

## **Tentative Syllabus**

### **IB 542 (also CPSC 542). Environmental Plant Physiology**

**When:** Fall Semester 2016; Tuesday and Thursdays from 9:30 to 11:20

**Where:** Room 607 Institute for Genomic Biology

**Instructor:** Carl Bernacchi

**Email:** [bernacch@illinois.edu](mailto:bernacch@illinois.edu)

**Office Location:** 196 ERML (Edward R. Madigan Laboratory)

**Office Hours:** By arrangement

**Class Website:** <http://www.life.illinois.edu/ib/542/>

**Class Moodle:** <https://learn.illinois.edu/course/view.php?id=194>

#### **Outline:**

This course is designed for students to understand the components of the environment that are directly relevant to plant growth, physiology, and function. The course will introduce the physical principles of the environment in which plants grow (both soil and atmosphere) and the exchange of matter, radiation and heat between plants and their environment. Similarly the principles underlying plant water relations will be presented.

Each class will follow the format: One hour of class lecture on a specific topic followed, on some days, by an in-class lab activity or in-class assignment. The grade breakdown for the course is as follows:

Three exams equaling a total of 75% of the final grade

Homework assignments, worth a total of 15% of the final grade

In-class report, worth 10% of the final grade.

**Expectations:** Attend and participate in all classes. Review notes from each class, so that the concepts and information may be used in subsequent discussions. Read papers for discussions, when provided or requested. Prepare one presentation to the class.

**Course text:** Individual journal articles and book chapters will be recommended for each class.

#### **Course text:**

H, Chapin, FS, Pons, TL (1998) **Plant Physiological Ecology**. Springer, New York. 540 pp. (UIUC Biology Stacks; Call Number: 571.2 L171p)

<http://vufind.carli.illinois.edu/all/vf-uiu/Record/10468278>

Campbell GS and Norman JM (1998) **An Introduction to Environmental Biophysics**, 2<sup>nd</sup> Edn. Springer, New York. 286 pp. [http://vufind.carli.illinois.edu/all/vf-](http://vufind.carli.illinois.edu/all/vf-uiu/Record/14941696)

[uiu/Record/14941696](http://vufind.carli.illinois.edu/all/vf-uiu/Record/14941696)

#### **Recommended reading:**

Nobel PS (2009) **Physicochemical & Environmental Plant Physiology**. 4<sup>th</sup> Edn. Academic Press, San Diego. 600 pp.

Lambers Monteith JL, Unsworth MH (1990) **Principles of Environmental Physics**. 2<sup>nd</sup> Edn., Edward Arnold, London. 291 pp. (UIUC ACES Stacks Call Number: 574.54 M76P1990 )

<b>Date</b>	<b>Lecture</b>	<b>Lecture Title</b>
23-Aug	1	Introduction, Units, the Environment, and Plants
		The Physical Environment:
25-Aug	2	Atmosphere/Temperature/Humidity
30-Aug	3	The Physical Environment: Wind and Light
1-Sep	4	Temperature and Development
		Conductance and diffusion; Wind, Turbulence, and Turbulent
6-Sep	5	Fluxes
8-Sep	6	Soils and Mineral Nutrition
13-Sep	7	Soil-Plant-Atmosphere Continuum (Wertin)
15-Sep	8	Ecosystems and the Nitrogen Cycle (Gomez-Casanovas)
20-Sep		Exam 1
22-Sep	9	Chemical Reactions and Stable Isotopes
27-Sep	10	Metabolic Fluxes
29-Sep	11	Leaves and the environment
4-Oct	12	Canopy Structure and Radiative Transfer
6-Oct	13	Photosynthesis: C3
11-Oct	14	Photosynthesis: C4
13-Oct	15	Photosynthesis: CAM
18-Oct		Exam 2
20-Oct	16	Biosphere-Atmosphere Fluxes
25-Oct	17	Surface Energy Balance
27-Oct	18	
1-Nov	19	
3-Nov	20	Measuring Ecosystem Fluxes
8-Nov	21	Canopy and Landscape Modeling
10-Nov	22	Stable isotopes and biological fluxes
15-Nov	23	Plant-Climate Interactions
17-Nov	24	Plants and the Environment
29-Nov	25	Plants and regional biogeochemistry (Guest)
1-Dec	26	Plants and Global Change
6-Dec		Exam 3