This syllabus is a general representation of the course as previously offered and is subject to change.

BIOL 351 / FRST 311 / APBI 351 – Plant Physiology I

General Course Syllabus (as of August 2019)

About the Course:

Course Description: The course will provide an introduction to functional processes that contribute to plant growth and survival. Topics include: events, mechanisms, regulation, and organization of processes contributing to the assimilation, transport and utilization of water, mineral nutrients, and carbon by plants. These processes are important to help multi-cellular, terrestrial, vascular plants to acquire and utilize environmental resources and survive environmental stresses. Plant functions may be explored at various levels of organization, ranging from the molecular to the multi-species association.
APBI 351, BIOL 351 and FRST 311 are one and the same course.

Course Format: Lecture and Laboratory.
Credits: 4
Prerequisites: One of BIOL 121, SCIE 001 and either: (a) CHEM 123 or (b) all of CHEM 111, CHEM 113. (CHEM 233 is recommended.)

Course Learning Objectives:

Upon completion of this course, students will be able to describe the following for major functional biological processes in plant physiology:

- The sequence of events that take place during a process.
- The materials involved in a process, including inputs and outputs.
- The physical and chemical mechanisms involved in a process.
- What forms of energy are required for a process, and how energy is transformed.
- In what plant tissues the processes occur, and how plant structures contribute.
- How a functional process is regulated.
- What evidence exists for our present understanding of plant function.
- How functional processes are investigated, and how experimental data is interpreted.
- How our knowledge of plant function helps us to interpret and predict plant performance.

Textbooks and Additional Resources:

Textbook (required):
Taiz, Zeiger, Møller and Murphy (2015) Plant Physiology and Development. 6th Edition, Sinauer Associates Inc., Sunderland MA

Course website: access Canvas at canvas.ubc.ca. Students will need a CWL Login name and password.

Evaluation:

As a guideline (may change with year), the final mark for each student will be based upon four components:

Assessment	Weight
Midterm Test	25%
Final Exam	35%
Class Quizzes	5%
Laboratory (includes written journal-style research reports, research proposal and presentation).	35%

NOTE: *In order to PASS the course, students MUST pass both the lab and the lecture components separately.*

Schedule of Topics:

Below is a sample schedule from 2018W1 (subject to change).

Unit	Lecture
1 (Weeks 1-4)	**Photosynthesis, Carbon Acquisition and Plant Productivity** • Introduction. • Energy and plant functions. Concepts of mass transport in plants. • Radiant energy interception for photosynthesis. • The photosynthetic apparatus of chloroplasts. • Energy transformations in chloroplasts. • Energy transformations by mitochondrial membranes I. • Energy transformations by mitochondrial membranes II. • CO_2 flow into leaves. Some photosynthetic enzymes. • Photosynthetic carbon assimilation (C3). • Photorespiration. • Photosynthetic CO_2 concentrating pathways (C4, CAM).
2 (Weeks 5-7)	**Assimilate Translocation** • Phloem structure. Source-sink relationships. Materials transported. • Rates of transport. Pressure-flow hypothesis. • Phloem unloading. Carbon allocation and plant productivity. • Starch Metabolism. • Plant Cell Wall Development and Synthesis.
	Mid-term Test

3 (Weeks 7-9)	**Plant Water Relations** • Role and state of water in plants. • Diffusion and osmosis. Components of water potential. • Absorption of water by roots and the flow of water through plants. • Dixon cohesion theory. Measuring water potential. • Stomatal structure. Photosynthesis-transpiration. • Water-use efficiency and gas exchange.
4 (Weeks 9-11)	**Inorganic Nutrition** • Essential elements and their functional roles in plants. • Acquisition of essential elements from the plant environment. • Nutrient distribution within plants. • Ion entry into cells: kinetic evidence. • Ion entry into cells: barriers, channels, carriers. • Assimilation of nitrate and ammonium. • Biological nitrogen fixation.
5 (Weeks 11-13)	**Plant Responses to Environmental Stresses** • Physiological stress. Plant responses to nutrient deficiency and excess. • Water stress: effects of water deficit, flooding and mechanisms of resistance. • Water excess and resistance to flooding stress. • Other plant stress –i.e. salt. • Last Day of Classes.

University Policies:

UBC provides resources to support student learning and to maintain healthy lifestyles but recognizes that sometimes crises arise and so there are additional resources to access including those for survivors of sexual violence.

UBC values respect for the person and ideas of all members of the academic community. Harassment and discrimination are not tolerated nor is suppression of academic freedom.

UBC provides appropriate accommodation for students with disabilities and for religious, spiritual and cultural observances.

UBC values academic honesty and students ae expected to acknowledge the ideas generated by others and to uphold the highest academic standards in all of their actions.

Details of the policies and how to access support are available on the UBC Senate website.