This position is in the Formulation Development Group in Tarrytown, New York supporting the development of in-house mRNA-Lipid nanoparticle (LNP) manufacturing capabilities. LNPs are being increasingly used for mRNA delivery. Scale-up of mRNA-LNP drug products for clinical and commercial production involves several key unit operations that must be controlled to ensure that the quality attributes of the final drug product are maintained. It is critical to optimize these unit operations at the lab-scale to have reproducible and robust parameters to transfer to manufacturing.

**The successful student will contribute to two projects related to the development of LNP-specific unit operations, one computational (Project 1) and the other experimental (Project 2).**

We are looking for a motivated individual who is excited to work on their independent projects under the guidance of senior scientists.

1. **Project 1 (computational modeling):**

This position will focus on microfluidic mixing devices, specifically building a computational model for mixing techniques involving various microchannel structures for nanoparticle synthesis. The goal of the project is to achieve a robust model that can simulate the effects of both microchannel geometry and process parameters. The Co-Op will work with both in-house development equipment and commercially available software to deliver robust models for current and future synthesis capabilities.

1. **Project 2 (experimental):**

This project will be focused on optimizing the tangential flow filtration (TFF) unit operation that involves buffer exchange and concentration of mRNA-LNPs. This unit operation is critical in maintaining the final drug product quality. The goal of this project is to develop a TFF process using various mRNA-LNP formulations, which will be generated in-house using microfluidic mixing devices. In addition, the co-op will also work on evaluating sterile filtration of mRNA-LNPs using different sterilizing grade filters.

This Co-Op position is an exciting opportunity for an enthusiastic graduate student to gain relevant experience and learn new skill sets in an industry setting while working on these two independent projects in parallel.

**Desired majors:**

* Biomedical and Chemical Engineering or Related Majors
* Mechanical Engineering Majors
* Engineering Science Mechanics
* Applied Engineering Physics
* Bioengineering, Pharmaceutical Sciences, or related discipline
* Biology, Chemistry or Related Majors

**Necessary technical skills:**

-Lab skills: Lipid nanoparticle or liposome manufacturing, different analytical techniques e.g. light scattering, pH, absorbance-based methods, fluorometric assays

-Preferable: Downstream experience with tangential flow filtration (TFF) and sterile filtration

- Knowledge of engineering principles related to heat and mass transfer (knowledge of fluid dynamics preferred)

- Experience with computational modeling, especially molecular dynamic simulations (experience with modeling microfluidic devices preferred)

- Proficiency with programming (e.g. Python)

**Necessary education level:** PhD or Masters