

MMBB 486/586: Plant Biochemistry

Spring 2007

Time: 3 credits, Tuesday and Thursday 9:30-10:45 AM**Place:** TBA**Instructor:** Zonglie Hong
132 Gibb Hall (office)/130 Gibb Hall (lab)
885-5464 (office)/885-4235 (lab)
zhong@uidaho.edu**Course description:** This course covers basic and exciting aspects of plant biochemistry and molecular biology including carbon and nitrogen metabolism, secondary plant products, plant hormones, signal transduction pathways, the circadian clock, and genomics. The course is designed for upper-level undergraduate students and graduate students who are interested in the biochemical nature of plants and in the frontiers of research in plant biochemistry and molecular biology.**Prerequisites:** MMBB 300/380**Objectives:**

- 1) To understand the functions and regulation of major biosynthetic pathways of plants.
- 2) To understand the mechanisms of major signal transduction pathways of plants.
- 3) To become familiar with the exciting topics in plant biology research from photomorphogenesis, agricultural genomics to molecular phytopharmaceutics.
- 4) To appreciate the relevance of plant biochemistry and molecular biology to molecular farming and the survival of humanity.

Textbook: *Biochemistry and Molecular Biology of Plants*, B. Buchanan, W. Gruissen & R. Jones, 2000, ASPP (ISBN 0-943088-39-9).**Handouts:** Lecture notes will be available for download from (for registered students only): <http://www.ag.uidaho.edu/mmbb/zhong/mmbb586/index.asp>.**Grading:** There will be three exams, each covering the material presented after the previous exam. For undergraduate students, final grading will be based solely on the total points from the three exams (each worth 33, 33 and 34 points, respectively). Graduate students will be required to submit a minireview paper on a research topic in plant biochemistry. Final grading for graduate students will be determined on the basis of the minireview paper (20% of the final grade) and the total points of the three exams (80%). On the scale of a possible total of 100 points, final course grades will be determined as follows:**A: > 90 B: 70-89 C: 50-69 F: < 49**

Examinations: The examinations will test your knowledge and understanding of the materials covered in the course. All exams will be close-book! Therefore, you may not bring your text, handouts and notes to exams.

Minireview paper (applicable to graduate students only): The review should focus on a hot topic of research in plant biochemistry and molecular biology, and provide a critical-yet-balanced view of the topic so that it is accessible to researchers in other areas. The review may include: 1) a brief introduction describing the nature and significance of the topic, 2) current status of knowledge and unsettled questions, and 3) future research directions. The length of the review should be in the range of 5-15 pages, excluding references cited. Students are strongly encouraged to discuss with the instructor before choosing a topic. The review is due on **Monday April 30, 2007**.

Assistance: The instructor will have office hours between 9:30-11:00am every Tuesday and Thursday. Students are also encouraged to make an appointment to meet with the instructor.

Lecture Topics

1. Plant Biochemistry and Molecular Biology: Introduction
 2. Photosynthesis: light absorption
 3. Photosynthesis: electron transfer
 4. Photosynthesis: Calvin cycle
 5. The C₄ cycle and CAM cycle
 6. Photosynthate transport and starch biosynthesis
 7. Cellulose, callose and cell walls
 8. Photomorphogenesis
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9. Biochemistry of symbiotic nitrogen fixation
 10. Molecular communications between Rhizobia and legumes
 11. Nitrogen uptake and assimilation
 12. Amino acid biosynthesis (1)
 13. Amino acid biosynthesis (2)
 14. Phenolpropanoid metabolism
 15. Isoprenoid
 16. Alkaloids
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17. Plant hormones: Physiology
 18. Plant hormones: Biosynthesis
 19. Plant hormones: Signal transduction
 20. Sugar signal sensing and responses
 21. Osmoprotection and osmosensing
 22. Receptor kinases and signal perception
 23. The circadian clock in plants
 24. Metabolomics, proteomics and genomics