

Plants harness sunlight energy, fix atmospheric carbon dioxide, and produce a diverse array of chemical compounds, which play critical roles in plant growth, development, and adaptation. Plant-derived metabolites are also major sources of human food, feed, fiber, fuel, pharmaceuticals, and other bio-based materials. The Biochemistry/Botany 621 course covers topics related to plant metabolism and discusses how plants generate carbon and energy sources by photosynthesis and synthesize various compounds through complex networks of metabolic pathways. Various analytical tools (e.g., mass spectrometry, NMR) that are used in plant biochemistry research will be also introduced. The course is designed for graduate students and advanced undergraduates and has two 75-minute classes per week, which consist of lectures and student presentations based on primary scientific literature. General chemistry and biochemistry are prerequisites to this course.

Time and location: Tuesdays and Thursdays from 9:30-10:45 am in Biochemistry building room 1116.

Textbook: There is no textbook for this course but we recommend two excellent plant biochemistry books.

- *Biochemistry and Molecular Biology of Plants*, 2nd Edition, Buchanan, BB, Gruissem, W, and Jones, RL editors. American Society of Plant Physiologists publisher (2015) [Available at UW-library online.]
- *Plant Biochemistry and Molecular Biology*. Heldt, H-W. Oxford University Press, 4th ed. (2010)
<http://www.sciencedirect.com.ezproxy.library.wisc.edu/science/book/9780123849861>

Instructors: Sebastian Y. Bednarek, Biochemistry, bednarek@biochem.wisc.edu
Hiroshi A. Maeda, Botany, maeda2@wisc.edu
John Ralph, Biochemistry, jralph@wisc.edu

Guest lecturer: Jean-Michel Ané, Bacteriology, jane@wisc.edu

Learning goals are to:

- Understand plants convert CO₂ (and N) to various metabolites through different metabolic pathways.
- Obtain scientific thinking skills (e.g. how to read literature, critically evaluate data, and identify unknown questions).
- Learn scientific writing skills.

Class format for each topics:

- Two to three 75-min lectures
- Assignment of problem sets (two or three essay-type questions, one question could be simply, “Describe an unresolved question in the field of photosynthesis light reaction.”)
- 75-min discussion based on an assigned primary literature (30-40 min presentation by an “author”, followed by discussion facilitated by an “editor” and contributed by “reviewers (the rest of the class)”.

Evaluation:

- Homework (1/3), problem sets for each topic (**due on the first lecture of the next module.**)
(One chance to resubmit within a week if there was not enough time for the first submission)
- Discussion based on primary scientific literature (presenter/editor/reviewer) (1/3)
 - **Presenter (“author”):** Present backgrounds, results, and conclusions of an assigned paper.
 - **“Editor”:** **Facilitate discussion and then write one-page summary**, which includes 1) main conclusion of the paper, 2) novelty and strength of the study, 3) weakness and shortfall of the study (e.g., if the conclusions are supported by the results), 4) potential future directions.
 - **“Reviewers” (the rest of the class):** **Fill out and submit a reviewer form before each discussion and provide your opinion to the class during discussion.**
- Proposal/Review (1/3) (5-10 pages)
 - Write either a review article or a research proposal on topics of your interest (but outside of your thesis project).
 - **Consult with an instructor before starting to write a paper by October 15th.**
 - For a review format, follow the guideline described in *Current Opinion in Plant Biology* (<http://www.journals.elsevier.com/current-opinion-in-plant-biology/>), then click “Guide for Author”.
 - **Submit to a peer reviewer by November 4, and then an instructor by November 18.** Revise and resubmit the final version **by December 14.** (and enjoy winter break!)

*There will be no final exam.

ACADEMIC INTEGRITY

By enrolling in this course, each student assumes the responsibilities of an active participant in UW-Madison's community of scholars in which everyone's academic work and behavior are held to the highest academic integrity standards. Academic misconduct compromises the integrity of the university. Cheating, fabrication, plagiarism, unauthorized collaboration, and helping others commit these acts are examples of academic misconduct, which can result in disciplinary action. This includes but is not limited to failure on the assignment/course, disciplinary probation, or suspension. Substantial or repeated cases of misconduct will be forwarded to the Office of Student Conduct & Community Standards for additional review. For more information, refer to studentconduct.wiscweb.wisc.edu/academic-integrity/.

ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

McBurney Disability Resource Center syllabus statement: “The University of Wisconsin-Madison supports the right of all enrolled students to a full and equal educational opportunity. The Americans with Disabilities Act (ADA), Wisconsin State Statute (36.12), and UW-Madison policy (Faculty Document 1071) require that students with disabilities be reasonably accommodated in instruction and campus life. Reasonable accommodations for students with disabilities is a shared faculty and student responsibility. Students are expected to inform faculty [me] of their need for instructional accommodations by the end of the third week of the semester, or as soon as possible after a disability has been incurred or recognized. Faculty [I], will work either directly with the student [you] or in coordination with the McBurney Center to identify and provide reasonable instructional accommodations. Disability information, including instructional accommodations as part of a student's educational record, is confidential and protected under FERPA.” <http://mcburney.wisc.edu/facstaffother/faculty/syllabus.php>

DIVERSITY & INCLUSION

Diversity is a source of strength, creativity, and innovation for UW-Madison. We value the contributions of each person and respect the profound ways their identity, culture, background, experience, status, abilities, and opinion enrich the university community. We commit ourselves to the pursuit of excellence in teaching, research, outreach, and diversity as inextricably linked goals.

The University of Wisconsin-Madison fulfills its public mission by creating a welcoming and inclusive community for people from every background – people who as students, faculty, and staff serve Wisconsin and the world.” <https://diversity.wisc.edu/>