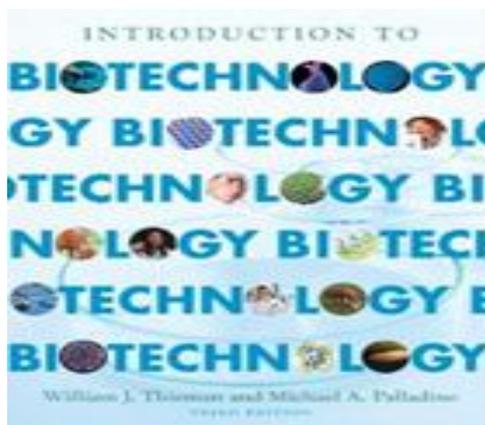


Kennesaw State University
Department of Molecular & Cellular Biology
Introduction to Biotechnology- BIOL 3301



INSTRUCTOR: Premila Achar
Room: Science Building: TBA
Course Schedule: TBA
Office: RM 526
Lab: New Science building SL 2050
Office Hours: TBA
Email: pachar@kennesaw.edu (used only for emergency situations otherwise communicate via D2L)

COURSE DESCRIPTION

This course introduces students to the concepts, methods and equipments currently being used in the field of biotechnology including areas of food biotechnology, genetics, diagnostics, gene therapy and forensics. Students gain practical, hands-on experience with a range of commonly used techniques in biotechnology. Prerequisite- BIOL 3300 Genetics ("C" or better grade).

COURSE OBJECTIVES:

By the end of the course students will be able to:

1. Recognize that biotechnology is a continually expanding science that relies on contributions from many disciplines, including biology, chemistry, mathematics, computer science, and engineering in addition to other disciplines such as philosophy and economics.
2. Describe the different types of biotechnology (e.g. microbial, plant, animal, forensic, medical, aquatic and environmental biotechnology) and their applications (historical, modern and emerging).
3. Understand the issues (legal and ethical) and controversies surrounding key biotechnology applications (e.g. genetic testing, stem cells, cloning, transgenic organisms, etc.).
4. Demonstrate and explain the role of basic laboratory skills and techniques that are required to be part of the biotechnology workforce.
5. Demonstrate and explain methods of recombinant DNA technology and molecular biology that are used in biotechnology.

PRE-REQUISITES: BIOL 3300 Genetics ("C" or better grade)

TEXTBOOK: Introduction to Biotechnology by W.J. Thieman and M.A. Palladino. *Pearson & Benjamin Cummings* 3rd edition.

LAB & LECTURE MATERIALS

- Laboratory Exercises for BIOL 3301 can be accessed via Desire2Learn (D2L).
- Hardcover wide ruled composition book/notebook is required as your laboratory notebook (detail of what goes in this notebook will be discussed in class).
- **Your exams require the use of scantrons for multiple choice and white paper for descriptive questions. You will need 3 scantrons sheets, in total, for Exam 1,2 & 3, which**

you should purchase from KSU bookshop.

ATTENDANCE POLICY:

General Lecture Policies:

- Attendance is *required* for periods in which an invited speaker or student presentation is scheduled.
- Participation in class activities will result in bonus points to earn extra credit. Class activities are not scheduled.
- If you miss a lecture, YOU are responsible for obtaining all notes, announcements, and assignments.
- Lecture notes will be available via D2L.
- The lecture schedule provided is TENTATIVE and subject to changes. Students will be notified of schedule changes as soon as possible in class or will be posted via D2L.
- Cellular telephones, pagers and other similar devices must be turned off during class.
- No snacking is allowed in the class room once lecture begins.
- If you miss class, it is your responsibility to get any missed notes and handout from another student. Instructor's Power point lectures/quiz/exam samples will be posted on D2L.

"Students are solely responsible for managing their enrollment status in a class; nonattendance does not constitute a withdrawal."

General Lab Policies:

- You must attend the laboratory section in which you are registered.
- Attendance of each lab session is essential for success in this class.
- You must plan to attend laboratory for the full period each week.
- Students who arrive in lab late or leave lab before being dismissed may not receive credit for the lab.
- Each absence will result in a loss of **5 points**** in the total

grading policy (see grading policy below).

- Attendance is *required* for periods in which an invited speaker or student presentation is scheduled.
- If you miss **3 lab sessions**, YOU will be considered **FAIL**.
- Lab notebook and printout for each lab exercise from D2L should accompany you at each lab session. You will not be allowed access to the lab if failure to comply to this instruction.

Lab Safety regulations:

Students are required to obey and comply with all **safety regulations** during laboratory as outlined in the KSU Chemical Hygiene Handbook.

In particular:

- No food or drink is allowed in the lab as per department and university regulations. This includes unopened food packages and beverage containers.
- Students are required to wear safety glasses. Students are encouraged to purchase their own safety glasses.
- Shorts and short skirts are prohibited. Open-toed shoes, open-heeled shoes, sandals, and bare feet are prohibited.
- All waste must be disposed in properly labeled containers as directed by the instructor or lab assistant.
- Cellular telephones, pagers and other similar devices must be turned off during lab session.
- **Failure to obey safety regulations will result in a 10 points penalty per offense****

ASSIGNMENTS AND QUIZZES:

- Assessments will take the form of Assignments, Quizzes, Class discussions, Group activities, Researcher papers and Oral presentation/s.
- Assignments are due before the end of the class period on the due date. An assignment is considered late if it is turned in

once the class period of its due date has ended. All late assignments must be given directly to the instructor.

- **5 points** will be deducted/day from total points after each due date.
- Assignments may **not** be placed in the box on the instructor's door. Assignments may **not** be submitted electronically, except in extreme circumstances and with the **prior** approval of the instructor.
- All quizzes will be administered at the beginning of the class period on the scheduled day.

All quizzes, assignments, exams, and other course materials not collected by students will be shredded and recycled at the conclusion of the final exam period.

EXAM POLICY:

Questions in exams are in the form of definitions, descriptions, drawings, problem analyzing and interpretation of data and multiple choices.

The grade in this course is determined by the total number of points earned (including extra credit) on examinations and other assigned work as listed below in "Course Grading Procedure". The dates for examinations are listed below. The final exam is cumulative.

Answer sheets of final exams will be shredded and recycled if not collected within two weeks of the start of the next academic semester.

MAKING UP FOR MISSED LAB SESSIONS, QUIZZES, AND ASSIGNMENTS

- Lab sessions will not be repeated for a particular group.
- There is no Make-up for this course

- Make-up exam will only be granted in extreme circumstances, and at the instructor's discretion. Examples of acceptable excuses include: serious illness, funeral and others with supporting documents. The determination of the validity of other excuses and the necessary documentation to support them will be at the instructor's discretion.
- Make-up examinations may consist of different question types, including essay questions, and they are usually more difficult than the scheduled examination.
- **There is no make-up for Final exam**
- **There is no further make-up if student missed a scheduled make-up.**
- **If dates in the schedule below clashes with an event you have planned prior to posting of this syllabus onto my webpage, please inform me in class or via email before DROP/ADD week to afford you a make-up.**
- The dates for examinations are listed below to be marked on your calendar and if it clashes with any of your academic activities, student should notify me in the first week of lecture.

Important Dates

TBA

Inclement Weather:

In adverse weather situations, find out the status of school closings by checking the following

weblink:https://portal2.kennesaw.edu/pls/portal92/APP_SNOW.DYN_SHOW_STATUS.show

COURSE GRADING PROCEDURE:

The final grade for the course will be based on the percentage of points earned out of the total number of points as outlined below. Final letter grades A, B, C...in the course will be assigned according to the point breakdown listed below:

Graded assignments	TOTALS	Final course grades	Percentage (%)
2 Mid-term Exams @ 100 pts	200	<i>A</i>	90-100
Cummulative Final Exam	100	<i>B</i>	80-89
2 Class Activities @ 10 pts. Each***	20	<i>C</i>	70-79
4 Quizzes @ 20 pts. each (lecture)	80	<i>D.</i>	60-69
4 Quizzes @ 20 pts each (lab)	80	<i>F</i>	<60
1 Research paper-Oral *	60		
Lab Notebook	10		
Grand Total	550**		

*** Group presentation (include instructor & peer evaluation)**

****Attendance- 5 points will be deducted for each absence in Lab; Safety regulations -failure to obey safety regulations will result in a 10 points penalty per offense; Extra credit earns for class participation will be added to grand total.**

*****not scheduled-random date**

Extra credit:

Extra credit may be offered, at the discretion of the instructor throughout the semester and the points earned will be added directly to the cumulative points scored on the exams. Extra credits are given for active participation in class during the course, leadership in group activity, or any other course related class activities.

Changes in policies:

Changes to the course's point distribution, schedule, policies, office hours, or any other component may be made throughout the semester. Changes will be announced in class and posted on the course web site.

LECTURE SCHEDULE

Tentative & Subject to Changes:

DATE TBA	TOPICS	CHAPTER
	Introduction to Class	Assignment will be collected on next lecture
	An Introduction Biotechnology	Chapt.1
	Areas of Biotechnology	
	Areas of Biotechnology (cont.)	
	Molecular Techniques	Chapt.3
	Molecular Techniques (cont.)	Quiz 1-Online
	Recombinant DNA Technology	
	Recombinant DNA Technology (contd.)	
	Recombinant DNA Technology (contd.)	
	PCR	
	PCR (Contd.)	
	Western/Southern /Dot Blot/SDS page	
	Western/Southern /Dot Blot/SDS page (contd.)	Quiz 2-Online
	Class Activity 1 & Research titles	
	Exam 1	Materials covered so far
	Microbial Biotechnology	Chapt.5
	Microbial Biotechnology (contd.)	
	Microbial Enzymes	
	Microbial Enzymes (contd.)	

	Use of Microbes in Industry	
	Use of Microbes in Industry (contd.)	
	Bioterrorism	
	Bioterrorism (contd.)	
	Plant Biotechnology	Chapt.6
	Discuss Oral presentation	
	Plant Biotechnology (contd.)	
	Plant Biotechnology (contd.)	
	Genetically modified Plants products (GMO)	
	Gene gun and Antisense technology	Quiz 3-Online
	Animal Biotechnology	Chapt.7
	Animal Biotechnology (contd.)	
	Animal Biotechnology (contd.)- Transgenic animals	
	Exam 2	Materials covered so far
	Environmental Biotechnology: Bioremediation	Chapt. 9
	Environmental Biotechnology: Bioremediation (contd.)	
	Intro to Medical Biotechnology	Chapt.11
	Intro to Medical Biotechnology (contd.)	
	Biotechnology Regulations and Ethics	Chapt.12 & 13
	Biotechnology Regulations and Ethics(contd.)	
	Class Activity 2	
	Library Day- Check Journals on Biotechnology	Quiz 4-Online
	Oral presentations- Group 1, 2 & 3	

	Oral presentations- Group 4, 5 & 6	
	Review & Guidelines for Final Exam if all materials covered/Field trip	
	Last day of Class for this course Review & Guidelines for Final Exam	
	Final Exam TBA	Cummulative

*Library Assignments are considered as class participation

LABORATORY SCHEDULE

TENTATIVE LABORATORY SCHEDULE

	Lab Exercises
	NO LAB
	Lab 1: Aseptic and Micropipetting Techniques
	Lab 1: Aseptic and Micropipetting Techniques (examine cultures) Lab 2: Transformation of <i>E. coli</i> with pGLO vector
	Lab 2 continued (analyze and interpret results; calculate transformation efficiency) Lab 3: Isolation of Plasmid DNA (perform plasmid miniprep, perform restriction digestion, prepare agarose gel)
	Lab 3 continued (examine plasmid digests by agarose gel electrophoresis to confirm plasmid identity) Lab 4: Amplification of the <i>gfp</i> gene Using PCR (set up PCR reactions; prepare gel) Lab 5: Expression and Purification of GFP Using Column Chromatography (prepare liquid cultures for GFP expression)
	Lab 4 continued (confirmation of PCR product by gel electrophoresis) Lab 5 continued: (purification of GFP using column chromatography)

	<p>Lab 6: Analysis of Cell Extracts and Final Column Fraction (from GFP Purification activity) Using SDS-PAGE (run and stain gel)</p> <p>Lab 7: Confirmation of GFP Identity Using Western Blot Analysis (perform transfer to membrane)</p>
	<p>Lab 6 continued (gel analysis)</p> <p>Lab 7: Confirmation of GFP Using Western Blot Analysis (blot development)</p>
	<p>Lab 8: Introduction to Bioinformatics (NOTE: This activity is completed outside of lab)</p>
	<p>Lab 9: Detecting GMOs (DNA extraction of food samples and set up PCR reactions)</p>
	<p>Lab 9 continued (analysis of PCR products by gel electrophoresis)</p>
	<p>Lab 10: Forensic Biotechnology - Crime Scene Investigation (set up PCR reactions)</p>
	<p>Lab 10 continued (analysis of PCR products by gel electrophoresis)</p> <p>Lab 11: Medical Biotechnology – Immunoassay for Detection of HIV</p>
	<p>OPEN (field Trip, lab practicum, etc.)</p>
	<p>NO LAB –The last day of classes</p>

*You will be tested on Lab Exercises in the form of quizzes after completion of a set of lab exercises and will be announced during lab period and posted on D2L.

Academic Integrity

KSU student is responsible for upholding the provisions of the Student Code of Conduct, as published in the Undergraduate and Graduate Catalogs. Section II of the Student Code of Conduct addresses the University's policy on academic honesty, including provisions regarding plagiarism and cheating, unauthorized access to University materials, misrepresentation/falsification of University records or academic work, malicious removal, retention, or destruction of library materials, malicious/intentional misuse of

computer facilities and/or services, and misuse of student identification cards. Incidents of alleged academic misconduct will be handled through the established procedures of the University Judiciary Program, which includes either an "informal" resolution by a faculty member, resulting in a grade adjustment, or a formal hearing procedure, which may subject a student to the Code of Conduct's minimum one semester suspension requirement.

Plagiarism and Cheating

The above is in accordance to the University policy concerning plagiarism and cheating as stated in the KSU Student Code of Conduct. Refer to KSU document. All instances of academic misconduct, both intentional and unintentional, will be handled through established procedures of the University Judiciary Program (<http://www.kennesaw.edu/judiciary/procedur.shtml>). Students violating the University's academic honesty code are subject to University-level disciplinary action, which may include suspension or expulsion from the University. For exams, any student observed cheating will receive an automatic zero for the entire exam in addition to any penalties assessed through campus disciplinary procedures.

Academic Withdrawal Policy

Students may withdraw from one or more courses anytime before the last three weeks of the semester. However, as of Fall 2004, students will be allowed a maximum of eight total withdrawals if they enter KSU as a freshman. Transfer students will be allowed one withdrawal per fifteen credit hours attempted, for a maximum of eight. Students who choose to pursue a second degree at KSU will be allowed two additional withdrawals. Students who entered KSU before the Fall of 2004 will be allowed one withdrawal per fifteen credit hours attempted for a maximum of eight. To withdraw, the student should complete an official withdrawal form in the Office of the Registrar. Students who officially withdraw from courses on or before the last day to withdraw without academic penalty will receive

a “W”. Students who officially withdraw after the last day to withdraw without academic penalty (and before the last three weeks of the semester) will receive a “WF”, which will be counted as an “F” in calculation of their grade point average.

The only exceptions to these withdrawal regulations will be for instances involving unusual circumstances, which are fully documented. Students may appeal to the academic standing committee for consideration of unusual circumstances.

Students cannot withdraw from their courses and remain in the program; they must carry at least 3 hours of credit. Program staff will not handle course withdrawals. Students must contact their home institutions (where they are registered) and handle the process themselves. They must provide the Faculty Member and Program Director with evidence that they have dropped the course.

Academic accommodations

Any student with a documented disability or medical condition needing academic accommodations of class-related activities or schedules must contact the instructor immediately. Written verification from the [KSU disAbled Student Support Services](#) is required. No requirements exist that accommodations be made prior to completion of this approved University documentation. All discussions will remain confidential."

****Good Luck****