Syllabus for
BIO 370–Methods in Biotechnology
1.0 Credit hour
Fall 2013

I. COURSE DESCRIPTION

Introduction to the latest cutting edge techniques used in the field of biotechnology. Laboratory activities include isolation and characterization of bacterial DNA, basic processes of DNA transfer, DNA finger printing, DNA sequencing, Polymerase chain reaction (PCR), tissue culture, Enzyme Linked Immuno-sorbant Assay (ELISA) and bioinformatics.
Prerequisite: Junior or Senior Biology major or minor.
Lab fee: $100.00

II. COURSE GOALS

This course will provide an opportunity for the students to get hands-on experience in various cellular and molecular techniques. Following completion of this course, students will be prepared for upper division biology courses, (Molecular Cell Biology, Genetics, Immunology, etc.) as they will be proficient in basic molecular biology techniques such as pipetting, sterile techniques, small volume calculations, dilutions, and handling DNA. In addition, students with this background will have a better chance of getting an internship opportunity in a local biotechnology laboratory. Graduating students with this background will be well positioned to pursue careers in government, medicine, private industry, pharmaceutical, and forensics research laboratories.

III. STUDENT LEARNING OUTCOMES

Following successful completion of this course, the student will be able to do the following:

A. Isolate and characterize DNA from bacteria.

B. Demonstrate three ways of DNA transfer in bacteria and its application in biotechnology.

C. Use DNA fingerprinting in forensics.

D. Use restriction enzymes effectively to cut DNA for various applications in biotechnology.

E. Amplify DNA using Polymerase chain reaction (PCR).

F. Demonstrate the use of ELISA in diagnostic medicine.

G. Have a working knowledge of representative techniques in genomics/proteomics/bioinformatics.

IV. TEXTBOOK AND OTHER LEARNING RESOURCES

Students are responsible for purchasing a three-ring binder, dividers, and notebook paper to assemble their cumulative laboratory notebook. Selected handouts will be used for each exercise, and these will be provided.

Students are also responsible for purchasing a composition notebook which will be used weekly for recording experimental procedures and documenting laboratory results.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.
2. Students taking a late exam because of an unauthorized absence are charged a late exam fee.
3. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:
   a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;
   b. Failing to meet group assignment or project requirements while claiming to have done so;
   c. Failing to cite sources used in a paper;
   d. Creating results for experiments, observations, interviews, or projects that were not done;
   e. Receiving or giving unauthorized help on assignments.

   By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.
4. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.
5. Students are to be in compliance with University, school, and departmental policies regarding the Whole Person Assessment requirements. Students should consult the Whole Person Assessment handbooks for requirements regarding general education and the students' majors.
   a. The penalty for not submitting electronically or for incorrectly submitting an artifact is a zero for that assignment.
   b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.

B. Course Policies and Procedures

1. Attendance policy.

   Oral Roberts University tries to educate and train you to succeed in a wide variety of situations, which usually require that you be present, punctual and prepared to do your job well. The attendance policy of this course is to prepare you for a responsible, successful post-ORU reality. Your sick or other emergency leaves equal the number of times you meet in a week, i.e., one day. Any additional absences will cost you, one absence 5% and two absences 10%. There

are no exceptions to this policy except for an official University activity. Absence on exam days will cost you 20 points.

2. Grading

Ten (10) weekly quizzes based on the material covered throughout each lab period (20 points each) 200
Six (6) lab reports based on experiments 240
Lab math worksheet 20
Gene sequencing assignment 20
Midterm examination 200
Cumulative laboratory binder 130
Composition notebook weekly checks 75
Attendance 15
Comprehensive final exam 200
TOTAL **1100**

Grades assigned as follows:

Percent	Grade
90-100	A
80-89	B
70-79	C
60-69	D

3. General Policies
   a. *Makeup Lab Work* – Experiments cannot be made up, but students are responsible for the material covered before the experiment, the experimental results, and a lab report based on the experiment. If a student misses a lab class, it is their responsibility to contact classmates to get experimental results and use these results to draft their lab report. The student will be given one (1) extra week to complete this report.
   b. *Final Exam*— The final exam is NOT optional. ORU requires that a final exam be taken at the scheduled time, unless written permission from an authorized person is received; otherwise, makeup of an exam should be scheduled in advance of the exam.
4. Other Information
   a. *Scheduled Meetings*— One 3-hour laboratory meeting is scheduled per week. Occasionally students will be required to come in at times other than the regularly scheduled time to evaluate their experiments. It is the responsibility of the student to come in during this time to gather experimental results..
   b. *Assignments*— The laboratory exercises are performed according to the schedule listed below. It is important for each student to read the material pertinent to the laboratory exercise before the laboratory period.
   c. *Incompletes*— An Incomplete ("I") is given for work that is incomplete at the time final grades are given due to circumstances beyond the student's control. It is the student's responsibility to personally submit to his or her instructor a written petition for an “incomplete" before final exam week and receive back written approval. If granted, the student must make up the incomplete work within one semester, or the "incomplete" automatically becomes an "F." Incompletes are not granted to students who have procrastinated or otherwise neglected the course by

absences, late work, etc.

d. No laboratory experiments may be omitted. Excused absences should be made up by making arrangements with the instructor. If a student misses six or more labs, a grade of "F" is automatically given.

5. Whole Person Assessment Requirements
None

VI. COURSE CALENDAR

Week	Topic
1	Course Introduction: Lab safety, sterile techniques, and lab reports
2	Lab Math: stock solutions, dilutions, general calculations EDVO Kit # S-44: Micropipeting Basics
3	EDVO Kit #269: Introduction to ELISA Reactions
4	EDVO Kit # 222: Transformation of *E. coli* with pFluoroGreen and pFluoroBlue
5	EDVO Kit # 202: Mini-prep Isolation of Plasmid
6	EDVO Kit # 212: Cleavage of Lambda DNA with Eco RI Endonuclease
7	EDVO Kit # 153: Determination of Protein Molecular Weight
8	Cumulative Midterm Examination
9	Dry Lab: Introduction to PCR and Primer Design
10	EDVO Kit # 334: PCR-Based VNTR Human DNA Typing
11	EDVO Kit # 339: Sequencing the Human Genome
12	Dry Lab: Introduction to RT-PCR and Q-PCR
13	Dry Lab: Introduction to Tissue Culturing
14	Comprehensive Final Examination
15	Lab Binders Due

Course Inventory for ORU's Student Learning Outcomes

Methods in Biotechnology – BIO-370
Fall 2013

This course contributes to the ORU student learning outcomes as indicated below:
Significant Contribution – Addresses the outcome directly and includes targeted assessment.
Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment.
Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment.
No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

OUTCOMES & Proficiencies/Capacities	Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1 **Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A Biblical knowledge				X
1B Sensitivity to the Holy Spirit				X
1C Evangelistic capability				X
1D Ethical behavior				X
2 **Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A Critical thinking		X		
2B Information literacy			X	
2C Global & historical perspectives				X
2D Aesthetic appreciation				X
2E Intellectual creativity			X	
3 **Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A Healthy lifestyle				X
3B Physically disciplined lifestyle				X
4 **Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A Communication skills				X
4B Interpersonal skills		X		
4C Appreciation of cultural & linguistic differences				X
4D Responsible citizenship			X	
4E Leadership capacity				X