

BIOLOGY 380.3 Project Proposal Form

Student's name: _____

Signature: _____

Student number: _____

NSID: _____

Proposed Supervisor: Byung-Kook (Brian) Ham Signature: _____

Course & CRN#: _____ BIOL380.3 _____ Term: Winter 2024

Proposed Project Title: Characterization of plant xylem-mediated signals in response to the imposed Pi-starvation

Project Outline: Please provide a brief outline of the proposed research project. Include any relevant methodology and explain what the student will learn over the course of the project (attach additional pages if necessary).

Phosphate (Pi) is an essential macronutrient for plant growth and is a main constituent of fertilizers that drive sustainable agricultural output. Given that rock Pi supplies are finite and non-renewable, to achieve global food security it will be essential for crop engineering to develop elite lines with both enhanced Pi uptake and use efficiency.

During reduced Pi availability, plant roots are the first organs to recognize these stress conditions through root-localized mechanisms. These stresses can be converted into root-derived signals that are transported via the xylem for communicating these challenging conditions to the shoot. The root-derived signals, delivered into vegetative tissues, elicits generation of specific output signals that enter the phloem to transfer commands from the shoot to the root for integrating the demands for various developmental and physiological processes.

Students will learn practical physiology and molecular biology techniques in this project. Students will learn Pi-starvation stress treatment onto cucumber plants, using artificial xylem sap and analyze the data which they obtain from experiments. Students will examine various plant responses of cucumber plants under Pi-starvation stress conditions.

Students will be required to perform at least 6 hours per week for this project throughout the Winter 2024 term. A maximum of 3 students can be accommodated on this course.

Please, contact Prof. Dr. Byung-Kook (Brian) Ham for more information.

Prerequisites: Completion of 12 credit units of senior BIOL courses.

Evaluation: Please indicate when grades will be assigned. Will anyone other than the proposed supervisor be providing any assessment?

| Assessment Metric: | Date(s) Grade is to be Assigned: |
|--------------------------------------|---|
| Practical Research Performance (25%) | 12% Feb 29, 13% Apr 5 |
| Research Notebook (25%) | 10% Feb 29, 15% Apr 5 |
| Literature Review/Final report (40%) | 5% annotated bibliography (2.5% Feb 29 and 2.5% Apr 5), 10% background literature review (5% Feb 29, 5% Apr 5), 25% Term paper by Apr 5 |
| Oral Presentation (10%) | To be determined, but before Apr 5 |
| Total (100%) | |

A copy of the final literature review is to be provided to the Department. The original Research Notebook may be retained by the Course Supervisor depending on intellectual property requirements.

Approved: _____
(Department Head)

Date: _____