

Biology 3041:
Plant Biology and Genetic Engineering
Fall 2008

The goals of this course are to convey a working knowledge of how plants grow, develop and reproduce, and how knowledge of plant genetics, development, cell biology, biochemistry, physiology and recombinant DNA techniques can be combined to produce plants with novel traits. Recent examples of genetically engineered crops and the current efforts of the biotechnology industry will be discussed. We will also spend some time discussing the environmental, social, economic and ethical issues related to genetic engineering of plants.

Students should note that recombinant DNA techniques are useful tools to analyze genetic, physiological and cellular phenomena in most intensively studied organisms, not just in plants. Consequently, the experimental approaches and concepts presented will be applicable in other fields of biological research and parallels will be pointed out throughout the course.

Prerequisite: Bio 2970: Principles of Biology II (Mendelian and molecular genetics).

Credit 3 units

TuTh 10:00-11:30 AM; Rebstock 322

Instructors: Note that e-mail is the best way to reach us

Professor: Dr. Barbara Kunkel

kunkel@biology2.wustl.edu

Office: Monsanto Hall 319, 935 -7284

Office Hours: Mondays 3 - 4 pm

TAs: Jeanne Sheffiield

jmsheffi@artsci.wustl.edu

Discussion Section: Thursdays 12- 1 pm; LS112

Andrew Mutka

ammutka@artsci.wustl.edu

Discussion Section: Tuesday 9 – 10 am LS112

Discussion Sections:

Each Teaching Assistant (TA) will hold a weekly, one hour-long discussion section. The main purpose of these sessions is for the TAs to discuss the assigned (e.g required) reading with you, and to go over lecture material that might require further clarification. This is also a good time to ask questions about problem sets. You can also e-mail your TAs with specific questions before the discussion section. That way you can be sure your question will be addressed.

If you need extra one-on-one time, come to Dr. Kunkel's office hours, or set up an appointment to meet with one of the TAs or Dr. Kunkel.

Evening help sessions:

With Dr. Kunkel: Monday or Wednesday nights before the midterms. Time and location to be announced

e-mail questions and answers:

Questions posted to the instructors by e-mail will be made available (with the name of the sender removed) to everyone in the class, along with the answers. In addition, we will set up a list-serve where anyone can post a question to everyone else in the class to allow online

discussions. This should be especially useful during late night study sessions prior to exams, when the instructors are unavailable. To post a message to the entire group, send your e-mail message to bio3041@biology2.wustl.edu and it will automatically be mailed to everyone in the class. If you have an answer to the question, or any other comment, you can send it to the whole class in the same way, or can send it directly to the person who asked the question. We will have a sign-up sheet at the first class meeting for you to provide your e-mail address so that the e-mail network can be set-up.

Course webpage:

The URL for our course web page is: <http://www.nslc.wustl.edu/courses/Bio3041/bio3041.html>. It is also accessible through The NSLC: <http://www.nslc.wustl.edu/courses/courses.html>. This webpage contains useful course information, the lecture outlines, PDF files for assigned readings when possible, answers to problem sets and other useful resources. Important class announcements will also be posted here. Please use the site, and let me or David Heyse (heyse@biology.wustl.edu), the manager of the NSLC, know if you have any questions or problems with the site.

Textbooks and reading assignments:

There is no single suitable textbook available that spans plant molecular genetics, development, biochemistry, physiology, and genetic engineering. Therefore, we will use a combination of assigned readings from several different textbooks as well as research articles and reviews from the primary literature.

We will rely most heavily on two textbooks:

1. Plant Physiology, by Taiz and Zeiger, 4th Ed. 2006, ISBN 0-87893-856-7
2. Molecular Biotechnology-Principles and applications of recombinant DNA, 3rd Ed. by Glick and Pasternak, 2003, ISBN 1-55581-224-4

Copies of these two books, as well as photocopies of the reading assignments are available on reserve in the Biology Library. I strongly encourage you to purchase your own copy of the Plant Physiology textbook. The Molecular Biotechnology text is also useful, but as we will only read a few of the chapters, you can get by without your own copy. If you would like to purchase your own copies of these texts, they are available at the Campus Book Store.

Additional reading assignments from other textbooks and from the primary literature will be handed out in class and posted on the course website when possible.

Additional useful references on reserve in the Biology library:

Botany, by Moore, Clark and Stern, 1998;
Molecular Genetics of Plant Development, by Howell, 1998.
Biochemistry and Molecular Biology of Plants, by Buchanan, Gruissem and Jones, 2000.
Recombinant DNA, 2nd edition, by Watson, Gilman, Witkowski and Zoller; 1992
Recombinant DNA, 3rd edition, by Watson, Caudy, Myers and Witkowski 2007
Introduction to Genetic Analysis, 7th or 8th edition, by Griffiths, Miller, Suzuki, Lewontin, and Gelbart, 2000, or 2005.
Molecular Cell Biology, 4th or 5th edition, 2000 or 2004, by Lodish, Baltimore, et al.
Plants, Genes and Crop Biotechnology, 2003, by Chrispeels and Sadava.
Mechanisms in Plant Development, 2003 by O. Leyser.

Tests, Homework and Research Assignments, Students Presentations and Grading.

There will be three closed-book exams: two midterms and one final. Each midterm will count 25% towards the final grade, and the final will be worth 30%. Approximately once every two weeks we will hand out a take-home problem set. The problem sets will consist of questions similar to those that will be on the exams, and are designed to help you study the material and practice answering questions. The problem sets will not be graded, but thorough answers will be made available one week after the problem sets are handed out. There will also be a final research project and presentation that will count towards 20% of your grade. This assignment will allow you to research in detail, and then briefly present to the class, an example of genetic engineering that we did not get a chance to discuss in lecture.

Problem solving will be emphasized in tests and homework assignments, not simple memorization of facts. For instance, you might be asked to design experiments towards accomplishing a hypothetical goal or to interpret data you've not seen before. Such questions will be based on what you've learned in class, but will not be identical to what you have learned. There may be more than one correct answer. Partial credit will be given for all essay and short-answer problems.

Students taking the class Pass/Fail (credit/no credit) will need the equivalent of a C-average to receive credit.

Make up exams:

Unfortunately, experience dictates that our exam policy be rigid. No make-up exams will be given. Unless you have checked into the hospital or campus health center you are expected to be present at the exams. If you have a legitimate medical excuse, please obtain documentation - for instance, the health center can provide a note saying that you were admitted with a health problem serious enough to warrant your absence. However, they also have a note simply saying that you came to the health center, with no comment as to the seriousness of your condition. You need the first kind of note.

In the event of a family emergency (e.g. a death in the family) that requires you to miss an exam, please try to make other arrangements with the instructors in advance of leaving town. If this is not possible and you must leave town immediately, please be prepared to provide documentation (e.g. a copy of the obituary) within a reasonable period of time after your return to validate your absence. We increasingly need to be able to document all grading decisions and exceptions.

If you have a legitimate excuse for missing an exam, your final grade will be determined by calculating the mean of the other tests and problem sets. Unexcused, missed exams will be given a grade of zero and may necessitate withdrawal from the course.

Course evaluation:

You are encouraged to fill out an evaluation form for this course online at evals.wustl.edu.