Course Title: Plant Metabolomics IB512
Credit: 2 hours
Instructor: Amy Marshall-Colon
Contact: amymc@illinois.edu
Class hours/week: T/R 11:00 AM – 12:20 PM
Office hours: Wednesdays from 3 - 4 PM in 193 ERML or by appointment

Course Description

Plants are sessile organisms that must respond dynamically to environmental signals. Key to their response and survival is the intricate network of metabolic pathways that result in the differential accumulation of metabolites. This course will familiarize students with the fundamentals of plant metabolomics research. Metabolomics is presented in relation to plant development, nutrition, and response to stress, among other topics. Students will use online tools to analyze, organize, and visualize metabolomics data. Course goals include a critical evaluation of a current topic in plant metabolomics and how metabolomics technology can enhance their own research objectives. Prerequisites: Graduate student status or consent of instructor. At least one upper level undergraduate course in biochemistry or its equivalent.

Student Learning Outcomes

i) Understand how metabolomics technology can enhance research in plant sciences.
ii) Relate metabolomics technologies to your own research interests.
iii) Critically evaluate research in plant metabolomics, such as that found in scientific journals.

Prerequisites:

This is an advanced course in systems biology and requires basic familiarity with biochemistry and molecular biology. At least one upper level undergraduate course in biochemistry or its equivalent is required.

Required textbook

The Handbook of Plant Metabolomics. Print ISBN: 9783527327775; Online ISBN: 9783527669882; DOI: 10.1002/9783527669882

Journal articles

Readings from primary literature for discussion will be made available online.

Academic Integrity

All students should follow University of Illinois "Code of Policies and Regulations Applying to All Students." The Code is available online at: http://www.admin.uiuc.edu/policy/code/index.html
According to the Student Code, `It is the responsibility of each student to refrain from infractions of academic integrity, from conduct that may lead to suspicion of such infractions, and from conduct that aids others in such infractions.' Please know that it is my responsibility as an instructor to uphold the academic integrity policy of the University, which can be found here: http://studentcode.illinois.edu/article1_part4_1-401.html

Attendance Policy

Regular class attendance is expected of all students at the University as described by the student code: http://studentcode.illinois.edu/article1_part5_1-501.html

Missed quizzes cannot be made up; however, prorates will be given for valid excuses as outlined by the student code. Likewise, final projects and final papers must be turned in by the due date. You must let the instructor know during the first week of class if you plan on missing class due to scheduled meetings or religious observances. Failure to notify the instructor during the first week of class will result in unexcused absences. Late assignments will not receive full credit.

Disability Accommodations

To obtain disability-related academic adjustments and/or auxiliary aids, students with disabilities must contact the course instructor and the Disability Resources and Educational Services (DRES) as soon as possible. To contact DRES you may visit 1207 S. Oak St., Champaign, call 333-4603 (V/TTY), or e-mail a message to disability@illinois.edu.

Class Format

Class format consists of short lectures at the beginning of each class period presenting the principles and fundamental knowledge necessary to understand the topic, followed by a discussion session or other activity to reinforce lecture topic. Some class periods will be devoted to learning relevant online tools and software for data collection, analysis, and visualization.

Computer Requirement

Students are required to have a laptop computer to complete in-class computational assignments. If a student cannot bring her/his laptop then he/she must pair up with someone who has a laptop for in-class assignments and discussion.

Grading

Quizzes	20 %
Final paper	40 %
Final presentation	30 %
Discussion Participation	10 %

Quizzes (20%)

Weekly quizzes will assess student comprehension of the literature and lecture material. Students with a valid reason for missing a quiz will be given an opportunity to take a make-up quiz at the discretion of the instructor. Valid reasons include only medical reasons (with a note from a doctor), tragedy in your immediate family, or religious observances and practices.

Final Paper (40%)

Near the conclusion of the course, students will write a mini-manuscript that describes how metabolomics technologies can be incorporated into their own research interests. Specifically, students will apply metabolomics tools learned during the course to data related to their research question to obtain results. Papers will be 10-15 pages long, including figures and references, and will include Introduction, Methods, Results, Discussion, and Conclusions. Papers are due the last day of class.

Final Presentation (30%)

Students will give an oral presentation of their final paper topic. Presentations are 15 minutes long, and should include Introduction, Methods, Results, Discussion, Summary and Future Directions. Final projects will be presented during the last week of classes.

Discussion Participation (10%)

Readings will be provided online in advance of discussion sessions. Students are expected to actively participate in classroom discussion sessions, and the instructor will award points based on level of participation.

Course Calendar

Week	Lecture	Date	Unit	Topic
1	1	01/15	Introduction	Overview of Course & Intro to metabolomics
	2	01/17		Analytical Methods in Metabolomics
2	3	01/22	Primary Carbon Metabolism	Field trip to Metabolomics Facility
	4	01/24		Central carbon metabolism
3	5	01/29	Primary Nitrogen Metabolism	Nitrogen uptake and assimilation
	6	01/31		Amino acid biosynthesis
4	7	02/05	Secondary Metabolism	Plant protection
	8	02/07		Secondary products
5	9	02/12	Metabolic Flux Analysis	Flux measurement; steady-state and dynamic
	10	02/14		Predicted fluxes
6	11	02/19	Genome-scale Metabolic Models	Development of genome-scale metabolic models
	12	02/21		Integrating the metabolome with the genome
7	13	02/26	Integrating Metabolite Data with Other Data	Integrating the metabolome, proteome, and transcriptome
	14	02/28		Intro to KEGG Pathways, AraCyc, Mapman
8		03/05	Final Presentations	Final presentations
		03/07		Final presentations; Final paper due