Student’s Name: XXX

WSU ID: XXX

**Cohen Honors College Petition for Exception**

**Reason**

Petition for exception to the research course requirement HNRS485 with the research experience working in Dr. Schneegurt’s Microbiology Lab. I will be taking another 3-credit honors course to substitute the research requirement to meet my Emory Lindquist Honors Scholar Track requirement.

**HNRS 485 Honors Research Seminar Outcomes**

* Explain basic principles of human subject research and research ethics
* Identify research questions, arguments, and practices in a variety of discipline
* Appreciate research and creative methodologies and problems from a variety of disciplines
* Formulate a research question or research-based creative project in a field or profession of the student’s choice
* Read and evaluate research materials from a chosen field
* Present research or creative interests to a potential faculty mentor
* Create a research or creative project plan
* Conduct preliminary research at the discretion of faculty mentor and with faculty mentor guidance
* Present research to a diverse audience
* Evaluate peer research questions, research plans and presentations

**Research/Project Summary**

URCAF Abstract 2023

Layered ice systems are analogs of natural environments expected on Mars. The presence of liquid water on Mars suggests that life may exist inside brine trapped between layers of pure water ice accumulated from frost and aeolian dust deposits. We are investigating the proliferation and survival of bacterial cells entrapped in layered ice systems under laboratory conditions by freezing and melting brine layers at low temperatures. Halophilic bacteria (*Halomonas* sp. str. GSP3, *Halomonas* sp. str. BLE7, and *Oceanobacillus* sp. str. SAF16) were isolated from JPL SAFs, Basque Lake, and the Great Salt Plains. Cultures were grown at a high salt concentration (15% NaCl) in R2A medium and frozen brine layers were formed at –40°C. The brine layer was melted at –12 °C and allowed to fractionate into dense liquid brine and a frazil ice layer, while top and bottom layers of pure water remained frozen. The microbes were in the brine layer to monitor their survival, activity and movement throughout the brine, frazil, and pure water ice layers. Microbial cells may exhibit migration patterns within the layered ice systems, as we observe cell partitioning and distribution. All three bacterial species exhibited high survival rates and appeared to partition more cells in the brine layer than the frazil layer. We are extending our research by creating layered ice analogs with salts, which have extremely low freezing points and are common on Mars. This project will help us monitor the activity of microbes in Mars-like conditions through layered ice systems and inform planetary protection protocols. The layered ice systems assist in studying the characteristics of these halophilic microbes and their potential to survive in entrapped layered ices. Supported by NASA and K-INBRE.

**Project Timeline**

The project started in December 2021, when I joined Dr. Schneegurt’s Microbiology Lab as a first-year research assistant with the FYRE program. I continued to do research with Dr. Schneegurt the in Fall 2022 and Spring 2023 semester after the FYRE showcase.

**Presentation Plan**

I plan to present my research at the annual Undergraduate Research and Creative Activity Forum (URCAF) in Spring 2023. URCAF is a forum hosted by Wichita State University for students to present their scholarly and creative activity to faculty, students, and community audience. I also plan to present my research at the 155th Annual Meeting of the Kansas Academy of Science at McPherson College.

**Experience Outcomes**

Through my experience, I have learned a lot about working in a wet lab, making mistakes, and learning a lot from my mistakes. I have grown to love working in the lab and am fascinated by the work I do. At first, I did not have any background knowledge about microbiology aside from the basic general biology knowledge. I learn something new every day working in the lab from my research mentor, lab mates, the experiments, other research, and my failure. Lab work consists of multiple trials and errors. Working to improve the experiments can be challenging and fun. Research can be enjoyable as there are varieties of aspects and activities, I take part in. Experimenting, creating, reading papers, learning from others, making mistakes, failing, persevering, improving, and organizing are all activities and learning experiences that I did while working in the lab. I have learned a lot about my project and a lot about myself as an individual. I gain a better understanding of my work ethic and interests. I discovered what I like, what I dislike, what I am good at, what I would like to improve on, and what I hope to do in the future.

\_\_Mark A. Schneegurt\_\_\_\_\_ \_\_\_03/20/2023\_\_\_\_

Signature of Faculty Mentor Date

xxx 03/15/2023

Signature of Student Date