

A UROP perspective: Summer 2021

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Research Title: Development of an online tool for modelling electrochemical thermodynamics

My initial ardour for chemical engineering stemmed from the potential outlook of energy industry. However, after studying remotely behind a laptop screen for a term – my initial zeal for chemical engineering has seemed to diminish to dying embers. I had to rediscover my passion, and that was when I was introduced to UROP – an insight into research and academia. I reached out to my personal tutor and asked for her thoughts and guidance regarding the registration procedure.

My UROP journey began with looking in to more detail the interests of researchers within my department and recognising where those interests aligned with mine – and then I began sending emails requesting opportunities. Some professors wouldn't entertain remote UROPs, while other professors weren't available, but I was fortunate enough to have received a reply and a potential placement from Dr. Anna Hankin.

We had a conversation regarding my motivation to further develop the online tool for electrochemical thermodynamics. As a first-year undergraduate student, I had no clue what my future career would look like – I wasn't even sure how I wanted it to play out. Since chemical engineering is such a broad discipline, a graduate would have an equally broad career outlook – from academia and consultancy, to pharmaceuticals and finance. With a puzzling future, I was apt to find out whether the aspect of research was suitable for me. One of my greatest hesitations to accept the UROP was my exceptionally rudimentary coding skills, in which the project demanded a great level of fluency. However much I disliked coding, I knew this skill would prove valuable to me in my future career, so my intrepid-self took on the project. Moreover, there is this internal conflict I often revisit – to love what you do or do what you love? Since it is unlikely I will be fortunate enough to love what I do for life, I should prepare the mentality to love what I do, so my shift in perspective on coding must change. To hopefully compensate for the lack of my coding abilities, I went to take a Python course on LinkedIn Learning. In hindsight, the course had negligible impact on the level fluency which was required for the project.

My project started with Dr. Hankin explaining the required concepts regarding solutions, in particular how pH, electric potential and thermodynamics would have an effect on the existence of species in solution. These concepts individually were not foreign at all, but the combination of this was treading into uncharted territory. Approximately halfway into the UROP, I moved outside my comfort zone – the coding of the diagrams. I was extremely fortunate to have had the help from Chris who explained his code.

Though a large part of my project was out of my comfort zone, the eight weeks went by in a flash. In short, it was an extremely fruitful experience, not only did I garner knowledge in electrochemical thermodynamics and coding, but it also taught me lessons that no lectures could – how to tackle problems. This personal experience, I imagine, will be quite similar to how I would tackle problems in my future career.

Despite the fruitful learning experience, I did experience an element of guilt. The guilt stemmed from my lack of my experience and/or my knowledge in the field. It feels all experiences would follow a Laffer curve, where the horizontal axis would be 'experience/knowledge' and the vertical axis would be 'fruitfulness/value of experience or "return on investment" of time'. With no experience or knowledge, the value of the experience would be nil, and with person who is extremely well versed in the said topic, they would not gain any new knowledge. It's finding the sweet spot between "taking" (learning new knowledge), and "giving" (providing useful work), which I aim to achieve, but I felt the former played a much more dominant role during these eight weeks which led to a sense of guilt.

That is not to say I regret this experience at all. I enjoyed steep learning curve. All the new skills, both hard and soft, I have garnered over the eight weeks are invaluable and will prove to be crucial for my long-term growth. The slight glimpse into academia I have amassed will prove useful when I strive further into my future. Over the next few years, I would like to garner more experience in a variety of fields, and hopefully find one where I can enjoy, thrive, and reach my potential to make a positive change in the world. Though this research experience was relatively niche, the skills I have accumulated are extremely versatile – and without a doubt, I will be further developing in the years to come.

I would like to conclude with expressing my gratitude to Malavika (an undergraduate who shared their UROP experiences with me), Dr. Marsha Maraj and Dr. Camille Petit for their guidance prior to the commencement of my project. I must also express my gratitude to Chris for explaining what he had achieved with Dr Hankin the previous year, and in particular, his patience for my endless questions. My deepest gratitude goes to Dr. Anna Hankin for the eight valuable weeks; thank you for your patience and time you have spent prior and during the project, and most importantly, thank you for the non-UROP support you have provided.