

Environmental Engineering Candidate Seminar



Matthew Berens, Ph.D.

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Dr. Matthew Berens has a BA in Chemistry and B.Sc in Biochemistry/Molecular Biology from Bethel University, and a M.Sc. and PhD in Civil Engineering from University of Minnesota-Twin Cities, with numerous scholarships and awards. His interests include aquatic systems chemical reactions for insecticides and munitions, bioreactors for sulfate removal. Matthew Berens has been a Postdoctoral Research Associate at the Natural Resources Research Institute at the University of Minnesota-Duluth since 2021.

Research Seminar

Thursday, January 27, 2022

11:00 AM - 12:00 PM

ENGR 326

The Role of Biogeochemical Cycling in Pollutant Dynamics and Engineered Remediation Technologies

Chemical and biological processes directly control the speciation, bioavailability, and mobility of pollutants in the environment. As humans place increasing stress on the environment, an understanding of these mechanisms is necessary to protect environmental health and advance engineered remediation strategies. This talk presents an example of past, current, and future research objectives that explore the interface of biogeochemical pollutant dynamics and the creation of remediation technologies for a changing climate. The highlighted research includes the formulation of a predictive model that estimates the degradation of military munitions by iron minerals, a spatiotemporal survey of persistent bioaccumulative toxins in Minnesota surface and groundwater, and the development of novel electrochemical bioreactors for nutrient recovery and pollutant removal from low-strength waste streams. This research combines basic chemical, biological, and engineering techniques with advanced analytical tools such as compound specific isotope analysis, high resolution mass spectrometry, mediated electrochemical analysis, and microbial ecology. Further, it provides a foundation for future work that aims to address the effects of environmental disturbances on biogeochemical cycling and its implications for water and soil treatment technologies. The importance of student development and their role in the Berens laboratory will be discussed in addition to potential internal collaborations, funding sources, and outreach activities.

Teaching Seminar

Thursday, January 27, 2022

1:30 PM - 2:30 PM

ENGR 326

Introduction to Sedimentation & A Discussion of Teaching Philosophy

Dr. Matthew Berens will present a teaching demonstration intended for the course Drinking Water Engineering (CEE 3640) at Utah State University. The session will mimic an introductory lecture on sedimentation by providing an overview of the relevant physical and chemical mechanisms and introducing basic calculations and design considerations. Berens will also outline his teaching philosophy and approach, describing codes of conduct, typical course structure, class session design, student assessments, the promotion of inclusivity, and accommodating students with disabilities. Dr. Berens' teaching integrates all aspects of the engineering process by applying fundamental theory with real-world applications and case studies. A successful student will be able to identify not only what processes are occurring in the environment, but why they occur, how they are influenced by humans and the surrounding environment, and why they are important to the natural and built environment.

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