

## FLORIDA STATE COLLEGE AT JACKSONVILLE

## COLLEGE CREDIT COURSE OUTLINE

COURSE NUMBER: BSC 2427C

COURSE TITLE: Biotechnology Methods II

PREREQUISITE(S): BSC 2420C

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 continues the study of modern molecular biology with a laboratory focus on advanced methods of manipulating and analyzing nucleic acids.

SUGGESTED TEXT(S): None

IMPLEMENTATION DATE: Fall Term, 2003 (20041)

REVIEW OR MODIFICATION DATE: Fall Term, 2006 (20071)  
Fall Term, 2008 (20091) - Outline Review 2007

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	10
	A. DNA	(10)
III.	Nucleic Acid Analysis	30
	A. Cell transformation	(5)
	B. Amplification methods	(5)
	C. Hybridization methods	(5)
	D. Probes	(5)
	E. Sequence analysis	(5)
	F. Polyacrylamide, agarose, and capillary electrophoresis	(5)
IV.	Immunochemistry	(15)

PROGRAM TITLE: Biotechnology Laboratory Technology

COURSE TITLE: Biotechnology Methods II

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
3.3.5	Monitor physical properties of reagents, buffers, media and solutions and determine optimum conditions for use

## LIST PERFORMANCE STANDARD ADDRESSED: (CONTINUED)

- | NUMBER(S): | TITLES(S):   |
|------------|--|
| 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  |
| 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  |

LIST PERFORMANCE STANDARD ADDRESSED: (CONTINUED)

NUMBER(S):        TITLES(S):

- 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.

<b>Section 1</b>	
<b>COURSE PREFIX AND NUMBER:</b> <u>BSC 2427C</u>	<b>SEMESTER CREDIT HOURS:</b> <u>4</u>
<b>COURSE TITLE:</b> <u>Biotechnology Methods II</u>	

**Section 2**  
**TYPE OF COURSE: (Click on the box to check all that apply)**

AA Elective                       AS Required Professional Course                       College Prep  
 AS Professional Elective       AAS Required Professional Course                       Technical Certificate  
 Other \_\_\_\_\_  
 General Education: (For General Education courses, you must also complete Section 3 and Section 7)

**Section 3 (If applicable)**  
**INDICATE BELOW THE DISCIPLINE AREA FOR GENERAL EDUCATION COURSES:**

Communication                       Social & Behavioral Sciences                       Mathematics  
 Natural Sciences                       Humanities

**Section 4**  
**INTELLECTUAL COMPETENCIES:**

Reading     Speaking     Critical Analysis                       Quantitative Skills     Scientific Method of Inquiry  
 Writing     Listening     Information Literacy                       Ethical Judgment     Working Collaboratively

<b>Section 5</b>		
<b>LEARNING OUTCOMES</b>		<b>METHOD OF ASSESSMENT</b>
•	Explain and apply techniques of advanced molecular biology, including manipulation of nucleic acids and bacterial cells.	Written tests, reports and/or use of equipment to demonstrate student competency in field.
•	Demonstrate knowledge of scientific method.	Formulate problem, make observations, derive and test hypothesis and make conclusions.
•	Communicate scientific ideas through oral or written assignments.	Students use analytical reasoning skills to solve problems on written tests and/or laboratory work.
•	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.
•	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.
•	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.

**Section 6**  
Name of Person Completing This Form: Kevin Pegg                      Date: 11/1/2007

**SECTION 7 MUST BE COMPLETED FOR ALL GENERAL EDUCATION COURSES.**

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