Syllabus for
BIO 372—Introduction to Biological Research
1.0 Credit Hour
Fall 2011

I. COURSE DESCRIPTION

A course designed to introduce junior biology majors to scientific research. Introduces students to the nature of science and its methods and teaches the distinction between a "library" and "experimental" research project. Students then select a research topic, a research director, and an advisor for the senior research project.

II. COURSE GOALS

This course is a catalyst to direct and assist the students' efforts in initiating, evaluating, and conducting valid scientific research. Much of the current scientific knowledge will be forgotten or superceded in the near future, but the need to critically analyze and conduct research will never be obsolete. Instead, it will become even more vital as we rush into the 21st century with new problems to understand and solve. This course will enable the student to develop the skills needed to understand and conduct both literary and experimental research, and learn to write scientifically.

III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

As a result of successfully completing this course, the student will be able to do the following:

A. Discuss the nature of science and its methods, including the characteristics of sound experimental design in biological research. Describe and explain experimental design and statistics relevant to biological research.

B. Select a research topic feasible for investigation; pose a relevant, scientifically testable question; and state a purpose or a hypothesis.

C. Select a Senior Research Advisor. For projects undertaken outside the Biology Department, a "Research Director" is also required.

D. Distinguish between library research and field or laboratory research.

E. Conduct research in the scientific literature, distinguish between primary and secondary sources, and prepare reference cards, i.e., notecards of pertinent references.

F. Evaluate the writing of other scientific writers using the evaluation criteria and forms that will be used to evaluate the student's senior paper.

G. Search and apply for summer research internships at other universities and institutions.

H. Maintain a research notebook according to the instruction and format prescribed by this syllabus.

I. Write a research proposal in biology.

J. Complete a senior paper during the subsequent academic year.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

A. Required Textbooks

Ambrose, HW and Ambrose, KP. 2007. A handbook of biological investigation. Winston Salem, NC: Hunter Textbooks Inc. 198 p. ISBN: 0-88725-331-8.

Kinsely, K. 2009. A student handbook for writing in Biology. Sunderland, Mass: Sinauer Associates, Inc. 279 p. 3rd edition. ISBN: 978-1-4292-3491-7.

Gillen, C. 2007. Reading Primary Literature. Pearson Education. ISBN: 978-08053-4599-5.

B. Other Required Materials

Appendices A-D
Research notebook as specified in syllabus.
BIO Style Manual.
BIO 499 syllabus.

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. Evaluation Procedures

	Points
Select Research Topic, complete Appendix A with signatures	5
Secondary References: i.e. individual, different references (sources) (one point per reference with GOOD NOTES & PROPER CITATION) (See Appendix C)	10
Primary References, i.e., individual, different sources (one point per reference with GOOD NOTES & PROPER CITATION)	20
Research Proposal (see Appendix D)	
Rough draft	10
Final approved version	20
Scientific meeting presentations: Attend Senior Seminar, OAS or TriBeta meetings	10
Research paper analysis	5
Class lecture notes and research log	5
Comprehensive Exam	10
Class Attendance: 0-1 absences = 5 points 2 absences = 3 points 3 absences = 1 points >3 absences = 0 points	5
TOTAL POINTS	100

Grade Determination: Late penalty = 10% per day late!

2. Whole Person Assessment Requirements
   None

3. Attendance/Other Policies and Procedures
   a. Class attendance is essential for a complete learning experience.
   b. If one is to be a part of the answer instead of the problem, one must do

what has to be done, when it ought to be done, whether it's agreeable or not. This is the mark of a truly mature person. Dependability and self-discipline are very important in the development of strong Christian character.

c. Excused Absences: Absences may be excused by the Instructor, the Dean, or other Administrators for LEGITIMATE reasons (illness verified with a doctor's note). An "E" will be assigned for classes missed. **The absence(s) will not count against the student, but neither DOES IT EXCUSE the individual from knowing information missed nor from making appropriate, timely arrangements for exam/quiz makeup(s).** It is the student's responsibility to find out what was missed including a test or quiz. Failure to make proper arrangements for makeup(s) will result in a **late test fee** being assessed and points deducted (10% per day including weekends) until the test or quiz is made up.

d. Unexcused Absences: Each student is allowed three unexcused absences. Sleeping in class = an absence. Students who carry on conversations, use cell phones, and use laptops for non-class purposes during lecture distract others, and inhibit learning. **Makeup quizzes and exams will not be permitted for any unexcused absence or tardy.**

e. Tardiness: For a mature individual, habitual, unexcusable tardiness is to be avoided like the plague. Three tardies equal one absence. **Tests and quizzes will not be given to individuals who arrive late to class**. Being tardy more than 10 minutes after class has started equals an unexcused absence for that day.

f. Late Work: The ORU catalog states that the "***privilege*** of making up assignments are between faculty and student." Thus, in this class a ***-10% per day late penalty*** will be assessed for unexcused late work. Furthermore, such assignments more than one week late will not be accepted and a zero will be assigned. Tardy assignments due to administrative excuses and verifiable serious illness will not receive late penalties.

g. Incompletes: Awarded very sparingly upon written petition to the instructor for emergency situations, which in the judgment of the instructor, were clearly unavoidable.

h. Unexcused Late Exams: May be assessed a late exam fee and a penalty up to 30% off.

i. Three other courses, BIO 370, BIO 499 and BIO 451 are designed and scheduled for successful completion of the undergraduate research experience.

VI. COURSE CALENDAR

Week	Date	Topic	Assignment
1	—	***Introduction to Biological Research:*** Course Overview Relation of BIO 372 to 370, 499, 451	Ambrose Ch.1,2; Knisley Ch. 1 Syllabus
2	—	***Research Opportunities:*** BIO Faculty and Student Projects - Session 1	Handouts
3	—	***Research Opportunities:*** BIO Faculty and Student Projects- Session 2	Handouts
4	—	***Research Opportunities:*** BIO Faculty and Student Projects- Session 3	Handouts
5	—	***Research Opportunities:*** Zoo, Aquarium OSU-HSC ; OU-HSC Tulsa, Au Sable, Summer Internships	Handouts
6	__	Final Week for Selecting Topic & Advisor Library Resources for Biologists***	***Appendix A due*** Library lecture & handouts
7	—	Types of Scientific Literature	Nagle 1994; Ambrose Ch.9,10; Knisley Ch. 2, Appendix C
8	—	Analysis of an "Experimental Paper"	Gillen, Knisley Ch. 3 ***10 Secondary References due***
9	—	Preparing a Research Proposal	Pechnenik Ch. 10 ***1st 10 Primary References due***
		Fall Break	
10	—	Experimental Design and Statistics	Ambrose Ch. 3-8 ***Rough draft proposal due***
11	—	Experimental Design and Statistics	Ambrose Ch. 3-8 ***2nd 10 References due***
12	—	How to Write a Scientific Paper	Ambrose Ch. 11-13, Knisely Ch. 3-5
13	—	**Research Proposal due**	
14	—	Preparing a Senior Paper Rough Draft	Ambrose and Knisely
15	__	**Notes and Research log due** **Exam**	

***Meet in the library, 3rd floor.

Course Inventory for ORU's Student Learning Outcomes

Introduction to Biological Research – BIO 372
Fall 2011

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		