

EVS 5896
Course Title: Environmental Biotechnologies
School of the Environment (SoE)
Florida A & M University
Semester: Fall 2012

Instructors: Ashvini Chauhan, Ph.D.

Office: 305B

Phone: 412-5119

Email: ashvini.chauhan@fam.u.edu

Website: <http://sites.google.com/site/ashvinichauhan/>

<http://www.fam.u.edu/index.cfm?a=environmentalscience&p=chauhan>

Office Hours: Monday, Tuesday and Thursday 2:00-3:00 pm or by prior appointment

SOE MISSION STATEMENT

The School of the Environment strives to produce students uniquely prepared to address present and future environmental science concerns. SoE fosters the development of students by emphasizing rigorous academic course work; student involvement in faculty research; and student involvement in collaborative research efforts with other universities, community/junior colleges, national laboratories, regulatory agencies, corporate environmental contractors, utilities, and municipalities.

COURSE DESCRIPTION

FAMU catalog description: Principles and practice of the various biotechnologies and their applications in environmental analysis, monitoring and measurements. This course reviews the development and application of biotechnologies for solutions to environmental challenges as well as associated regulatory, ethical, and legal issues. Topics include instrumentation, applications, techniques and research.

Prerequisite(s): Organic chemistry, biochemistry or equivalent.

Core curriculum course: No

Course restrictions: None

Availability to non-ESI majors: Yes

COURSE OBJECTIVES

Presentations in this course will give a detailed review of the biochemical reactions and molecular biology techniques that underpin current biotechnology methodology. Students will understand and review emergent techniques and applications to environmental biotechnology. On a rotating basis, latest journal articles will be included for group discussions and critique. At the end of the course, it is expected that students will have the ability to read and fully comprehend original research literature that use biotechnology techniques.

LEARNING MATERIALS

Course Text-book: Introduction to Biotechnology, William J. Thieman and Michael A. Palladino, Pearson, Benjamin Cummings Publishers, 2004.

Reference Texts:

1. Microbiology: An Introduction, Tortora, Funke and Case, 7th edition, Benjamin Cummings Publishers, 2001.
2. Molecular Cell Biology, Lodish, Berk, Matsudaira, Kaiser, Krieger, Scott, Zipursky and Darnell, W.H Freeman and Company, 2004.

EXPECTED LEARNING OUTCOMES

1. Foundation skills and knowledge: a) Students will demonstrate understanding of traditional approaches to study environmental microorganisms and application of emergent genomic and proteomic techniques to enhance desired functionalities. B) Students will demonstrate a basic understanding of environmental microorganisms and manipulation of microbially-mediated processes in soils, wetlands, aquatic environments and marine environments.

2. Effective written and verbal communication: Students will develop an extensive oral and written vocabulary to communicate effectively with environmental biotechnologists, as well as with the public at large.

3. Critical thinking: Students will demonstrate an ability to comprehend, dissect and critically evaluate the research literature in context to environmental biotechnology.

4. Integration of learned skills and information: Students will develop the ability to synthesize a holistic (interdisciplinary) approach to environmental problem-solving using cutting-edge genomic and biochemical approaches using microbes, plants, animals and combinations thereof.

COURSE ADMINISTRATION

Evaluation:

Class Participation and Discussion	15%
Mid-term	15%
Term Paper	35%
Final Exam	35%

Final grades will be determined on the basis of the following scale:

A = 90% - 100%

B = 80% - 89%

C = 70% - 79%

D = 60% - 69%

F = 0% - 59%

Class Participation: Active participation in class discussions is strongly encouraged and highly valued.

Exams: The purpose of exams will be to evaluate students' critical thinking ability. The format for exams will be short answer and essay. The material for these exams will come from class discussions, lectures, textbook, reading handouts, and homework sets. Exam will also include information from the journal article discussions.

Journal Article Presentation and Group Discussion: On a rotating basis each student will lead a discussion on a selected refereed journal article that is pertinent to the respective current topic being covered in class. You can select article(s) that you would like to discuss but it must be pre-approved by the instructor (this should be done as early as possible). Once approved, you should make copies of the article and distribute to fellow classmates and professor. This must be done at least a week prior to the discussion session. Failure to do so will result in a grade of '0' for the assignment. All students are expected to actively participate in journal article discussion. For example, read the selected article and prepare 2-4 specific questions and/or comments for the discussion that is specific to the paper being discussed. These discussion points are to be handed to the professor at the beginning of the lecture period. These written discussion questions will be included in the "class participation" grade. You are also required to present at least one journal article in a group consisting of two students each. For this, it is suggested that both participants should contribute equally to prepare and present the article.

Term paper: Submission of a term paper submission is required for this course. The format should follow the style of a published mini review from top journals such as Applied and Environmental Microbiology (<http://aem.asm.org/>). Total length of the paper should not exceed 8 pages using single-spaced, 12-pt Times New Roman font, excluding illustrations and citations. You are encouraged to explore and read topics in environmental biotechnology that should guide your selection process. Students should prepare an outline and meet with the instructor prior to final approval of a research paper topic. Topics must be approved by the instructor by **Tuesday, October 25th, 2012**. Submit a hard copy of your paper to me in class on **Tuesday, December 7th, 2012**. In addition to the hard copy, you must also submit an electronic version of your paper via email at ashvini.chauhan@famu.edu. Late submissions will not be accepted.

Make-up policy: Homework, presentations and projects will not be accepted late; no make-up exams will be given. This policy will be strictly enforced. Please refer to the University catalogue regarding class attendance regulations.

Attendance: Regular and punctual attendance is expected and is fundamental to success in this course. If a student is late for class they will be marked absent for that day. Information presented during class is the responsibility of the student whether he/she is present or not. It is up to the student to obtain class material and class assignments from other students when a session is missed. Note that any student exceeding 3 unexcused absences *'may be dropped from the course and assigned the letter F'* (FAMU's 2006-2008 Catalogue). For more information regarding class attendance regulations please refer to the University Catalogue.

Academic Honesty: Plagiarism and cheating will NOT be tolerated in any form. Plagiarism is defined as a direct and unattributed use of textual material. Evidence of plagiarism will result in reduction of grades by 50% for appropriate component of the course. Please review the Florida A & M University handbook (*“The Fang”*) for FAMU’s academic honesty policy. The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct- Regulation 2.012 section, beginning on page 55-56.

Americans with Disabilities Act (ADA) Policy Statement: To comply with the provisions of the Americans with Disabilities Act (ADA), please alert instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

Non-discrimination Policy Statement: It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

Cell Phone Policy: Cell phone use is strictly prohibited during class; no ringing, vibrating, text-messaging, games, pictures, etc. Failure to comply with this rule will result in your dismissal from the class.

TOPICS COVERED

Date	Topic
August 28	Overview of syllabus, course organization, administration etc.
August 30	Survey
September 4	Introduction and applications of environmental biotechnologies
September 6	Genes and genomes
September 11	Gene regulation
September 13	Genetic engineering
September 18	Biosafety, ethics and regulations
September 20	Microbial biotechnology: Microbial enzymes, vaccines, genomes, diagnostics, bioterrorism.
September 25	Student-led discussion on Journal Article #1:
September 27	Continue Journal Article #1
October 2	Plant biotechnology: transgenics, vaccines, environmental concerns

October 4	Bioenergy: Microbial fuel cells, algae to biobased products, biodiesel, bioethanol, hydrogen production from waste
October 9	Student-led discussion on Journal Article #2:
October 11	Continue Journal Article #2
October 16	Aquatic biotechnology: Aquaculture, drug discovery from marine environments, antifouling agents, biosensors
October 18	Student-led discussion on Journal Article #3:
October 23	Continue Journal Article #3

Term Paper Topic Due

October 25	Mid-term exam
October 30	Bioremediation: enzymes, biodiversity, genetic erosion, biopiracy
November 1	Student-led discussion on Journal Article #4:
November 6	Continue Journal Article #4
November 8	Industrial biotechnology: Microbial enzymes, food microbiology
November 13	Biotechnology and waste processing: Industrial sustainability, wood pulp processing, bioprocessing to value added products
November 15	Student-led group discussion on Journal Article #5:
November 20	Continue Student-led discussion on Journal Article #5
November 22	Thanksgiving break
November 27	Petroleum biotechnology: Microbial enhanced oil recovery (MEOR), biosensors, biorefining
November 29	Student-led group discussion on Journal Article #6
December 4	Continue Journal Article #6
December 6	Course review and take home exam

Term Paper Due

Week of December 10: Finals week; final exam due by December 13th, 5:00 pm EST.

*** Syllabus and schedules are subject to change at the discretion of the professor(s).**

Statement of Understanding

I, _____ have read and completely understand the course policies for this class.

PRINT NAME