Joseph Marchand

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Education

University of Minnesota Duluth
Bachelor of Science, Chemistry and Biochemistry | Departmental Honors — May 2023
Master of Science, Chemistry — Expected May 2025

Honors and Awards

Rober Bayer Memorial Scholarship — 2022

Larry C. Thompson Inorganic Award — 2023

Casmir Ilenda Award for Oustanding Undergraduate Research — 2023

Departmental Honors — 2023

John C. Cothran Memorial Fellowship — 2024

Related Experiences

Research Assistant – *University of Minnesota Duluth* — December 2021 – Present

- Utilized machine learning techniques to analyze and manipulate large, complex datasets, deriving meaningful insights using Python and R.
- Designed, developed, and deployed a neural network for automated microplastic identification, incorporating data preprocessing, transformation, and validation processes.
- Built an interactive dashboard to streamline neural network model deployment, improving usability and accessibility for diverse users.
- Conducted statistical analysis to identify trends in microplastic accumulation and assess environmental impact.
- Designed and executed experiments focused on improving accuracy, performance, and efficiency in analytical methodologies.
- Developed and optimized SQL queries for efficient structured data extraction, transformation, and analysis.
- Published peer-reviewed manuscripts, demonstrating strong written communication skills in conveying research findings clearly and effectively, while developing high-quality figures to support data visualization.
- Collaborated with cross-functional teams while multitasking to translate complex data insights into actionable recommendations, driving informed decision-making.

- Delivered presentations at professional conferences, effectively communicating complex concepts to diverse audiences.
- Extracted spatial land use data, U.S. Census statistics, and socioeconomic indicators from targeted watershed regions.

Graduate Teaching Assistant – *University of Minnesota Duluth* August 2023 – Present
- Assisted students on data analysis, and statistics in Quantum Mechanics and Thermodynamics undergraduate courses**.**

Undergraduate Teaching Assistant – *University of Minnesota Duluth* January 2022 – May 2023
- Led General Chemistry laboratory and discussion sessions, guiding students in fundamental chemistry concepts, statistical analysis, and scientific manuscript writing.

Additional Experiences

Walgreens Senior Pharmacy Technician December 2020-Present
- Accurately prepare and distribute patient medications.
- Collect patient information accurately and process third party billing claims and assist with prior authorization completion.
- Administer vaccinations and COVID-19 testing.

Hermantown – Proctor Stealth Lacrosse – Assistant Coach April 2021 – June 2024
- Led and communicated effectively with young adults, creating a supportive and motivating environment that improved team cohesion, performance, and individual confidence.
- Mentored and guided high school athletes to excel beyond the sport by encouraging sportsmanship, discipline, and personal growth, helping them become the best versions of themselves.

Projects

Automated Identification of Microplastics (AIM)
Developed and deployed a neural network-based polymer classification model utilizing over 2.2 billion data points to accurately identify polymer types. The project integrated advanced preprocessing and data cleaning techniques to ensure high-quality input for model training, followed by automated post-processing to refine predictions. The final phase involved creating an interactive dashboard to enhance usability and model integration.

Programming Languages

Python | R | SQL | MS Excel | Machine Learning | Neural Network | ArcGIS | CustomTkinter |

Instrumentation

μFTIR, FTIR – ATR, GC, GC/MS, HPLC, UV-VIS-NIR, Spectrofluorometer, Bomb Calorimetry

Presentations

Lead Presenter

"Combatting highly complex matrices and exploring the human influence on microplastic distributions in Minnesota's lakes and rivers" Abstract ID#: 21665, Goldschmidt 2024 Conference. Chicago, Illinois

"Microplastics Investigation in Fish and the Impacts of Body Size and Feeding Behavior" UMD Chemistry and Biochemistry Spring Symposium 2023. Duluth, Minnesota

Affiliated Co – Author

"Drivers of Microplastic Ingestion by Fish in Four Inland Lakes, Minnesota, USA" Abstract ID #:1089075, AGU fall 2022 conference

"Microplastic Size Fractions in Groundwater and Surface Water Sources for Drinking Water" Abstract ID#:1340150 AGU fall 2023 conference

Publications

Conowall, P., Schreiner , K. M., Marchand, J., Minor , E. C., Schoenebeck, C. W., Maurer - Jones, M. A., & Hrabik, T. R. (2024). Variability in the drivers of microplastic consumption by fish across four lake ecosystems. *Frontiers in Earth Science: Hydrosphere*, *12*. https://doi.org/doi.org/10.3389/feart.2024.1339822

Thomas, A., Marchand, J., Schwoerer, G.D., Minor, E.C., & Maurer-Jones, M. A. (2024b). Size Distributions of Microplastics in the St Louis Estuary and Western Lake Superior. *Environmental Science & Technology*, *58*(19), 8480–8489.). https://doi.org/10.1021/acs.est.3c10776