Curriculum Vitae

HANNAH CURTIS, E.I.T

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EDUCATION

University of Wisconsin-Madison — Fall 2022-Fall 2024

MS Environmental Engineering — **GPA: 4.0**

Thesis Title: *Calculating Flows Using Reverse Routing and Analyzing Drivers of Hydrologic and Ecosystem Service Function in Stormwater Detention Ponds*

Advisor: Steven Loheide

University of Oklahoma — Fall 2017-Fall 2021

BS Environmental Engineering (Summa cum Laude) — **GPA: 3.97**

BMA Cello Performance (with distinction)

Minor: Environmental Sustainability

Honors Thesis Title: *The Impact of Aeration and Addition of Iron Solids on Iron and Zinc Removal at Mine Drainage Discharge near Beaver Creek*

Advisor: Robert Nairn

RESEARCH AND WORK EXPERIENCE

United States Geological Survey — July 2024-Present

Student Hydrologist Intern

- Built Generalized Additive Models (GAMs) to assess relationships between design parameters and infiltration rates in 182 biofilters in the Great Lakes region.
- Conducting field work including collecting samples and calibrating stage/velocity sensors, conductivity sensors, and rain gauges at stormwater ponds and green infrastructure sites
- Analyzing statistical trends between street cleaning practices and pond performance reducing downstream nutrient loading at Cherokee Pond.

UW-Madison Hydroecology Lab — Aug. 2022-Dec. 2024

Graduate Research Assistant

- Independently conceptualized, designed, and executed all aspects of master's thesis research, including study development, site selection, field instrumentation, data collection, statistical modeling, and result interpretation, contributing to advancements in stormwater management and ecosystem services analysis.
- Selected study sites, instrumented pressure transducers to measure water level, and sampled and analyzed water quality parameters (TSS, TN, TP, Chloride, Nitrate, SPC, DO) at 20 stormwater detention ponds in Madison, WI.
- Calculated inflows and outflows to ponds using reverse routing method and assessed noise and bias error propagation in real world and synthetic scenarios using EPA-SWMM.
- Used Partial Least Squares Regression and other statistical models to assess the relationship between hydrologic, watershed, and engineering design parameters and ecosystem services in pond and downstream in 20 stormwater detention ponds in Madison, WI.
- Measured after-storm outflow at 20 stormwater detention ponds using a FlowTracker2.

UW-Madison Department of Civil and Environmental Engineering — Jan.-Dec. 2023

Teaching Assistant for CEE 311: Hydroscience

- Created lesson plans and taught three 2-hour weekly discussion sections.
- Developed and graded homework assignments, projects, quizzes, and exams.

OU Center for Restoration of Ecosystems and Watersheds Aug. 2019-Dec. 2021

Undergraduate Research Assistant

- Gathered water samples from Beaver Creek at the Tar Creek Superfund site and performed a 5-day experiment testing the effects of aeration and solid iron on zinc and iron removal.
- Analyzed samples from this experiment for the total and filtered metals concentrations over time, gaining laboratory experience using a MARS 6 Microwave Digestion System and Inductively Coupled Plasma Atomic Emission Spectroscopy.
- Assessed relationship between aeration and settling velocity using water from Tar Creek Superfund site in Imhoff cone laboratory experiments.
- Wrote an Honors Thesis summarizing the results using multivariate analysis of variance (MANOVA), which was used to implement aeration and iron solids at the Mayer Ranch and Southeast Commerce passive treatment systems.

Oklahoma Water Survey Jan. 2021-Dec. 2021

Undergraduate Research Assistant

- Assisted with research projects by collecting, analyzing, and interpreting information on water and soil issues facing the state through field work, lab work, and data analysis using Microsoft Excel and ArcGIS.
- Performed grain size distribution analyses on soil samples, including sieve analysis and hydrometer tests.
- Analyzed water samples in a laboratory setting for turbidity, total suspended solids, and total phosphorus, gaining experience in digestion processes.
- Gathered water samples from autosamplers at sewage manholes around the University of Oklahoma campus and Oklahoma City to be tested for COVID-19 to predict outbreaks, gaining experience troubleshooting field equipment.

OU Honors College Aug. 2018-Dec. 2021

Writing Assistant

- Edited papers for 25 students each semester and met with them to discuss the content, organization, and syntax of their essays in their first year Honors Perspectives courses.

OU Center for Risk and Crisis Management Jan. 2019-May 2021

Academic Research Assistant

- Executed various projects related to weather, energy use, nuclear energy, public health, and public perception.
- Used Microsoft Excel and CodeLab to train an AI to sort tweets, broadcasts, and speeches into various weather and energy categories.

OU English Training and Certification Services Aug. 2019-May 2020

English Communication Capacity Test Panelist

- Tested graduate students' ability to communicate English in an Undergraduate setting.

PUBLICATIONS AND PRESENTATIONS

Curtis and Loheide, (in prep). *Error Analysis of Reverse Hydrologic Routing to Estimate Inflow and Outflow in Stormwater Detention Ponds*

Curtis and Loheide, (in prep). *Drivers of Hydrologic and Ecosystem Service Function in Stormwater Detention Ponds*

World Environmental & Water Resources Congress May 19-22, 2024
Presentation Title: *Drivers of Water Level Fluctuations in Stormwater Detention Ponds and their Relation to Ecosystem Services*. Hannah Curtis and Steven P. Loheide II

American Geophysical Union Annual Meeting Dec. 13, 2023
Poster Title: *Identifying Drivers of Abrupt Change in Stormwater Detention Pond Level and Consequences for Ecosystem Services.* Hannah Curtis and Steven P. Loheide II

Water@UW Fall Poster Session Nov. 7, 2023
Poster Title: *Identifying Drivers of Abrupt Change in Stormwater Detention Pond Level and Consequences for Ecosystem Services.* Hannah Curtis and Steven P. Loheide II

NTL LTER Site Review Aug. 23, 2023
Poster and Field Trip Presentation Title: *Identifying Drivers of Abrupt Change in Stormwater Detention Pond Level and Consequences for Ecosystem Services.* Hannah Curtis and Steven P. Loheide II

UNDERGRADUATE MENTORSHIP

Tess Parrott, Fall 2023
Poster/Presentation Title: Detention *Pond Design, Watershed Characteristics, Bounce, and Downstream Nutrient Concentrations in the Representative Climate of Madison, Wisconsin*

Toby Weisensel, Summer 2023
Poster/Presentation Title: *Identifying Relationships Between Detention Pond Riparian Vegetation, Watershed Permeability, and Pond Ecosystem Services**
*Awarded Best Talk

RELEVANT COURSEWORK

Hydrology Fall 2023
- Modeled extreme precipitation and snowmelt events in the Upper Taylor Park watershed using HBV and delivered results as a semester project.

Open Channel Hydraulics Fall 2023
- Compared hydraulically modeled outflow using HEC-RAS and hydrologically modeled outflow using the Puls Routing Method in one stormwater detention pond in Madison, WI and delivered results as a semester project.
- Created a website using Weebly to display the results of the hydraulic and hydrologic routing project.

Ecosystem Simulation Modeling Spring 2023
- Modeled influence of various watershed characteristics and engineering design parameters on water level changes in stormwater detention ponds using VenSim and delivered results as a semester project.

Environmental Biophysics Fall 2022
- Created and delivered a semester project on modeling evaporation in stormwater detention ponds using the Penman-Monteith and Priestley-Taylor methods.

Hydrogeology Fall 2022
- Performed laboratory experiments and created reports for topics including porosity, hydraulic gradients and conductivity, aquifer monitoring and tests, graphical and computer-based analyses of pumping tests, and MODFLOW.

Hydroscience Fall 2022
- Created and delivered an executive summary and presentation on the Tar Creek Superfund Site.

- Completed an urban hydrology capstone project designing a stormwater detention pond using concepts of infiltration, unit hydrographs, and reservoir routing.

Soil Mechanics Fall 2021

- Performed laboratory experiments and created reports for soil classification, grain size distribution, Atterberg limits, soil compaction, soil permeability, oedometer testing, direct shear testing, and unconfined compression testing.

Environmental Engineering Capstone Fall 2020-Spring 2021

- Analyzed 20 years of water quality data for relationships between water quality parameters and land use, population growth, and hydrologic effects using various statistical tests in R.
- Sampled water and analyzed for water quality parameters both in the field at Lake Thunderbird and in the laboratory.
- Performed a literature review on water quality solutions to solve eutrophication and turbidity issues.
- Created a 150-page final group report suggesting solutions to water quality issues at Lake Thunderbird and presented these results, which will be implemented in the coming years, at a Central Oklahoma Master Conservancy District board meeting.

Environmental Biology and Ecology Fall 2020

- Participated in laboratory tests, studying the biodegradation of phenol compounds and performing Lettuce Seed Bioassay toxicity tests, culminating in two group reports.
- Participated in field work, performing on habitat assessment and rapid bioassessment of Bishop Creek, culminating in a group report.

Aquatic Chemistry Fall 2020

- Performed laboratory experiments and created full-length reports on titrations and buffer systems, titration complexations, and metal complexations.
- Learned MINEQL+ 5.0 in this course.

Environmental Transport and Fate Processes Spring 2020

- Found two soil profiles with at least three soil horizons and sampled each horizon.
- Analyzed each soil profile for structure and texture and compiled all of the information into a report and presentation.

Water and Waste Treatment Design Spring 2020

- Completed several projects and reports, including projects on coagulation and flocculation, settling velocities, designing water treatment systems in WatPRO, and designing waste treatment systems in AutoCAD.
- Wrote technical memos in this course.

Water Resources Engineering Fall 2019

- Estimated the water use, completed water budgets, and designed water systems in groups for two imaginary cities, complete with pumps.
- Used WaterCAD and FlowMaster in this course.

Water Quality Fundamentals Fall 2019

- Observed the Norman Duck Pond and measured and analyzed various water quality parameters, culminating in a final group report.

Hazardous and Solid Waste Management Fall 2019

- Studied Norman's Water Reclamation Center and created several group reports and presentations arguing for the viability of water reuse.

Air Quality Management Spring 2018

- Completed a sample presentation for business leaders on the air quality at their business.

AWARDS AND SCHOLARSHIPS

- Awarded supplemental funding through NSF Non-Academic Research Internships for Graduate Students (INTERN) Program, 2024
- Awarded research funding through the Anna Grant Birge Award, 2023
- Becker Travel Grant, 2023
- Received funding for an undergraduate researcher through the Freshwater@UW Summer Research Scholars Program, 2023
- ASRS Memorial Scholarship, 2021
- Passed FE Exam, Aug. 2021
- Awarded research funding through the Undergraduate Research Opportunities Program (UROP), Fall 2020
- Awarded research funding through the Honors Engineering Research Experience (HERE) Program, Fall 2019
- Fred and Katie Cobb Civil Engineering and Environmental Science Scholarship, 2018
- National Merit Scholarship, 2017
- Jo Knapp Memorial Scholarship, 2017

INVOLVEMENT

Middleton Community Orchestra Fall 2024-Present
UW-Madison All University Strings Fall 2023-Spring 2024
OUr Earth Club Fall 2017-Fall 2021

Vice President, May 2020-Dec. 2021

- Organized volunteer and social events for members of OUr Earth.

Freight Farm Coordinator and Treasurer, May 2019-May 2020

- Coordinated schedules and volunteered at a hydroponic farm on OU's campus.

Integrity Council Spring 2019-Fall 2021

Vice Chair of Operations and Membership, May 2020- Dec. 2021

- Led annual membership drive and recorded attendance at events.

Treasurer, May 2019-May 2020

- Created budget requests, documented spending, and managed reimbursement requests.

Peer Educator, Jan 2019-May 2020

- Met individually with students in integrity course for those found responsible for academic misconduct.

OU Symphony Orchestra Fall 2017-Fall 2021
Green Week Executive Committee Fall 2018-Spring 2019

Publicity and Design Committee

- Promoted sustainability on OU's campus at various events each spring.

TECHNICAL SKILLS

- Microsoft Office
- R Lang
- Python
- Git
- ArcGIS
- EPA-SWMM
- HEC-RAS
- HBV-Light Model
- MODFLOW
- AutoCAD
- WaterCAD
- VenSim
- SimaPro
- MINEQL+ 5.0
- PLSR Modeling
- GAM