

# BROOKE E. MASON

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## EDUCATION

### PhD in Civil Engineering, Intelligent Systems

University of Michigan – Ann Arbor, MI (Sept. 2018 – Present)

*Advisor:* Dr. Branko Kerkez

### MS in Electrical and Computer Engineering, Signal Processing & Machine Learning

University of Michigan – Ann Arbor, MI (Sept. 2018 – Present)

### Certificate in Engineering Education Research

University of Michigan – Ann Arbor, MI (Sept. 2019 – Present)

### MS in Civil Engineering, Environmental Focus

University of Toledo – Toledo, OH (*Jan. 2017 – Aug. 2018*)

*Thesis Title:* “Real-Time Control of a Bioretention Cell for Enhanced Phosphorus Capture”

*Advisor:* Dr. Cyndee Gruden

### BS in Environmental Engineering

Summa Cum Laude, University of Toledo – Toledo, OH (*May 2015 – Dec. 2016*)

### BA in Environmental Policy & Analysis

Summa Cum Laude, Bowling Green State University – Bowling Green, OH (*Aug. 2008– May 2012*)

## RESEARCH EXPERIENCE

### Graduate Research Assistant

University of Michigan – Ann Arbor, MI (*September 2018 – Present*)

*Advisor:* Dr. Branko Kerkez

- Developing system scale control algorithms to maximize total suspended solids (TSS) removal while minimizing overflow and downstream erosion. TSS movement through the system can be controlled in order to, for example, send TSS to the lowest basin for easier system maintenance. This control algorithms are tested on real-world inspired stormwater networks in PySWMM, a Python-wrapper for the U.S. EPA Stormwater Management Model (SWMM).
- Collaborating with the Huron River Watershed Council (HRWC) on a surface water quality monitoring project. Developed a small, low-cost, data node to collect real-time data, make automated decisions, and allow for remote triggering of the samplers. The node sends data to a dashboard allowing a team to monitor the depth of water in the stream/creek, along with sampler information. In manual mode, the team can simply tap a “trigger” button on the dashboard to order a sample. In addition to manual mode, to improve data collection and reliability, an algorithm is being developed to trigger the sampler autonomously using weather forecast and stream condition data.
- Collaborating with the Detroit Sierra Club on a rain garden monitoring project. Developed a small, low-cost, data node to collect real-time data on soil moisture conditions and infiltration rates.

### Graduate Research Assistant

University of Toledo – Toledo, OH (*January 2018 – May 2018*)

*Advisor:* Dr. Cyndee Gruden; *Collaborators:* Xavier Gabarrell i Durany, Universitat Autònoma de Barcelona

*Project Title:* “Saving Water with Intelligent Irrigation Systems for Urban Agriculture”

- Simulation using FAO’s CROPWAT program to quantify water savings and crop yield of an urban tomato garden for a real-time controlled intelligent irrigation system and a conventional irrigation system for various climatic conditions.

### Graduate Research Assistant

University of Toledo – Toledo, OH (*May 2017 – Aug. 2018*)

*Advisor:* Dr. Cyndee Gruden; *Collaborators:* Dr. Branko Kerkez, Real-Time Water Systems Lab, University of Michigan

- Continuous hydraulic/hydrologic simulation using EPA’s Stormwater Management Model (SWMM) of real-time controlled green stormwater infrastructure. Built a soil nutrient model in Python for green stormwater infrastructure (bioretention). Coupled the models to quantify the impact of active control of the stormwater infrastructure on nutrient removal.
- Collaborated with UM remotely via Slack and with weekly site visits to design, build, and install a real-time control system on a bioretention cell at the Toledo Zoo. A sensor node was installed with a battery, control board, cell module for communication, and solar panel for long-term power. The site was instrumented with sensors to measure water flow, infiltration performance, and quality. A control valve which included a gate valve, actuator, and safety overflow pipe was installed on the underdrain to provide the ability to hold and release flows on demand, thus improving exfiltration. More details at [open-storm.org](http://open-storm.org).

## Undergraduate Research Assistant

University of Toledo – Toledo, OH (*May 2015 – Sept. 2016*)

*Advisor:* Dr. Defne Apul

*Role:* Project Lead

- Completed a cradle-to-gate ex-ante life cycle analysis using GaBi software for single-walled carbon nanotube (SWCNT) solar photovoltaic (PV) cells. Compared SWCNT PV impacts and energy payback with silicon PV and thin film PV technologies.

## TEACHING EXPERIENCE

### Teaching Assistant

University of Toledo – Toledo, OH (*Jan. 2017 – Dec. 2017*)

- Teaching assistant for Civil & Environmental Engineering courses including Statics, Fluid Mechanics, Professional Development, and Freshman Orientation.
- Tasks included grading, Blackboard management, office hours, quiz creation, exam revisions, leading exam review sessions. Developed the lesson plans and taught several classes in the Freshman Orientation course.

## ENGINEERING EXPERIENCE

### Engineering Intern

Brendle Group – Denver, CO (*June 2016 – Aug. 2017*)

- Quality control and analysis of greenhouse gas data submitted by ski resorts for the National Ski Area Association (NSAA) Climate Challenge. Wrote the 2016 Climate Challenge report and an article for the NSAA Journal.
- Organized and hosted three educational seminars for the ski resorts on a variety of topics including setting and meeting realistic targets, emission reduction projects, funding opportunities, and program logistics.
- Drafted the annual contract, project budget, project timeline, marketing timeline, and more for the 2017 Climate Challenge.

### Sustainability Specialist

University of Toledo – Toledo, OH (*Aug. 2012 – May 2015*)

- Coordinated the utility rebate program and other sustainability and energy reduction projects. Secured over \$435,000 in rebates, \$25,000 in recycling revenue, and \$96,000 in grants.
- Completed the first comprehensive greenhouse gas inventory and a plan to reduce emissions by 7% with savings of \$1 million.
- Managed the processing of over 1 million pounds of recycling with one full-time and nine student employee direct reports.

## PUBLICATIONS

- **Mason, Brooke**, Martí Ruff-Salís, Felipe Parada, Xavier Gabarrell, and Cyndee Gruden. 2019. “Intelligent Urban Irrigation Systems: Saving Water and Maintaining Crop Yields.” *Agricultural Water Management* 226. doi:10.1016/j.agwat.2019.105812.
- Celik, Ilke, **Brooke E. Mason**, Adam B. Phillips, Michael J. Heben, and Defne Apul. 2017. “Environmental Impacts from Photovoltaic Solar Cells Made with Single Walled Carbon Nanotubes.” *Environmental Science & Technology* 51 (8): 4722–4732. doi:10.1021/acs.est.6b06272.

## BOOK CHAPTERS

- **Mason, Brooke E.** 2017. “A Comprehensive Overview of University and College Recycling Programs.” In *Sustainability Practice and Education on University Campuses and Beyond*, edited by Ashok Kumar and Dong-Shik Kim, 29–49. Sharjah, United Arab Emirates: Betham Science Publishers.

## NATIONAL CONFERENCES

- McCaffery, R., Montgomery, J., Bartos, M., **Mason, B.**, Love, N., and B. Kerkez. June 2019. “A first-year college course on smart water systems” Associate of Environmental Engineering and Science Professionals Education & Research Conference, Tempe, AZ.
- **Mason, B.**, Ilke, C., Phillips, A., Heben M., and D. Apul. June 2017. “Life cycle environmental impacts of single-walled carbon nanotube PV cells.” 20th Annual Green Chemistry & Engineering Conference, Portland, OR.

## LOCAL CONFERENCES

- **Mason, B.**, Mullapudi, A., Kerkez, B. and C. Gruden. May 2018. “Pollutant treatment with real-time control of rain gardens.” Ohio Stormwater Conference, Sandusky, OH.
- **Mason, B.**, Mullapudi, A., Kerkez, B. and C. Gruden. Oct. 2017. “Real-time control of bioretention cells for enhanced phosphorus removal.” Research & Education Symposium, Michigan State University, East Lansing, MI.
- **Mason, B.**, Ilke, C., Phillips, A., Heben M., and D. Apul. April 2017. “Life cycle environmental impacts of single-walled carbon nanotube PV cells.” Choose Ohio First Scholar Showcase, Columbus, OH.
- **Mason, B.**, Ilke, C., Phillips, A., Heben M., and D. Apul. Nov. 2016. “Life cycle analysis of carbon nanotube photovoltaic cells.” Undergraduate Research Showcase, University of Toledo, Toledo, OH.

- **Mason, B.**, Ilke, C., Phillips, A., Heben M., and D. Apul. Nov. 2015. “Life cycle analysis of carbon nanotube photovoltaic cells.” GreenUp: Michigan Green Chemistry and Engineering Conference, University of Michigan, Ann Arbor, MI.

## HONORS & AWARDS

- DOW Sustainability Fellowship – University of Michigan (2020)
- NextProf Pathfinder Workshop Attendee – College of Engineering, University of Michigan (2019)
- Rackham Merit Fellowship – Rackham Graduate School, University of Michigan (2018-19)
- Graduate Research Fellowship Program Honorable Mention – National Science Foundation (2018)
- William Rhodes and Jean Clark Rhodes Scholarship – College of Engineering, University of Toledo (2017–18)
- Engineering Alumni Affiliate Scholarship – College of Engineering, University of Toledo (2017–18)
- Special Dean Assistantship – College of Engineering, University of Toledo (2017)
- Outstanding Teaching Assistant – College of Engineering, University of Toledo (2017)
- Gretchen Koo Memorial Fund Scholarship Award – College of Engineering, University of Toledo (2016–17)
- Dean’s List & President’s List – College of Engineering, University of Toledo (2015–2016)
- Building Ohio’s Sustainable Energy Future Scholarship – University of Toledo (2015–16)
- Second Degree Scholarship – Eberly Center, University of Toledo (2015–16)
- University Women’s Club Nontraditional Student Scholarship – University of Toledo (2015–16)
- Ciba Travel Award in Green Chemistry – American Chemical Society (2015–16)

## SOFTWARE SKILLS

- Python
- MATLAB
- Julia
- ArcGIS
- U.S. EPA’s Stormwater Management Model (SWMM) / PCSWMM / PySWMM
- Inkscape

## CERTIFICATIONS

- Professional Development Diversity, Equity, & Inclusion – Rackham Graduate School, University of Michigan (2019 – Present)
- PH526x: Using Python for Research – Harvard edX (2018)
- Culture of Diversity – University of Toledo (2015)
- Leadership in Energy and Environmental Design (LEED) Green Associate – U.S. Green Building Council (2013)
- Effective Personal Productivity – Leadership Management International (2013)

## SERVICE

- Graduate Student Advisory Council, College of Engineering, UM (September 2019- Present)
- Lunch & Lab with a Grad Mentoring Program, College of Engineering, UM (September 2019 – Present)
- Graduate Student Advisory Council, Civil & Environmental Engineering Department, UM (June 2019- Present)
- Student Co-Chair, Association of Environmental Engineering and Science Professors’ (AEESP) Research & Education Conference, University of Michigan, Ann Arbor, MI (May– June 2017)
- Board Member; Program Manager, Urban Environmental Institute (May 2012 – October 2012; January 2015 – May 2018)
- Volunteer, Girl Power STEM, Toledo Imagination Station, Volunteer (February 2016 – May 2018)

## PROFESSIONAL MEMBERSHIPS

- Association of Environmental Engineering and Science Professors (2017 – Present)
- Chi Epsilon Civil Engineering Honor Society (2016 – Present)