**2023 Multidisciplinary Research Program in Medicine Project**: Gender relationships to paths into and out of a biomedical engineering program

**Hypothesis or Research Question(s):** Why do women/gender minority students select biomedical engineering at UBC over other engineering disciplines? Do women/gender minority graduates of biomedical engineering at UBC enter jobs/graduate programs in engineering following their degree? If not, what field do they enter?

**PROJECT BACKGROUND & SUMMARY**

Engineering has a long-standing gender imbalance, with 24.2% of engineering students identifying as women in 2020 (Engineers Canada 2021). (Note there is essentially no population information on non-binary or genderqueer students in engineering, so much of the background will be focused on women-identifying individuals). Many concerted efforts are being made, locally and nationally, to increase the proportion of women-identifying students in engineering to better reflect the society that engineers serve, with an increase of about 8% over the past 20 years.

Biomedical engineering, however, is known for having the highest proportion of women students of any engineering discipline, both at UBC and broadly in North America. In Canada, 53.1% of students in the category of "biosystems" engineering identified as women in 2020 (Engineers Canada 2021).

While this high proportion of women in biomedical engineering may seem like a great step on the way to more representative student populations, recent research on US schools suggests two issues: first, adding a biomedical program to an engineering school tends to draw women from other engineering programs instead of adding women to engineering. And second, biomedical engineering is a niche field making up a small proportion of the jobs in engineering (unlike mechanical or electrical engineering). It's not clear that biomedical engineering programs will substantially help to increase gender parity across engineering.

While women enroll in biomedical engineering at higher rates than other disciplines, the specific reasons why are not always clear. Is it the healthcare focus and a desire to work in that field? Is it seen as "helping" others (or pro-social)? Is it to have more women-identifying peers, or a more gender-balanced cohort? Is it because of perceptions around the technical difficulty of the program compared to other disciplines? Is it job opportunities?

Our first research aim will address this issue of why women/gender minority students choose biomedical engineering. We will perform a mixed-methods (qualitative and quantitative) study involving both surveys of current and former UBC Biomedical Engineering students (all genders), and interviews of current UBC Biomedical Engineering students.

Engineering is often described as a "leaky pipeline", where women/minority-gender folks self-select out of the engineering training and career path. Anecdotally, there is a perception that this happens more frequently in biomedical engineering, because of its close relationship with a second cluster of healthcare professions. It's not clear if this is truly occurring, and if there is a difference in rates of leaving between men and other genders. It's also not clear when in their degree students in biomedical engineering may decide on leaving engineering after graduation - it could be a goal prior to enrollment (e.g. chose biomedical engineering as part of a plan to pursue MD degree), during their degree, or after their degree. And finally, it's not clear why students may choose to leave engineering after a biomedical engineering degree.
2023 Multidisciplinary Research Program in Medicine Project: Gender relationships to paths into and out of a biomedical engineering program

Our second research aim will address these issues. This will be a mixed-methods study with surveys and interviews of former UBC Biomedical Engineering students (all genders).

**BENEFIT TO THE STUDENTS**

Students will be involved in all phases of the project from the start under the supervision of the faculty. Their work will range from literature review, to designing survey and interview questions, to implementing the surveys and joining the interview sessions. They'll help recruit fellow students to participate in the surveys and interview. They'll also carry analysis of the gathered data using mixed methods, and will help prepare a final report.

Participating students will learn how to carry methodological research on a sociological topic that affects themselves and their peers. This project will raise student awareness about EDI topics, and the engagement of women in healthcare and biomedical engineering. Students will also learn about structured ways of designing surveys and interview questions. They'll learn how to carry systematic quantitative and qualitative data analysis. They'll also practice drawing conclusions and preparing scientific manuscripts for presenting their work to the professionals.

Potential theoretical concepts learned may be around self-efficacy, fit/belonging, gender schemas, and microaggressions.

What we learn in the project could help us understand more about what draws people of different genders to engineering, and ultimately help produce representative gender distributions in both BME and other engineering programs and keep women/minority-gender students/graduates in the engineering pipeline in BME.