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## **Kaushik Venkiteshwaran, Ph.D., EIT**

Assistant Professor

Department of Civil, Coastal and Environmental Engineering

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### **Research Interests**

- Developing chemical and biological processes for sustainable water and wastewater treatment
  - Novel bio-adsorbent development for nutrient recovery and emerging contaminant removal
  - Modelling microbial interactions in natural and engineered environments
  - Relating microbial community structure to biological process performance
  - Developing novel microbial cultures for bio-energy production
  - Advanced oxidation targeting organic contaminant destruction and pathogen disinfection
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### **Education**

- Ph.D. in Civil Engineering, Marquette University, Milwaukee, WI, USA.  
Graduated in Summer 2016, CGPA: 3.85/4.
  - Masters in Civil Engineering, Clarkson University, Potsdam, NY, USA.  
Graduated in Spring 2010, CGPA: 3.4/4.
  - Bachelors of Technology in Biotechnology, The ICFAI University, Dehradun, India.  
Graduated in Spring 2007, CGPA: 8.87/10.
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### **Employment History**

- Assistant Professor, University of South Alabama, Mobile, AL, USA. 2021 to Present
  - Post-Doctoral Researcher, Marquette University, Milwaukee, WI, USA. 2016 to 2021
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### **Research Experience**

- **Post-Doctoral Research** (Marquette University - 2016 to 2021)
  - *Research focus: Modelling microbial interactions for sustainable wastewater treatment.*
    - Project 1: Developing quantitative artificial neural network (ANN) model and relating microbial communities of 50 anaerobic digesters to their function.
    - Project 2: Monitoring microbial community dynamics of activated sludge process and developing a quantitative ANN model to predict foaming events.

- *Research focus: Improving sustainability through nutrient recovery.*
    - Project 3: Investigating phosphorus recovery using a phosphate binding protein.
    - Project 4: Applying ammonia binding protein for ultra-low ammonia recovery.
    - Project 5: Mineralizing dissolved organic phosphorus using advanced oxidation for increased phosphorus recovery.
  - *Research focus: Developing novel microbial cultures for bio-energy production.*
    - Project 6: Developing microbial cultures for improved bio-methane production during anaerobic digestion of phenolic wastewaters.
    - Project 7: Developing microbial cultures for anaerobic digestion of bioplastics.
    - Project 8: Culturing anaerobic microbes capable of tolerating drying (heat or freeze) and storage in ambient air.
  - **Doctoral Research** (Marquette University – 2010 to 2016)
    - *Research focus: Modelling microbial community for increased bio-energy production.*
      - Project 1: Examining the role of propionate degrading microbial communities in improving anaerobic digester function.
      - Project 2: Developing a regression model relating microbes to digester function.
  - **Masters Research** (Clarkson University – 2008 to 2010)
    - *Research focus: Investigating bio-energy production from high strength dairy waste.*
      - Project 1: Investigating anaerobic co-digestion of dairy manure, cheese whey and biodiesel glycerol in single and two-phase digester configuration.
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## Funding History

I served as a PI\* and Co-PI in the following successful grants. Total research funds secured is \$390,000.

- Funding Source: Lafferty Family Foundation.
  - \*Project: Closing the Phosphorous Loop: Characterizing the potential of green infrastructure for phosphorous removal and recovery (Jan to Dec 2021).
    - **Awarded amount \$50,000.**
- Funding Source: Water Coordinated Activities on Research for the Environment Project - Milwaukee Metropolitan Sewage District.
  - Project 1: Novel algorithm to increase anaerobic co-digestion renewable energy (Jan to Dec 2020).
    - **Awarded amount \$96,000.**
  - Project 2: Understanding microbial community dynamics of activated sludge to predict and mitigate foaming events (Jan to Dec 2020).
    - **Awarded amount \$94,000.**

- National Science Foundation Water Environment Policy- Industry/University Collaborative Research Center.
    - Project 1: Ultra-low phosphorus regulations: Improving removal of non-reactive phosphorus and downstream dewaterability in bio-P biosolids-Phase 3 (Jan to Dec 2019).
      - **Awarded amount \$50,000.**
    - Project 2: Ultra-low phosphorus regulations: Improving removal of non-reactive phosphorus and downstream dewaterability in bio-P biosolids-Phase 2 (Jan to Dec 2018).
      - **Awarded amount \$50,000.**
    - Project 3: Removal and recovery of ammonia using *amtB* protein (Jan to Dec 2018).
      - **Awarded amount \$50,000.**
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## Teaching and Mentoring Experience

- **Instructor of Record**

*Marquette University*

- CEEN 4520/5520 - Industrial Wastewater Treatment (Spring 2019).
  - Instructor of record for a senior undergraduate and graduate level course on unit operations of industrial wastewater treatment (Course Evaluation: 5.3/6).
- CEEN 6520 - Environmental lab 1-analyses (Fall 2018).
  - Instructor of record for a graduate laboratory course on water/wastewater analyses (Course Evaluation: 5.9/6).

Complete course evaluations are provided in my teaching statement.

- **Guest Lecturer**

*Marquette University*

- CEEN 5530 - Hazardous and industrial waste management
- CEEN 5515 - Environmental chemistry
- CEEN 5535 - Environment engineering microbiology
- CEEN 5715 - Sustainable engineering
- CEEN 6510 - Biochemical transformation in the environment
- CEEN 6521 - Environmental lab 2-processes
- CEEN 6540 - Physical chemical processes in wastewater treatment

- **Mentoring Experience**

*Marquette University*

- Member of thesis advisory committee for Nicholas Benn (PhD candidate) on his Doctoral thesis project “Novel algorithm to relate microbial community to anaerobic digestion function”. Ph.D., ongoing.
- Mentoring Seyedehfateme Seyedi (PhD candidate) on her Doctoral thesis project “Anaerobic co-digestion of aqueous pyrolysis liquid from wastewater solids and synthetic primary sludge”. Ph.D., ongoing.
- Mentoring Synthia Parveen Malick on her Doctoral thesis project “Conversion of organic nitrogen in wastewater to recoverable inorganic forms using electro-oxidation”. Ph.D., ongoing.
- Mentoring Faten Hussein on her Doctoral thesis project “Cell surface-expression of the phosphate-binding protein PstS for phosphorus removal and recovery”. Ph.D., ongoing.
- Member of thesis advisory committee for Nicholas Benn on his Masters thesis project “Biomethane production from biodegradable plastics”. Defended in 2019.
- Mentored Eileen Kennedy on her Masters thesis project “Chemical pretreatment and dewaterability of anaerobically digested bio-p biosolids”. Defended in 2019.
- Member of thesis advisory committee for Seyedehfateme Seyedi on her Masters thesis project “Anaerobic co-digestion of aqueous liquid from biosolids pyrolysis”. Defended in 2018.
- Member of thesis advisory committee for Dylan Fryss on his Masters thesis project “Effect of low aeration and heat drying on anaerobic digester performance and microbial community”. Defended in 2018.

*Clarkson University*

- Mentored senior undergraduate students Mariadina DiGennaro in 2009 and Ryan Zeils in 2010 in environmental engineering projects under the Research Experience for Undergraduates (REU) program.

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## Publications

- **Published Journal Articles**

I have 19 published peer reviewed articles.

Underline refers to the articles in which I mentored the primary author in planning and conducting the research.

Symbol (\*) refers to the articles for which I am also the corresponding author.

- **Venkiteshwaran, K.**, Kennedy, E., Graeber, C., Mallick, S.P., McNamara, P.J., Mayer, B.K., 2021. Conversion of soluble recalcitrant phosphorus to recoverable orthophosphate form using UV/H<sub>2</sub>O<sub>2</sub>. Chemosphere 130391.  
<https://doi.org/10.1016/j.chemosphere.2021.130391>

- Mallick, S.P., Ryan, D.R., **Venkiteshwaran, K.**, McNamara, P.J., Mayer, B.K., 2021. Electro-oxidation to convert dissolved organic nitrogen and soluble non-reactive phosphorus to more readily removable and recoverable forms. *Chemosphere* 279, 130876. <https://doi.org/10.1016/j.chemosphere.2021.130876>
- **Venkiteshwaran, K.**, Wells, E., Mayer, B.K., 2020. Kinetics, affinity, thermodynamics, and selectivity of phosphate removal using immobilized phosphate-binding proteins. *Environ. Sci. Technol.* <https://doi.org/10.1021/acs.est.0c02272>. (Impact Factor: 7.7)
- **Venkiteshwaran, K.**, Wells, E., Mayer, B.K., 2020. Immobilized phosphate-binding protein can effectively discriminate against arsenate during phosphate adsorption and recovery. *Water Environ. Res.* 1498. <https://doi.org/10.1002/wer.1498>. (Impact Factor: 1.15).
- **Venkiteshwaran, K.**, Benn, N., Seyedi, S., Zitomer, D., 2019. Methane yield and lag correlate with bacterial community shift following bioplastic anaerobic co-digestion. *Bioresour. Technol. Reports* 7, 100198. <https://doi.org/10.1016/j.biteb.2019.100198>. (Impact Factor: N/A).
- Hussein, F.B., **Venkiteshwaran, K.**, Mayer, B.K., 2020. Cell surface-expression of the phosphate-binding protein PstS: System development, characterization, and evaluation for phosphorus removal and recovery. *J. Environ. Sci.* 92, 129–140. <https://doi.org/10.1016/j.jes.2020.02.016>. (Impact Factor: 4.3).
- Liu, Z., Mayer, B., **Venkiteshwaran, K.**, Seyedi, S., Raju, A.S.K., Zitomer, D., McNamara, P., 2020. The state of technologies and research for energy recovery from municipal wastewater sludge and biosolids. *Curr. Opin. Environ. Sci. Heal.* <https://doi.org/10.1016/j.coesh.2019.12.004>. (Impact Factor: 1.3).
- Mathai, P.P., Nicholes, M.S., **Venkiteshwaran, K.**, Brown, C.M., Morris, R.L., Zitomer, D.H., Maki, J.S., 2020. Dynamic shifts within volatile fatty acid-degrading microbial communities indicate process imbalance in anaerobic digesters. *Appl. Microbiol. Biotechnol.* 104, 4563–4575. <https://doi.org/10.1007/s00253-020-10552-9>. (Impact Factor: 3.9).
- Seyedi, S., **Venkiteshwaran, K.**, Benn, N., Zitomer, D., 2020. Inhibition during anaerobic co-digestion of aqueous pyrolysis liquid from wastewater solids and synthetic primary sludge. *Sustainability* 12, 3441. <https://doi.org/10.3390/su12083441>. (Impact Factor: 2.57).
- Mathai, P.P., Dunn, H.M., **Venkiteshwaran, K.**, Zitomer, D.H., Maki, J.S., Ishii, S., Sadowsky, M.J., 2019. A microfluidic platform for the simultaneous quantification of methanogen populations in anaerobic digestion processes. *Environ. Microbiol.* 21, 1798–1808. <https://doi.org/10.1111/1462-2920.14589>. (Impact Factor: 4.93).
- Mullen, P., **Venkiteshwaran, K.**, Zitomer, D.H., Mayer, B.K., 2019. Ion exchange nutrient recovery from anaerobic membrane bioreactor permeate. *Water Environ. Res.* <https://doi.org/10.1002/wer.1080>. (Impact Factor: 1.15).
- Seyedi, S., **Venkiteshwaran, K.**, Zitomer, D., 2019. Toxicity of various pyrolysis liquids from biosolids on methane production yield. *Front. Energy Res.* 7, 5. <https://doi.org/10.3389/fenrg.2019.00005>. (Impact Factor: 2.96).

- **Venkiteshwaran, K.**, Pokhrel, N., Hussein, F., Antony, E., Mayer, B.K., 2018. Phosphate removal and recovery using immobilized phosphate binding proteins. *Water Res. X.* <https://doi.org/10.1016/J.WROA.2018.09.003>. (Impact Factor: N/A).
- **Venkiteshwaran, K.**, McNamara, P.J., Mayer, B.K., 2018. Meta-analysis of non-reactive phosphorus in water, wastewater, and sludge, and strategies to convert it for enhanced phosphorus removal and recovery. *Sci. Total Environ.* <https://doi.org/10.1016/j.scitotenv.2018.06.369>. (Impact Factor: 6.55).
- Bhattad, U., **Venkiteshwaran, K.**, Maki, J.S., Zitomer, D.H., 2017. Biochemical methane potential assays and anaerobic digester bioaugmentation using freeze dried biomass. *Environ. Sci. Water Res. Technol.* 3, 1152–1161. <https://doi.org/10.1039/c7ew00203c>. (Impact Factor: 3.45).
- Bhattad, U., **Venkiteshwaran, K.**, Cherukuri, K., Maki, J.S., Zitomer, D.H., 2017. Activity of methanogenic biomass after heat and freeze drying in air. *Environ. Sci. Water Res. Technol.* 3. <https://doi.org/10.1039/c7ew00049a>. (Impact Factor: 3.45).
- \***Venkiteshwaran, K.**, Milferstedt, K., Hamelin, J., Fujimoto, M., Johnson, M., Zitomer, D.H., 2017. Correlating methane production to microbiota in anaerobic digesters fed synthetic wastewater. *Water Res.* 110. <https://doi.org/10.1016/j.watres.2016.12.010>. (Impact Factor: 9.13).
- \***Venkiteshwaran, K.**, Milferstedt, K., Hamelin, J., Zitomer, D.H., 2016. Anaerobic digester bioaugmentation influences quasi steady state performance and microbial community. *Water Res.* 104, 128–136. <https://doi.org/10.1016/j.watres.2016.08.012>. (Impact Factor: 9.13).
- **Venkiteshwaran, K.**, Bocher, B., Maki, J., Zitomer, D., 2016. Relating anaerobic digestion microbial community and process function. *Microbiol. Insights* 8, 37–44. <https://doi.org/10.4137/MBI.S33593>. (Impact Factor: 4.2).
- **Conference Presentations**
  - **Venkiteshwaran K.**, Lang N., Dong H. Y., Zitomer D., “Deep neural network algorithm can predict methane production using microbial community composition of anaerobic digester”, selected for oral presentation (virtual) at Water Environment Federation's Technical Exhibition and Conference 2020 in New Orleans, LA, USA.
  - **Venkiteshwaran K.**, Wells E., Mayer K. B., “Immobilized phosphate binding protein can selectively remove & recover phosphorus”, poster presentation at International Water Association - Leading Edge Conference 2019 in Edinburgh, UK.
  - **Venkiteshwaran K.**, Benn N., Seyedi S., Zitomer D., “Methane production correlates with bacterial community shift during PHB bioplastic anaerobic co-digestion”, poster presentation at International Water Association - World Conference on Anaerobic Digestion 2019 in Delft, The Netherlands.
  - **Venkiteshwaran K.**, Pokhrel N., Antony E., McNamara P., Mayer K. B., “Phosphorus removal and recovery immobilized phosphate binding proteins”, oral presentation at the Association of Environmental Engineering and Science Professors conference 2017 in Ann Arbor, MI, USA.

- **Venkiteshwaran K.**, Johnson M., Zitomer D., “Methane production rates can be predicted from anaerobic digester microbial community structure”, oral presentation at the Residual and Biosolids Conference 2016 in Milwaukee, WI, USA.
  - **Venkiteshwaran K.**, Milferstedt M., Hamelin J., Zitomer D., “Bioaugmentation of anaerobic digesters for increased methane production”, oral presentation at Water Environment Federation's Technical Exhibition and Conference 2016 in New Orleans, LA, USA.
  - **Venkiteshwaran K.**, Milferstedt M., Hamelin J., Zitomer D., “Bioaugmentation of anaerobic digesters: Does it work and does it last?”, oral presentation at International Water Association - World Conference on Anaerobic Digestion 2015 in Viña del Mar, Chile.
  - **Venkiteshwaran K.**, Mathai P., Hristova K., Maki J., Zitomer D., “Bioaugmentation of propionate enriched anaerobic culture can improve steady-state digester function”, oral presentation at International Water Association - World Conference on Anaerobic Digestion 2013 in Santiago de Compostela, Spain.
  - **Venkiteshwaran K.**, Seib M., Bocher B., Zitomer D., “Bioaugmentation can increase steady-state methane production and COD reduction in anaerobic digesters”, oral presentation at Water Environment Federation's Technical Exhibition and Conference 2012 in New Orleans, LA, USA.
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## **Patent**

- Brooke Mayer, Kaushik Venkiteshwaran, “Process for Controlled Adsorption and Desorption of Phosphate from Liquids using Phosphate-Selective Proteins”, 2018; Provisional Application No. 62/701,235.
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## **Professional Services**

- **Organizing Activities for Conferences/Technical Workshops**
  - 2015 to 2019: Anaerobic Treatment of High-Strength Industrial and Agricultural Wastes Short Course. Held annually at Marquette University, Milwaukee, WI.
  - 2017 to 2019: Anaerobic Digester Operator Workshop. Held annually at Marquette University, Milwaukee, WI.
- **Community Engagement & Social Responsibility**
  - Community engaged scholarship - community of practice (COP) program.  
Every semester the faculties in the College of Engineering at Marquette University meet for 6-8 sessions to exchange ideas and invite experts with a focus on continued improvement in engineering education at the college. I participated in two programs in Fall 2019 and Spring 2020 with the following accomplishments:

- Fall 2019: Collaborated with faculties in the College of Engineering to develop engineering education scholarships and implementing Transparency in Learning and Teaching (TILT) in the classroom.
  - Spring and Fall 2020: This session was focused on the impacts of COVID 19 on engineering education. The faculty group designed a comprehensive survey and received over 400 responses from students. The group collaborated to critically analyze the data and implement measures to improve remote/hybrid learning in engineering education. The faculty group also raised awareness to help minority students whose education was affected from the COVID 19 pandemic due to lack of technological resources.
  - **Journal Reviewer**
    - Served as a reviewer for journals such as *Biochemical Engineering Journal*, *Environmental Science & Technology*, *Environmental Science Water Research & Technology*, *Science of the Total Environment*, *Waste Management*, *Water Environment Research*, *Water Research and Water Science & Technology*.
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### **Professional Certification**

- USA Engineer in Training certification (October 2012).
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