF)*

**Civil and Environmental Engineering Opportunity Award August 2020**  
*Department of Civil and Environmental Engineering, UW-Madison*

**The Michael D. LaGrega Award for Excellence in Environmental Engineering May 2020**  
*Bucknell University*

**Undergraduate Honors Thesis May 2020**  
*Bucknell University*  
“Analysis of aqueous and oil products from hydrothermal liquefaction of manure digestate.”

**Clare Boothe Luce Research Scholar May-August 2018, 2019**  
*Bucknell University*

**McKenna Environmental Internship May-August 2017**  
*Bucknell University*

## SERVICE AND INVOLVEMENT

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### **Steering Committee Member, Delta Program**

**January 2023-Present**

*[The Delta Program in Research, Teaching and Learning](#), UW-Madison*

- Advise the Delta community on specific issues during the academic year.
- Provide a graduate student's perspective and ideas on program changes towards improvement and new opportunities.
- Organization Mission: "The Delta Program in Research, Teaching and Learning promotes the development of a future national faculty in the natural and social sciences, engineering, and mathematics that is committed to implementing and advancing effective teaching practices for diverse student audiences."

### **Engineering Exposition**

**April 2024**

*College of Engineering, UW-Madison*

- Help organize tabling for multiple research groups to present engineering and chemistry topics to middle-grade children.

### **Panelist, Graduate School Winter Welcome Back**

**January 2024**

*Advocating for Students and Yourself: A Panel for TAs, the Graduate School at UW-Madison*

- Share experience, offer advice, and answer questions regarding challenges and opportunities presented by teaching as a graduate student.

### **Facilitator, Scholarship of Teaching and Learning Workshop**

**June 2023**

*American Association of Environmental Engineering and Science Professors Research and Education Conference, Boston, Massachusetts*

- Plan and implement an interactive workshop on the scholarship of teaching and learning.
- Facilitate discussions on potential teaching-as-research studies, with an emphasis on practices that improve inclusivity and promote diversity.

### **Facilitator, Presentation Skills Workshop**

**January 2023, 2024**

*New Educator Orientation, College of Engineering, UW-Madison*

**September 2022**

- Facilitate brief presentations from new teaching assistants.
- Provide actionable feedback on speaking and teaching skills.

### **Environmental Educator and Event Coordinator**

**August 2021-Present**

*[SheJumps](#) Midwest*

- Oversees Madison-area events and experiences for girls and women in the outdoors, with a focus on environmental stewardship and education.
- Organization Mission: "SheJumps increases the participation of women and girls in outdoor activities by partnering with nature to create safe, educational outdoor experiences for girls and women that nurture growth and transformation."

## PROFESSIONAL AFFILIATIONS

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### **Academy of Environmental Engineering and Science Professors**

**August 2021-Present**

### **Chi Epsilon**

**November 2018-May 2020**

*Chapter 122, Bucknell University*

**American Academy of Environmental Engineers and Scientists**  
*Bucknell University*

**September 2017-May 2020**

**RELEVANT SKILLS**

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**Languages (Spoken):** English (Native), French (Proficient)

**Languages (Programming):** Python (Intermediate), R (Adept)

**Computer Software:** SigmaPlot (Advanced), Microsoft Suite (Advanced), BioWIN (Intermediate), Autodesk Inventor/AutoCAD (Adept), QualtricsXM (Beginner)

**Laboratory Instrumentation:** HPLC, GC-MS, TGA, CHN.