Erica Babusci

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EDUCATION

Duke University — **Durham, NC**
Pratt School of Engineering — *May 2028*
Doctorate in the Department of Civil and Environmental Engineering
Focus: Environmental Health Engineering
Advisor: Dr. Claudia Gunsch

Duke University — **Durham, NC**
Pratt School of Engineering — *May 2025*
Master of Science in Civil and Environmental Engineering — GPA 3.962/4.0
Focus: Environmental Health Engineering

The Ohio State University — **Columbus, OH**
School of Environment and Natural Resources — *May 2023*
Bachelor of Science in Environment and Natural Resources — GPA 3.814/4.0
Major 1: *Environmental Science; Specialization in Ecosystem Restoration*
Major 2: *Biology; Specialization in Environmental Microbiology*
Minor*: Environmental Engineering*

CURRENT RESEARCH PROJECTS

Microencapsulation of Microbes to Enhance Bioremediation of PAHs
Claudia K. Gunsch

Metagenomic Analysis of Microbial Communities Present on Solar Panels
Solar Unsoiled, Mike Valerino, Claudia K. Gunsch, Mike Bergin, Andrew A. Jones

Investigating the Efficacy of *Micro-Blaze* to Degrade PAHs on Firefighter Suits
Claudia K. Gunsch, Heather Stapleton

Automating Real-Time Fungal Identification and Spatial Mapping
Claudia K. Gunsch, Yanbaihui Liu, Boyuan Chen

RESEARCH EXPERIENCE

The Gunsch Lab — **Durham, NC**
PhD Student Researcher — *August 2022-Present*

- Conduct research on microbial microencapsulation strategies to enhance stability, survival, and performance of environmental microbes for bioremediation applications.
- Design and execute laboratory experiments involving fungal and bacterial encapsulation, PAH degradation assays, and microbial viability assessments.
- Analyze metagenomic and experimental data to evaluate microbial community dynamics and treatment efficacy.
- Present research findings at national and international conferences through poster and oral presentations.
- Contribute to grant writing and renewal proposals.

The Sullivan Lab — **Columbus, OH**
Student Research Assistant — *August 2021-May 2023*

- Investigated bacterial genes essential for phage infection using a randomly barcoded transposon mutant (RB-TnSeq) library across four soil bacterial model systems.
- Assisted in the isolation, sequencing, and annotation of over 80 genetically diverse bacteriophages.
- Analyzed phage–host interaction patterns to identify cross-family and phage-specific host

gene requirements.

Water TEAM Lab **Columbus, OH**

Student Research Assistant *August 2022-May 2023*

- Collaborated with a Ph.D. candidate to determine optimal UV wavelengths and dosages for inhibiting bacterial species harmful to immunocompromised individuals.
- Conducted controlled laboratory experiments assessing bacterial inactivation under varying UV exposure conditions.
- Contributed to efforts aimed at improving wastewater treatment and drinking water disinfection while reducing reliance on chlorine-based treatments.

Ohio State University Ecohydrology Lab **Columbus, OH**

Student Research Assistant *August 2021– May 2022*

- Processed and analyzed agricultural water samples to quantify phosphorus and nitrogen concentrations in filtered and unfiltered samples.
- Presented findings at regional workshops to promote sustainable fertilizer management practices and reduce environmental nutrient pollution.

PRESENTATIONS

1. **Babusci, E.,** Gunsch, C.K. 2025. *Microencapsulation as a Strategy for Precision Microbiome Engineering in Superfund Site Remediation.* **Oral Presentation.** 2025 Superfund Annual Meeting. College Station, TX. December 2025.
2. **Babusci, E.,** Gunsch, C.K. 2025. *Optimizing Fungal Microencapsulation for Bioremediation of PAHs.* **Poster Presentation.** FEMS Micro 2025. Milan, Italy. July 2025.
3. **Liu, Y.,** Babusci, E., Chen, B., Gunsch, C.K. 2025. *Rapid Fungal Typing and Spatial Mapping via VOC Sensing and Machine Learning.* **Poster Presentation.** 2025 PreMiEr Site Visit. Durham, NC. June 2025.
4. **Babusci, E.,** Gunsch, C.K., Valerino, M., Bergin, M., Jones, A., Rivera, A., 2025. *Metagenomic Analysis of Microbial Genera on Solar Panels.* **Poster Presentation.** AEESP 2025 Research and Education Conference. Durham, NC. May 2025.
5. **Babusci, E.,** Gunsch, C.K., Stapleton, H., 2025. *Testing the Efficacy of Micro-Blaze Detergent on PAH Removal from Firefighter Uniforms.* **Poster Presentation.** 2025 International Fire Service Cancer Symposium. Miami, FL. February 2025.
6. **Babusci, E.,** Gunsch, C.K. 2024. *The Effect of Microencapsulation on the Growth of the Fungal Genera Trichoderma and Aureobasidium.* **Poster Presentation.** NC-ASM 2024 Meeting. Wilmington, NC. October 2024.
7. **Babusci, E.,** Gunsch, C.K. 2024. *The Influence of Microencapsulation on Fungal Viability.* **Poster Presentation.** 2024 Microbiome Symposium. Durham, NC. May 2024.
8. **Babusci, E.,** Gunsch, C.K. 2024. *Characterization of the Release of the Fungal Genus Trichoderma from Sodium Alginate Microcapsules.* **Poster Presentation.** 2024 Mid-Atlantic States Mycology Conference. Durham, NC. April 2024.
9. **Babusci, E.,** Foley, A., Gunsch, C.K. 2023. *Effect of Microencapsulation of Bacteria and Fungi on PAH Biodegradation Success.* **Poster Presentation.** NC-ASM 2023 Meeting. Durham, NC. November 2023.
10. **Babusci, E., M.,** Selbes, S. C., Gittrich, M. R., Sanderson, C. M., Leopold, J. E., Noel, C. M., Daboul, A., Farinas, O. R., Hyman, P., Mutalik, V. K., & Sullivan, M. B. 2023. *Investigating the Genetic Determinants of Phage Infection in Klebsiella sp. M5a1.* **Poster Presentation.** Undergraduate Spring Research Festival. Columbus, OH. April 2023.

PUBLICATIONS

1. **Erica Babusci** & Claudia K. Gunsch. *Draft Genome Sequence of PAH-Degrading Fungal Isolates Trichoderma Deliquescens and Aureobasidium sp*. Microbiology Resource Announcement. 2026 (Accepted)
2. **Erica Babusci,** Ellen Cooper, Heather Stapleton, Claudia K. Gunsch. *Efficacy of Microbial Detergent in Degrading PAHs from Firefighter PPE to Reduce Post-Fire Exposure Risks.* Journal of Occupational and Environmental Hygiene. (Under Review)
3. Alexandra Rivera, Matthew Muller**, Erica Babusci,** Brooke J Stanislavski, David Miller, A-Andrew D Jones, III, Claudia Gunsch, Mike Bergin, Michael Valerino. *Persistent Soiling: The Widespread Impact of Fungal Bio-Soiling to Photovoltaic Energy.* Journal of Photovoltaic Cells. (In Prep)
4. Yanbaihui Liu, **Erica Babusci**, Claudia K. Gunsch, Boyuan Chen. *Scensory: Automated Real-Time Fungal Identification and Spatial Mapping.* Nature Communications. (Under Review)
5. Marissa R. Gittrich, Courtney M. Sanderson, James M. Wainaina, Cara M. Noel, Jonathan E. Leopold, **Erica Babusci,** Sumeyra C. Selbes, Olivia R. Farinas, Jack Caine, Joshua Davis II, Vivek K. Mutalik, Paul Hyman, Matthew B. Sullivan. *Isolation and characterization of 24 phages infecting the plant growth-promoting rhizobacterium Klebsiella sp. M5al*. PLOS One. February 21, 2025
6. Marissa R. Gittrich, Courtney M. Sanderson, Cara M. Noel, **Erica Babusci,** Sumeyra C. Selbes, Ami Fofana, Aghiad Daboul, Jonathan Leopold, Alessandra Gonçalves de Melo, Marion Urvoy[1], Sylvain Moineau, Vivek K. Mutalik, Matthew B. Sullivan. *Cross-family and phage-specific gene requirements for Klebsiella infection revealed by scalable RB-TnSeq genetic screens*. (In Prep)

LEADERSHIP EXPERIENCE

Dept. of Civil & Environmental Engineering **Duke University**
Teaching assistant *January 2025 – December 2025*

- Courses: Environmental Microbiology (CEE 566), Biological Processes in Environmental Engineering (CEE562)
- Planned and lead instructional laboratory activities
- Instruct students via guest lectures, guided debates, and scheduled office hours

Dept. of Civil & Environmental Engineering **Duke University**
Undergraduate Research Mentor *January 2025 – July 2025*

- Trained undergraduate students in core wet-lab techniques, including sterile technique, sample preparation, and laboratory safety protocols
- Mentored and supervised two undergraduate research assistants by providing technical guidance, experimental oversight, and research mentorship

COMMUNITY INVOLVEMENT

Females and Allies Excelling more In Math, Engineering and Science **Durham, NC**
Volunteer *April 2024 and April 2025*

RESEARCH GRANTS

Undergraduate Research Apprenticeship Program Recipient- $5,928 *Summer 2022*

- Used during summer RB-TnSeq research project to help determine which genes are associated with phage resistance in *Klebsiella michiganenis.*

Undergraduate Research Scholarship - $4,500 *2022-2023 academic year*