

FLORIDA STATE COLLEGE AT JACKSONVILLE

COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: BSC 2420C

COURSE TITLE: Biotechnology Methods I

PREREQUISITE(S): BSC 1404C and MCB 2010C and BSC 2010C

COREQUISITE(S): None

CREDIT HOURS: 4

CONTACT HOURS/WEEK: 5

CONTACT HOUR BREAKDOWN:

Lecture/Discussion:	3
Laboratory:	2
Other:	

FACULTY WORKLOAD POINTS: 4.4

STANDARDIZED CLASS SIZE ALLOCATION: 24

COURSE DESCRIPTION:

This course introduces students to modern concepts of molecular biology, with a laboratory focus on basic methods for preparing and analyzing nucleic acids.

SUGGESTED TEXT(S):

Bloom, Mark V., Greg A. Freyer, David A. Micklos, et al. Laboratory DNA Science: An Introduction to Recombinant DNA Techniques. Addison Wesley, 1996. ISBN 0805330402

Clark, David P. and Lonnie Dee Russell. Molecular Biology Made Simple and Fun. Cache River Press, 1997. ISBN 0962742295

IMPLEMENTATION DATE: Fall Term, 2003 (20041)

REVIEW OR MODIFICATION DATE: Fall Term, 2006 (20071)

COURSE TOPICS		<u>CONTACT HOURS PER TOPIC</u>
I.	Cell Biology	20
	A. Molecular biology of prokaryotes	(10)
	B. Molecular biology of eukaryotes	(10)
II.	Biochemistry of Nucleic Acids	20
	A. DNA	(10)
	B. RNA	(10)
III.	Nucleic Acid Analysis	35
	A. Sample preparation	(5)
	B. Separation methods	(6)
	C. Quantitation methods	(6)
	D. Enzymatic modifications	(6)
	E. Electrophoresis	(6)
	F. Recombinant DNA methods	(6)

PROGRAM TITLE: Biotechnology Laboratory Technology

COURSE TITLE: Biotechnology Methods I

CIP NUMBER: 1626.061600

LIST PERFORMANCE STANDARD ADDRESSED:

NUMBER(S):	TITLES(S):
1.1.1	Ability to interact with vendors, colleagues, scientists
1.1.2	Notify appropriate persons about problems and observations
1.1.3	Coordinate tasks with coworkers
1.1.4	Make oral and written presentations
1.2.1	Comprehend and use technical vocabulary
1.2.2	Document results at the time of performance
1.3.1	Take notes on procedures
1.3.2	Prepare, identify, and apply changes to control procedures
1.3.3	Employ scientific writing techniques
1.4.1	Perform computerized research and web searches
1.4.2	Read technical literature
1.4.3	Identify basic reference sources in biotechnology
2.1.1	Identify first aid supplies, co-worker contact, medical information, emergency protection, and evacuation plan
2.1.2	Follow correct safety procedures, guidelines, and chemical hygiene plans
2.1.3	Maintain required safety training; observe rules of electric and equipment safety; recognize common lab hazards
2.1.4	Maintain and utilize safety equipment and personal protection equipment (PPES)
2.2.1	Check expiration dates, lot numbers, and labels for hazards
2.2.2	Monitor usage and exposure of radioisotopes and biohazards
2.2.3	Follow universal precautions for biological pathogens; store chemicals and biologicals according to storage guidelines.
3.1	Obtain and read protocol, test procedure, standard operating procedure and proper forms.
3.1.1	Apply scientific methods
3.1.2	Recognize and follow documentation requirements
3.1.3	Design and troubleshoot procedures and/or tests
3.1.4	Prioritize and perform multiple tasks in a timely manner
3.2.1	Check and maintain equipment, logs, and perform preventive maintenance tasks according to schedule
3.2.2	Clean, organize, and sterilize materials when required
3.2.3	Order inventory of supplies and reagents; date/label reagents
3.3.1	Practice aseptic techniques
3.3.2	Use titration/pipetting techniques; measure volume/weights
3.3.3	Perform basic calculations and statistical analysis
3.3.4	Calculate and prepare dilution series

LIST PERFORMANCE STANDARD ADDRESSED: (continued)

NUMBER(S):	TITLES(S):
3.3.5	Monitor physical properties of reagents, buffers, media and solutions and determine optimum conditions for use
3.4.1	Obtain and review appropriate procedures and test forms
3.4.2	Collect and set up samples for analysis
3.4.3	Set-up equipment and perform/document tests and results
3.5	Operate laboratory equipment
4.1	Accept federal regulations
4.1.1	Follow the guidelines from the following agencies: FDA, OSHA, USDA, NIH, NR, DOT, EPA, CDC, NRC
4.1.2	Follow regulations from Clinical Lab Improvement (CLIA, 88, Amendment of 1988 Protein tech skills) and Drug Enforcement Administration
4.2.1	Follow and observe HAZMAT Guidelines
4.2.2	Follow and observe country and state environmental protection guidelines
4.2.3	Perform manufacturing using current good manufacturing practices (GMP)
5.1	Apply decision making techniques in the workplace
5.1.1	Identify decision to be made and compare alternatives
5.1.2	Make decision based on values and goals and evaluate decision made
5.2.1	Diagnose problem, its urgency, and causes
5.2.2	Be sensitive to multicultural and nonsexist dimensions of problem solving
5.2.3	Explore possible solutions to a problem and compare/contrast advantages
5.2.4	Determine appropriate action; implement it and evaluate results
6.4.1	Probe and analyze DNA library
6.4.2	Construct recombinant vectors
6.4.3	Perform transformation techniques
6.4.4	Perform polymerase chain reaction
6.4.5	Perform translation assays
6.4.6	Isolate and analyze nucleic acid isolation
6.4.7	Transcribe DNA
6.4.8	Perform electrophoresis on RNA, DNA, and protein
6.4.9	Perform nucleic acid hybridization
6.4.10	Perform autoradiography
6.4.11	Perform non-isotopes techniques
6.6	Perform chemical assays
6.6.1	Perform quantitative analysis and distillation techniques
6.6.2	Perform titration techniques (manual and automatic)
6.6.3	Employ dyes and indicators
6.6.4	Perform lypholization and organic chemistry techniques
6.6.5	Perform extractions
6.6.6	Measure turbidity, viscosity, and density

LIST PERFORMANCE STANDARD ADDRESSED: (continued)

NUMBER(S): TITLES(S):

- 7.1.1 Perform quality tests and document results
- 7.1.2 Verify test standards and maintain QA records
- 7.1.3 Archive samples and documents

- 8.1 Monitor and record the environmental conditions of the facility (growth chamber, greenhouse, seed storage room, animal room, or manufacturing site)
- 8.1.1 Sample environment, clean work area according to SOP's and document room integrity.
- 8.1.2 Notify appropriate personnel if sampling indicates a problem.



NOTE: Use either the Tab key or mouse click to move from field to field. The box will expand to accommodate your entry.

<i>Section 1</i>	
COURSE PREFIX AND NUMBER: BSC 2420C	SEMESTER CREDIT HOURS: 4
COURSE TITLE: Biotechnology Methods I	

<i>Section 2</i>		
TYPE OF COURSE: (Click on the box to check all that apply)		
<input type="checkbox"/> AA Elective	<input checked="" type="checkbox"/> AS Required Professional Course	<input type="checkbox"/> College Prep
<input type="checkbox"/> AS Professional Elective	<input type="checkbox"/> AAS Required Professional Course	<input type="checkbox"/> Technical Certificate
<input type="checkbox"/> Other _____		
<input type="checkbox"/> General Education: (For General Education courses, you must also complete Section 3 and Section 7)		

<i>Section 3 (If applicable)</i>		
INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:		
<input type="checkbox"/> Communication	<input type="checkbox"/> Social & Behavioral Sciences	<input type="checkbox"/> Mathematics
<input checked="" type="checkbox"/> Natural Sciences	<input type="checkbox"/> Humanities	

<i>Section 4</i>					
INTELLECTUAL COMPETENCIES:					
<input checked="" type="checkbox"/> Reading	<input checked="" type="checkbox"/> Speaking	<input checked="" type="checkbox"/> Critical Analysis	<input checked="" type="checkbox"/> Quantitative Skills	<input checked="" type="checkbox"/> Scientific Method of Inquiry	
<input checked="" type="checkbox"/> Writing	<input checked="" type="checkbox"/> Listening	<input checked="" type="checkbox"/> Information Literacy	<input checked="" type="checkbox"/> Ethical Judgment	<input checked="" type="checkbox"/> Working Collaboratively	

<i>Section 5</i>	
LEARNING OUTCOMES	METHOD OF ASSESSMENT
<ul style="list-style-type: none"> Explain and apply techniques of fundamental molecular biology, including manipulation of nucleic acids and bacterial cells. 	Written tests, reports and/or use of equipment to demonstrate student competency in field.
<ul style="list-style-type: none"> Demonstrate knowledge of scientific method. 	Formulate problem, make observations, derive and test hypothesis and make conclusions.
<ul style="list-style-type: none"> Communicate scientific ideas through oral or written assignments. 	Students use analytical reasoning skills to solve problems on written tests and/or laboratory work.
<ul style="list-style-type: none"> Interpret scientific models such as formulas, graphs, tables and schematics, draw inferences from them and recognize their limitations. 	Written reports of lab experiments and/or written tests demonstrate student competency in the application of scientific knowledge.
<ul style="list-style-type: none"> Demonstrate problem solving methods in situations that are encountered outside of the classroom. 	Students use demonstrations, group discussions, written tests, laboratory reports, research projects and/or field experiences to illustrate competence in recognizing and evaluating various scientific processes.
<ul style="list-style-type: none"> Demonstrate proper laboratory technique including safety in the use and care of laboratory equipment and materials. 	Results from laboratory work and experiments demonstrate student awareness of science and society.

<i>Section 6</i>	
Name of Person Completing This Form: Kevin Pegg	Date: 3/4/05

SECTION 7 MUST BE COMPLETED FOR ALL GENERAL EDUCATION COURSES.

<i>Section 7</i>	<i>Primary</i>	<i>Secondary</i>	<i>N/A</i>	VALUE	<i>Primary</i>	<i>Secondary</i>	<i>N/A</i>
A. Global and Historical Knowledge & Understanding	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Intellectual honesty	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Comprehends a general knowledge of the nature, origins and contributions of major civilizations	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Curiosity and openness to new ideas	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Comprehends the workings and interrelations of personal, business and government economies	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Recognition of one's own creative potential	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Comprehends political, social and economic systems and their effects upon society	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Acceptance of and respect for differences among people and cultures	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B. Cultural and Aesthetic Knowledge and Understanding	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the contributions of the arts and humanities to the human experience on a personal, national or global level	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Civic Engagement	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
• Comprehends the historical development of the arts and sciences	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Lifelong Learning	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
• Comprehends religious and cultural systems and their effects upon society	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>				
C. Human Awareness and Understanding	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the dynamics of human behavior and the process of increasing self-awareness, growth and development	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the stages of human development and the dynamics of human relationships in diverse cultures	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the factors that promote physical, mental and social well-being	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
D. Mathematics, Science and Technology	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the basic concepts and investigative processes of the natural sciences	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the breadth, significance and development of the mathematical sciences	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				
• Comprehends the ways science and technology have shaped and continue to reshape human cultures and the environment	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>				