

# **Biotechnology, People and the Environment (3 credits) (CFAN 1501) – Spring Semester 2015**

## **Syllabus**

(version: 1/20/15)

### **Time and Location**

Classes meet in Ruttan Hall B25 on Monday, Wednesday, Friday from 11:45 am to 12:35 pm throughout spring semester. Students should plan to attend every class, because new material not found in the readings or handouts is presented each day and this material is important for tests and assignments. Unless otherwise announced, students should come to class ready to discuss readings that were assigned for that date.

### **Faculty and Staff**

#### **Nevin Young**

Plant Pathology

Plant Biology

612-625-2225 / 320-Cargill Building

Office Hours: Fridays, 9-10am

**Email Address:** [nevin@umn.edu](mailto:nevin@umn.edu)

#### **Karen Ballen**

Soil, Water and Climate

612-625-8268 / 256-Borlaug Hall (Moving to 429-Soils early 2015; Look for updates)

Office Hours: Mondays, 10-11am

**Email Address:** [balle008@umn.edu](mailto:balle008@umn.edu)

#### **Melissa Palmer**

Animal Science

612-625-1814 / 317B-Hacker Hall

Office Hours: Mondays & Wednesdays, 2-3pm

**Email Address:** [melissap@umn.edu](mailto:melissap@umn.edu)

*Note: Instructors are frequently available to answer e-mail questions if this is more convenient for you. Also, instructors can generally meet with students before/after class to answer student's questions.*

### **Learner Outcomes.**

**This is what you should expect to know by the end of the semester:**

*Biotechnology, People, and the Environment* will teach you:

- How to clone a gene.
- How to genetically modify microbes, plants, and animals.
- What is possible, and what is not possible, using current tools of biotechnology.
- How biotechnology impacts society.
- How biotechnology impacts the environment.
- How different people view biotechnology.
- How biotechnology influences -- and is influenced by -- ethical, legal, economic and social issues.

## Goals and Objectives

*Biotechnology, People and the Environment* (CFAN 1501) introduces the subjects of biotechnology and genetic engineering with a special emphasis on food, agriculture, the environment, and human health. The course seeks to present relevant technology in an accessible manner intended for a broad audience.

CFAN 1501 is organized into three sections: 1) a brief overview of genetic engineering and genomic technology, leading directly into the biotechnology of plants, highlighting genetically modified foods and crops as well as the creation of bioproducts; 2) the biotechnology of microbes, highlighting bioremediation of pollution, biocontrol of environmental organisms, and the microbiology of food products and 3) the biotechnology of human and animal health, emphasizing biopharmaceuticals, genetic screening, stem cells, genome sequencing, animal cloning, bioterrorism, and gene therapy.

*Biotechnology, People, and the Environment* fulfills the **Technology and Society theme of the Council on Liberal Education** (CLE). Each section of the class explores measurable impacts of biotechnology on contemporary society.

*Biotechnology, People, and the Environment* also fulfills the **Interdisciplinary Requirement** for undergraduate programs in the College of Food, Agriculture and Natural Resources Sciences (CFANS).

With this in mind, CFAN 1501 includes the following features:

- Commonalities in the questions and technologies across disciplines
- Motivations behind biotechnological innovation
- Real world impacts of biotechnology, including unintended consequences
- Critical and quantitative evaluation of risk
- The role of society in driving biotechnology development
- Contrasting perspectives toward biotechnology
- Ethical dilemmas arising from biotechnology
- Intellectual property and its relation to biotechnology.

Students are challenged to develop their own fact-based ways of thinking about biotechnology, to recognize the impacts of biotechnology broadly in the world around them, and to appreciate the role that society plays in the creation, utilization, adoption, and response to new biotechnologies.

## Moodle Page

<https://ay14.moodle.umn.edu/course/view.php?id=8989>

*(Best to access through your own X500 password and Moodle link)*

## Textbook and Readings

The textbook for CFAN 1501 in 2015 is INTRODUCTION TO BIOTECHNOLOGY 3<sup>rd</sup> Edition (ISBN 0-321-76611-3), available through the University Bookstore as well as from on-line book suppliers. Paperback, used, electronic, and rented versions of this textbook are acceptable. No matter what medium you choose, *it is essential that you are able to find the correct page numbers for reading assignments.*

Additional readings for CFAN 1501 come from the World Wide Web and are accessed as links through the course Moodle site.

**Students also need to have a Top Hat student participation account.** Top Hat accounts (you only need a single account for all UMN classes using TopHat this semester) cost \$20. Early during the term, you'll receive an "invitation" to register. More details are found later in the syllabus. For more information, visit [support@tophat.com](mailto:support@tophat.com).

### **Grading (Version 1/16/15)**

Grades for the course will be determined based on the following exams and assignments (details provided below):

- 100 points: Recombinant DNA and Plant Biotechnology Exam
- 100 points: Animal & Human Biotechnology Exam
- 100 points: Microbial Biotechnology Exam
- 50 points: Plant Biotechnology Journal
- 50 points: Microbial Biotechnology Journal
- 30 points: Consumer Perception Activity
- 45 points: Online quizzes (9 quizzes, 5 points each)
- 25 points: Debate points
- 15 points: Personal Reflections
- 45 points: In-class activities (12 activities total, 5 points each)  
(but the lowest score is dropped from each of the three class sections)
  
- TOTAL: 550 points

*Sorry, CFAN 1501 does not include an option for extra credit or re-submitted homework.*

Letter grades in CFAN 1501 are then calculated by the following formula:

A 95.00 and above

A- 90.00 - 94.99

B+ 87.00 - 89.99

B 83.00 - 86.99

B- 80.00 - 82.99

C+ 77.00 - 79.99

C 73.00 - 76.99

C- 70.00 - 72.99

D+ 65.00 - 69.99

D 60.00 - 64.99

F 59.99 and below

I *Assigned at the discretion of the instructor. This grade can only be given when, due to extraordinary circumstances, a student is prevented from completing the work of the course on time, but has already completed a significant portion of the class.*

**PLEASE NOTE:** For all written assignments (such as the Personal Reflections and Consumer Perception) as well as essay questions on exams, grading will be guided by the following formula:

25% Scientific Accuracy

25% Depth  
25% Creativity and Overall Impression  
25% Writing Quality

**ALSO:** Organization, legibility, spelling and grammar are taken into consideration in grading assignments! *Students should always leave a 1" margin on the left and right sides* of homework or essay question answer to provide space for the instructor's comments. Homework assignments should be typed.

### **Grade Disputes**

Students who feel an assignment has been graded incorrectly *should submit a **written or email explanation within one week of having the assignment returned.** Grades cannot be disputed more than one week after an assignment or exam is returned.* If the disputed grade is a matter of opinion, the entire assignment or exam will be given to the two other course instructors for re-grading. Their decision will be final. Errors due to a simple miscalculation can be corrected immediately. The Student Dispute Resolution Center is also available to help resolve grade conflicts.

## **ASSIGNMENTS**

### **Biotechnology Journals and Personal Reflections**

Biotechnology Journals and Personal Reflections are intended to illustrate the impact of biotechnology on people, society and the environment and to provide additional insights into debates involving biotechnology. For the Plant and Microbial sections, you will create a journal consisting of four entries that are based on your understanding and interpretation of specific web-readings assigned for class. For the Animal/Medical biotechnology section, Personal Reflection activities will be assigned and announced by the instructor.

### **Due Dates:**

Plant Biotech Journal due Feb-18

Microbial Biotech Journal due Mar-27

Animal/Medical Personal Reflections assigned periodically during April.

### **Debates (primarily during the Animal Biotech section of class)**

The purpose of in-class debates is for you to appreciate differing opinions and common arguments in society about controversial issues in biotechnology. Each student will prepare for one of three in-class debates. You will be randomly assigned to a group of 7-8 students, and either to a pro- or con- argument or to a group that will deliver background information only. Each group may split into two in order to cover more related issues. Topics that will be debated in-class this semester are: (1) Stem Cells, (2) Vaccines, and (3) Gene Therapy.

### **Public Perception Homework**

The purpose of the Public Perception Assignment is for you to discover more about how people outside of class feel about controversial issues in biotechnology. In the process, you will need to learn how to communicate effectively about these issues. Much of the assignment will be performed individually outside of class. On the day the homework is due, everyone's results will be collected and discussed in small groups and by the entire class. This will provide a sample of society's attitudes towards biotechnology.

**Due Date: May 4**

**PLEASE NOTE:**

*Assignments handed after the deadline will be reduced one letter grade. Assignments handed in two business days late will be reduced two letter grades. No late assignments will be accepted after two business days without a written valid excuse and permission of instructor.*

**Exams**

**Recombinant DNA and Plant Biotechnology Exam (February 23)**

The exam will be primarily fact-based and focused on recombinant DNA technology and the principles of plant biotechnology. There will be a combination of multiple choice, short answer and essay questions.

**Microbial Biotechnology Exam (April 1)**

The exam will be primarily fact-based and focused on microbial biotechnology. There will be a combination of multiple choice, short answer and essay questions.

**Animal & Human Biotechnology Exam (May 8)**

The exam will be primarily fact-based and focused on animal and medical biotechnology, though there will be at least one question "integrating" bioethics and/or environmental ethics from the entire course. There will be a combination of multiple choice, short answer and essay questions.

**Excused Absences**

All students are expected to be present on the days of exams. **There are no make-up exams except for unusual circumstances.** However, University policy does provide for make-up exams for students in cases of legitimate absences. Students should provide a written explanation to the instructor as far in advance as possible and certainly no more than three days after the exam. Instructors will determine whether the absence is excused. Written documentation from a physician, clergy, funeral director, coach or academic adviser will help to validate requests for an excused absence. **In cases of an excused absence, faculty may decide to schedule a special, essay question only exam for students with an excused absence. Alternatively, faculty may decide to excuse students from one exam (and no more) during the semester, in which case the student's final grade will be calculated on the basis of the other exams during the course.**

**Class Participation**

Attending and participating in class on a regular basis is essential for succeeding in *Biotechnology*. Subjects presented in class are explored in further detail through student discussion and are generally the topics covered most on exams.

To encourage class participation throughout the semester, instructors will assign frequent in-class activities during class, often for credit, so you need to participate every time. Some TopHat activities will be in the form of quizzes that test student learning. Quiz and Participation activities are included in calculating final grades, with the lowest activity score for each of the three sections (rDNA/Plant, Microbial, Animal/Medical) dropped from the final grade calculation.

## Flipped Classes

Throughout the semester, several classes will be “flipped”, which means that most of the fact-based material will be provided to you through a narrated presentation available on the class Moodle site. You should view these on-line presentations before coming to class. During the regular class session, most of the time will be spent in active learning and/or group learning activities. **To ensure that everyone is prepared for flipped classes, you must take a short on-line quiz (also found on the Moodle site) before coming to class to participate.** Scores on these quizzes will be included in the final grade.

## Top Hat:

This class will be using the Top Hat classroom engagement system throughout the semester. Top Hat is a web-based system that allows immediate interactive feedback and graphical simulations to aid and assess understanding of the course material. Top Hat feedback, questions and simulations are launched on demand by the professor during class. Students can participate by using laptops, iPods, smartphones, tablets and cellphones. Top Hat questions, simulations and answers can also be reviewed throughout the semester should they be made available by the professor.

Review the Top Hat Student Quick Start Guide on the course Moodle web site and register by the end of the first week of class. Students can register for a Top Hat account by visiting [tophat.com](http://tophat.com) and clicking the green **Student Signup** button in the top-right of the page. You will be prompted to find your school—by typing it into the drop-down menu—or you can enter the 6-digit course code **752742**. Clicking the **Info** button in the bottom right of the Top Hat course page will launch a pop-up that lists some of the methods you can utilize to access your course. All forms of digital access (laptop, tablet, smartphone, text-only phone) are supported.

The **Course SMS Response Number (SMS text no. 315-636-0905)** lists the phone number you can use to submit your text responses – it’s a good idea to add this phone number to your cellphone’s address book for easy access during class. The **Course URL ([app.tophat.com/e/752742](http://app.tophat.com/e/752742))** is also displayed in this window as another point of reference for the 6-digit course code. You will be presented with easy-to-follow steps, requesting that you input personal data such as name, email address, then selecting a username and password.

You will then be requested to enter your student identifier and mobile phone number, which will link the phone number to your Top Hat student account. You will be directed to the please contact Top Hat support by email ([support@tophat.com](mailto:support@tophat.com)), clicking “Support” within the Top Hat course web page and within the mobile app, or by visiting the Top Hat support forums at [support.tophat.com](http://support.tophat.com).

## Scholastic Conduct

All students in CFAN 1501 are expected to do their own work, though group activities and discussion among students are strongly encouraged. To make it clear what types of activities are **not acceptable** in class, here is a summary of the University of Minnesota Student Handbook on Scholastic Conduct:

***“cheating on assignments or examinations; plagiarizing, which means***

***misrepresenting as your own work any part of work done by another; submitting the same paper or substantially similar papers to meet different course requirements without the approval and consent of all instructors concerned; depriving another student of necessary course material; or interfering with another student's work."***

None of these activities will be tolerated in CFAN 1501. Any scholastic misconduct will lead to failure or expulsion from class.

Students are also reminded that disrupting class is disrespectful to other students and can lead to dismissal from that class period. Repeated problems can lead to expulsion from class. *The use of cell phones, tablets or laptops on activities unrelated to CFAN 1501 is not permitted. **Cell phone conversations can never occur during class and cell phones can only be used in class as part of Top Hat activities.*** There will generally be a second instructor in class to help ensure that student attention remains focused on class.

***Students who violate these rules or disrupt the learning environment for others will be dismissed from class, may receive a reduced final grade, and are potentially subject to disciplinary action.***

#### **Old Exam File**

An old exam file, including the questions for exams over the past few years, is available on-line. These exams give students an indication of the kind of questions to expect on this year's exam. *Keep in mind, new exams are prepared each year, so the old exams should be treated only as an indication of the types of questions to expect.*

#### **Help Sessions (TBA)**

Just before each exam, help sessions are scheduled for students who feel they need a little more preparation for assignments or the final exam. Help sessions will be scheduled to take place during regular class times.

#### **Disabilities**

CFAN 1501 is committed to providing equitable access to learning opportunities for all students. The Disability Resource Center (DRC) is the campus office that collaborates with students with disabilities to provide and/or arrange reasonable accommodations. If you have, or think you may have, a disability (e.g., mental health, attentional, learning, chronic health, sensory or physical), contact the DRC at 612-626-1333 to arrange a confidential discussion regarding equitable access and reasonable accommodations. If you are registered with the DRC and have a current letter requesting accommodations, please contact the instructors early in the semester to review how accommodations will be applied in the course.

#### **Constructive and Open Class Discussions**

Everyone's experience and opinions will be valued. Not everyone has to agree, even with the instructor. But differing view points must be communicated respectfully. Positions will be discussed and evaluated based on their supporting evidence. Various kinds of supporting evidence may be used. Students and the instructor will be expected to learn from discussions, and each person will have the chance to test and, if desired, revise their views.

<b>BIOTECHNOLOGY, PEOPLE AND THE ENVIRONMENT (CFAN 1501) - 2015</b>				
<b>MWF 11:45am - 12:35pm</b>				
<b>Ruttan Hall, B25; St. Paul Campus</b>				
<b>Nevin Young; Karen Ballen; Melissa Palmer</b>				
<b>CFAN 1501 (2015) TENTATIVE SCHEDULE (Updated 1/19/15)</b>				
<b>DATE</b>	<b>INSTRUCTOR</b>	<b>TITLE</b>	<b>SUBJECT</b>	<b>SPECIAL</b>
1/21/15	All	Course Introduction		
1/23/15	Young	Creating Life	Synthetic Biology	
1/26/15	Young	The Mighty Gene	The Central Dogma of Biology	
1/28/15	Young	Send in the Clones	Recombinant DNA Technology	
1/30/15	Young	Molecular Tinker Toys (Flipped)	Constructing Gene Libraries	
2/2/15	Young	Engineering Green Machines	Genetic Modification of Plants	
2/4/15	Young	A New Green Revolution (Flipped)	Plant Breeding	
2/6/15	Young	Plants that Defend Themselves	BT-Corn & Roundup-Ready Beans	
2/9/15	Young	Agroecology	Agroecology of GM-Crops	
2/11/15	Young	Race to Save the Orange (Flipped)	Citrus Greening Disease Case Study	
2/13/15	Young	Biopharming, Bioproducts & Biofuels	Novel Products from Plants	
2/16/15	Young	Custom-Designed Genomes	Genome Editing of Crops	
2/18/15	Young	Should We Eat GM-Foods? (Flipped)	GM-Food Labeling Controversy	<i>Journal</i>
2/20/15	Young	<i>Plant Biotech Review</i>	—	
2/23/15	Young	<i>Plant Biotech Exam</i>	—	<i>Exam</i>
2/25/15	Ballen	It's a Small World After All	Microbiology & the Nature of Bacteria	
2/27/15	Ballen	Nature's Fertilizer Factories	Biocontrol I	
3/2/15	Ballen	Bugs to the Rescue	Biocontrol II	
3/4/15	Ballen	Industrial Strength Proteins (Flipped)	Enzyme Basics	
3/6/15	Ballen	Extreme Enzymes	Enzyme Engineering Discussion	
3/9/15	Ballen	Let's Get Cooking	Food Microbiology	
3/11/15	Ballen	We're All a Little Different (Flipped)	Biodiversity	
3/13/15	Ballen	Nature's Cleanup Crew	Bioremediation I	
3/16/15		<i>Spring Break</i>		
3/18/15		<i>Spring Break</i>		
3/20/15		<i>Spring Break</i>		
3/23/15	Ballen	Nature's Cleanup Crew 2	Bioremediation II	
3/25/15	Ballen	Sequencing Ecosystems (Flipped)	Metagenomics	
3/27/15	Ballen	The Ecosystem Within	Human Microbiome Discussion	<i>Journal</i>
3/30/15	Ballen	<i>Microbial Biotech Review</i>	—	
4/1/15	Ballen	<i>Microbial Biotechnology Exam</i>	—	<i>Exam</i>
4/3/15	Palmer	Born Again	Cloning Animals	
4/6/15	Palmer	Born Better - GM Animals	Transgenic Animals / Gene Editing	
4/8/15	Palmer	You're Not So Specialized (Debate)	Stem Cells	
4/10/15	Palmer	Down on the Biopharm 2	Biopharmaceuticals	
4/13/15	Palmer	Are You Going to Eat That 2	Biotechnology and our Food Supply	
4/15/15	Palmer	The Parts Store (Flipped)	Mammalian Cell & Tissue Culture	
4/17/15	Palmer	Express Yourself (Debate)	Expression Systems & Vaccines	
4/20/15	Palmer	The Other Parts Store	Regenerative Medicine	
4/22/15	Palmer	It's All in the Genes (Flipped)	Genetic Testing	
4/24/15	Palmer	Call Dr. Gene Therapy (Debate)	Gene Therapy	
4/27/15	Palmer	Specifically for You	Pharmacogenomics & Genomics	
4/29/15	Palmer	Who Dunit? (Flipped)	DNA Fingerprinting and Forensics	
5/1/15	Palmer	The End of the World As We Know it	Bioterrorism	
5/4/15	Palmer	Consumer Perception Activity		<i>Perception</i>
5/6/15	Palmer	<i>Animal Biotech Review</i>	—	
5/8/15	Palmer	<i>Animal Biotech Exam</i>	—	<i>Exam</i>
5/16/14		Official Last Day		