# BRUCE BANNER

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## Education

**Master of Applied Science (MASc), Biomedical Engineering** Sept. 2024 – Expected Dec. 2025

McMaster University, Hamilton ON

- *Thesis:* Synthetic Biology Approaches to Rewire Cellular Signaling in Immune Cells

**Honour Bachelor of Health Science (BHSc), Biomedical Engineering** Sept. 2020 - April 2024

McMaster University, Hamilton ON

*Specialization:* Health, Engineering Science & Entrepreneurship (HESE)

- *Thesis:* Cardiovascular Risks Associated with the Use of Selective Androgen Receptor Modulators (SARMs) in Performance Enhancement

## Research Experience

**Genetic Engineering Research Assistant** May – Aug. 2025

STEMCELL Technologies Inc., Vancouver BC

- Conducted RNA/DNA extractions and optimized PCR protocols to ensure high-quality nucleic acid yields
- Analyzed qPCR and gel electrophoresis data with GraphPad Prism and Excel for gene expression
- Maintained detailed lab records for cell culture and reagent conditions

**Biomaterials Research Assistant** May – Aug. 2023

Sheardown Laboratories, Hamilton ON

- Developed biomaterials for ocular drug delivery, improving hydrogel stability by 15% through polymer preparation and UV-Vis characterization
- Synthesized and characterized mucoadhesive nanoparticles for anterior eye drug delivery
- Designed Excel tools to streamline in vitro drug release data tracking, reducing analysis time by 20%
- Presented literature reviews on mucoadhesive polymers to inform team research directions

## Teaching Experience

**Instructional Assistant, McMaster University** Spring 2024, Fall 2024

*Engineering Differential Equations and Biomedical Innovation & Entrepreneurship*

- Administered written and MATLAB assignments on Childsmath; created and graded examinations, ensuring congruency with in-class content and expectations
- Reviewed content at weekly tutorials (average 30 students) and hosted office hours beforehand to ensure students sufficiently understood all course content and material
- Led wet-lab experiments and ensured all students followed bio-lab safety procedures and protocols

## Extracurricular and Volunteer Experience

**Editorial Team Member**, *Meducator Health Sciences Journal* Sept 2022 – April 2024

- Reviewed and edited scholarly submissions for clarity, accuracy, and adherence to publication standards, ensuring high-quality content in health sciences
- Collaborated with authors and peer reviewers to refine manuscripts and uphold academic integrity
- Contributed to editorial planning and issue curation, enhancing the journal's impact and readership

**Wet Lab Member** | *International Genetically-Engineered Mind* Oct. 2022 – Feb. 2024

*McMaster University*

- Engineered bacteria to detect sepsis biomarkers in collaboration with a multidisciplinary team
- Conducted molecular cloning, protein expression, and analysis (PCR, SDS-PAGE, Western blot)
- Analyzed experimental data using Python (Pandas, NumPy, Matplotlib) and Excel
- Troubleshot protocols and refined project goals with advisors and teammates

## Publications

- Banner, B., & Kim, H. (2024). *Synthetic Promoter Design for Controlled Expression of Therapeutic Genes in Cardiac Tissue*. Genetic Engineering & Biotechnology Journal, 18(4), 210–222
- Banner, B., Alvarez, M., & Chen, L. (2023). *Nanoparticle-Based Delivery of siRNA for Targeted Silencing of Oncogenes in Breast Cancer Cells*. Molecular Bioengineering, 27(2), 134–148



## Presentations and Posters

- Banner, B. (2024). *3D Bioprinting of Cartilage Tissue Using Alginate-Based Bioinks*. Poster session at the Undergraduate Engineering Design Expo, Hamilton, ON
- Banner, B., & Li, M. (2023). *Development of a Wearable Pulse Oximeter Using Flexible Sensors*. Presented at the Undergraduate Biomedical Innovation Symposium, Hamilton, ON

## Professional Memberships

Canadian Medical and Biological Engineering Society (CMBES) 2024 - Present

## Awards

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| Stelco Graduate Bursary, McMaster University ($35k CAD) | 2025 |
| NSERC Undergraduate Research Scholarship ($6k CAD) | 2023 |
| Dean's List Award, McMaster University ($1k CAD annually) | 2022, 2023 |

## Skills

**Programming Languages:** Python (Pandas, Numpy, Matplotlib, Seaborn), C/C++, Java, R, MATLAB
**Software:** SolidWorks, AutoCAD, ANSYS, Abaqus, Multisim, Simulink, Maple, COMSOL Multiphysics, Excel, MS Office, GSuite