BSPM 581A2 Plant Biochemistry in Agriculture

Instructor
Dr. Franck E. Dayan, franck.dayan@colostate.edu, 662-816-6214. Office hours: most mornings
111 Weed Research Laboratory

Meeting time and place
Monday, Wednesday and Friday
Conference room in Weed Research Laboratory

Targeted Student Population
The course is intended for graduate students in the plant sciences, such as botany, plant ecology, crop science, weed science or horticulture, but it is opened to other students with general interest in plants.

Course Learning Objectives
Upon successful completion of the 10 modules, computer modeling sessions and projects related to agriculture and health in this course, students will be able to do the following:
Module 1 – identify the building blocks of proteins and their assembly in macromolecules as well as interpret basic enzyme kinetic parameters
Module 2 – explain the conversion of light energy into chemical energy in photosynthesis
Module 3 – contrast the different mechanisms of carbon fixation in the plant kingdom
Module 4 – interpret the role ammonia assimilation in photorespiration
Module 5 – illustrate the carbon flow from glycolysis to carbohydrate synthesis
Module 6 – discuss various ways to manipulate fatty acid synthesis to benefit mankind
Module 7 – describe the relationships between the biosynthesis of photosynthetic pigments
Module 8 – contrast the role of nitrogen and sulfur assimilation in amino acid synthesis
Module 9 – differentiate the amino acid biosynthesis pathways
Module 10 – characterize the main biosynthetic pathways of natural products

Computer Modeling Practicum – build protein homology models and analyze key structural features

Plant Biochemistry in Agriculture and Health – explain how plant biochemistry plays a key role plant productivity, response to its biotic and abiotic environment, and has a positive influence on human health

This course will provide students with an experiential learning environment leading to mastery of biochemical methods of enzyme purification and assays, and important plant biochemical pathways. A theme that will underlie all of these areas will be the structure and function of enzymes in metabolic pathways and the contributions of these pathways to plant growth and development. To that end, students will become proficient in basic modeling of proteins throughout the semester. When appropriate, topics are taught as problem-based situations related to plant production, stress responses, chemical ecology and the production of secondary metabolites of importance to mankind. Students will be able to critically read the scientific literature pertaining to plant biochemistry and metabolism.

Course Prerequisites
Students should have completed a course in BZ440 (Plant Physiology), HORT476 (Environmental Plant Stress Physiology) and a course general chemistry or equivalent with a grade of C or better.

Required Textbook
Course Home Page
From Canvas, you will be able to access notes and lecture slides, take quizzes, view the course calendar, view exam scores, access study questions, read course announcements and find information concerning assignments.

Attendance Policy and Participation
Regular attendance in class is expected because successful completion of the course is highly unlikely without direct participation in the lecture instructor-student dialog and discussion of the course content. Lecture notes and slide sets serve primarily as an outline to direct the content presented in lectures, and should not be considered a detailed account of all content presented in the lectures. Attendance to the Student-Centered Projects and Computer Modeling sessions are required.

Occasional unavoidable absences will not necessarily impact student performance in the course. However, if extended absences become necessary, the student should contact the course organizer to discuss options and strategies of how to make up missed work.

Participation will be assessed according to the following criteria:
- Preparedness: the extent of your reading, analyzing and understanding of the material, demonstrated by contribution to discussion.
- Contribution to discussion: the extent to which you volunteered answers, asked relevant questions, expressed your own opinions and analyzed the contributions of others.
- Group skills: the extent to which you allowed others to contribute, avoided class domination, shared ideas with others, assisted others, provided positive feedback to others and exhibited tolerance and respect for others.
- Communication skills: the quality of your expression, clarity, conciseness, use of appropriate vocabulary, confidence.

Quizzes
A total of 10 quizzes will be given, in class or on Canvas. Quizzes given on Canvas will be open-book, but must be completed in 20 minutes. They will appear as pop-up windows—be sure this feature is enabled in your web browser.

The quizzes will consist of 5 – 10 questions on the previous two week's lectures, and each will count 10 points. The quizzes will test vocabulary, structures, and pathway details. The instructor reserves the option of adding quizzes not shown on the syllabus, replacing quizzes by homework assignments, or cancelling quizzes.

Course Projects
Students will be required to participate in 7 Plant Biochemistry in Agriculture and Health Projects based on critical reading of scientific articles and 7 Computer Modeling Sessions.

Exams
There will be two exams and a final, which are each 100 points. Exams are not comprehensive and will cover the lectures specified on the schedule. However, some questions may require knowledge of material covered on previous exams. Exams will consist of questions (multiple-choice, fill in the blank, short and long answer) and problems. Exams will cover details of structure, function, and pathways, major concepts, problem solving, data analysis. Each exam will be given two scores, the raw score and the scaled score. The raw score is the number of points answered correctly on the exam. The scaled
score is the raw score plus a scaling factor, which weights the exam for difficulty. This system allows use of questions that are challenging for everyone in the class.

**Make Up Exams and Course Work**

If for any reason, it is not possible to properly prepare or take an exam or quiz or turn in the course project on time, the student should contact the instructor in advance of the assessment if the absence is a non-emergency or as soon as possible afterward in the case of an unforeseen emergency to arrange for an accommodation or make up of missed, quiz or project submission. As noted above there will be no make-up exams because you are allowed to drop the lowest exam grade. The instructors reserve the right to disallow a make-up opportunity based on the nature of the reason for missing an assessment.

**Grading Policy**

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<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Participation</td>
<td>10%</td>
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<tr>
<td>Quizzes</td>
<td>15%</td>
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<tr>
<td>Course projects</td>
<td>45%</td>
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<tr>
<td>Exams</td>
<td>30%</td>
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Grading will be based on the standard CSU grading policies found in the Graduate Catalog: [http://catalog.colostate.edu/general-catalog/academic-standards/grading/#grading-scale](http://catalog.colostate.edu/general-catalog/academic-standards/grading/#grading-scale)

**Accommodations for Students with Disabilities**

Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student, who must then provide this documentation to the Instructor when requesting accommodation.