

Nicholas A. Bainbridge

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EDUCATION

University of Western Ontario, London, ON

Bachelor of Science, Honours Specialization in Biochemistry & Chemistry (Expected May 2023)

Capstone Thesis: “Atomistic Modelling of Weak Protein-Protein Interactions.”

Advisor: Professor Styliani Conostas

Deans Honour List (2019 – Present)

Western Scholarship of Distinction (2019)

Summer Fellowship Recipient (2022)

NSERC USRA Scholarship (2023)

Research Experience

NSERC-USRA Summer Research Assistant – Paul Group (2023 – Present)

- Followed literature procedures producing desired compounds to correct specifications.
- Facilitated the use of Raman Spectroscopy and NMR to better characterize hydrogels.
- Developed and documented methods to calculate hydrogel crosslinking abundance.
- Ascertained potential biosensing activities of silver nanoparticle hydrogels from literature.

Research Assistant – Conostas Group (2022 – 2023)

- Worked with Dr. Styliani Conostas to investigate weak protein-protein interactions (PPIs)
- Analyzed the PPIs on an atomistic, microsecond scale using computational methods.
- Developed novel strategies to analyze the results of Molecular Dynamics (MD) simulations.
- Designed protein model using VMD and NAMD.
- Wrote Python scripts to analyze the ligand-protein binding interface.

Research Assistant – Konermann Group (2022)

- Investigated solvent attributes in Native Electrospray Ionization–Mass Spectrometry.
- Conducted and documented benchtop experiments in conjunction with MD simulations.
- Developed innovative computational methods in GROMACS to strengthen findings.
- Wrote complex Python scripts with multivariate calculations to determine the pH of a multi-buffered solution.
- Responsible for sourcing chemicals and ordering analytical devices like pH electrodes.

Researcher – Open Insulin Foundation (2021 – 2022)

- Made advances in the biochemistry department.
- Investigated patents for a viable extraction method of insulin from bacteria.
- Discovered prospective workflow to better optimize extraction efficiency.

Research Assistant – Robarts Research Institute (2018 – 2020)

- 3D modelled patient mitral valves based off 2D and 3D ultrasound images and recreated them in silicon.
- Established an efficient workflow process and improved upon organization systems.
- Designed and developed a desktop model of mitral valve simulator which enabled students to practice valvular surgeries.
- Gained experience in operating and interpreting Philips EPIQ ultrasound system.

Co-op Student: Partners in Experiential Learning – Robarts Research Institute (2018)

- 3D printed patient kidney vasculature based off patient data inlayed within silicon mold.
- Validated simulated kidney size and vasculature against patient image data.

Presentations / Publications

- "On the Chemistry of Aqueous Ammonium Acetate Droplets During Native Electrospray Ionization" (Sent for Review, May 2023)
- "Atomistic Modelling of Weak Protein-Protein Interactions" (December 2022).
- "Quantum Tunnelling: When Going Through the Mountain is Easier than Over." (February 2022).
- "Mitral Valve Repair Simulation using Dynamic Patient-Specific Models." (June 2019).

Work Experience

Tutor – Physics, Chemistry, and Math (2020 – Present)

- Created science lesson plans for high school students in Grades 9 through 12.
- Organized alternative lesson models to best suit learning styles of students.
- Helped students set and achieve realistic goals.

Ski Instructor – Boler Mountain (2016 – 2018)

- Responsible for safety of my students, myself, and other patrons
- Developed lesson plans for groups and individuals of ages ranging from 3 – 65.
- Built a fun, interactive environment fostering community and skill development.
- Advocated for students at the end of the season by writing ability development report cards.

Starbucks Barista (2018 – 2019)

- Collaborated with fellow staff members to create an enjoyable experience for customers.
- Facilitated friendly communication with customers, processed transactions, and produced beverages according to the customer's needs.
- Maintained the excellent quality control that Starbucks is held in high regard for.
- Achieved high standards and *Partner of the Quarter* award.

Lifeguard (2016 – 2018)

- Ensured the safety of pool patrons, staff, and all personnel near the pools.
- Maintained standards according to the rules and regulations of the facility.
- Remained constantly vigilant of potential hazards to prevent and treat injuries.
- Responded to emergency situations, reacting swiftly to assess situations and act accordingly.
- Ensured proper documentation and event coordination for facility records and liability.

Freelance Rapid Prototyping: 3D Printing and Design (2020 – Present)

- Build and design prototypes built to the clients specifications
- Use a combination AutoCAD, Autodesk Fusion 360, and Space Claim for 3D design.

- Communicate openly with clients throughout the entire design process to streamline quality.
- Receive feedback from clients on current projects and adjust future prototypes.

Certifications

- Laboratory Health and Safety, WHMIS, Safe Campus Community, Accessibility in Service
- National Lifeguard Lifesaving Society
- Standard First Aid and CPR-C
- Western's NMR Facility: Bruker 400 and INOVA 600 MHZ NMR Spectrum Acquisition
- Canadian Ski Instructors' Alliance: Level 1 Ski-Instructor

Extracurriculars

- Software programming in Python, C++, Java, HTML, CSS, REACT, and MATLAB
- Hardware Soldering and PCB Design using custom built CNC.
- 3D Modelling in AutoCAD, blender, and Fusion 360 and slicing in Cura.
- 3D printing using both SLI and FDM 3D printers.
- Chemistry Club at Western: Goggle Sales representative and CHEM 1301 tutor.
- Volunteer at London Ontario Children's Museum Halloween event
- Volunteer at Western University Science Rendezvous
- Harry Potter Club at Western: Executive – Events Coordinator.

Volunteer Experience

Chemistry Department Highschool Outreach

- Supervised high school students in conducting 1st-year university experiments.
- Ensured experiments were conducted correctly and followed proper safety measures.
- Taught students about the scientific method, emphasizing the importance of proper documentation during experiments.

Western University Science Rendezvous

- Family-friendly event directed toward children ages 4-12, to engage in S.T.E.A.M activities.
- Saw a collective record total of over 4,500 youth visiting the event.
- Created an interactive experiment to teach students about differential pressures effect on household items like marshmallows and balloons.
- Created fun and intrigue, tailoring experience based on the age and perceived interest of visitors, providing explanations that are educational to both youths, and adults.

USC Early Outreach Conference

- Introduces 250 at-risk youth ages 11-13, to post-secondary education opportunities.
- Organized and planned 14 experiments fit to best match our target audience.
- Promoted scientific intrigue from youth by asking them questions and encouraging an active involvement in each experiment.

London Ontario Children's Museum Halloween Event

- Toddler and youth campaign for safe trick or treating during Halloween.
- Responsible for transporting supplies off-site and setup of experiments.
- Conducted experiments tweaked to fit the Halloween theme.
- Promoted scientific intrigue from youth by asking them to predict the outcomes of experiments.