

**Course Syllabus
Biology 155
GENERAL BIOLOGY I**

**NICHOLLS
STATE UNIVERSITY**

FALL 2009

LECTURE LOCATION: 101 GOUAUX HALL (2M)

LABORATORY LOCATION: 211 GOUAUX HALL

LECTURER: Dr. David Schultz

Lecture time: 2M (MWF 8:35-9:30)

Office: 315 Gouaux Hall

Phone: 448-4720

E-mail: Dave.Schultz@nicholls.edu

Office Hours: MWF: 7:30-8:30, 9:40-11:40, T: 7:30-9:00, 1:30-3:00

LABORATORY SECTIONS AND INSTRUCTORS:

Section 2M & 4T: Tuesday 9:00 - 11:50 (2T)

Sam Wise

Section 2M1 & 4T1: Thursday 9:00 - 11:50 (2R)

Cynthia Fox

Section 2M2 & 4T2: Tuesday 1:30 - 4:20 (5T)

Sam Wise

Section 2M3 & 4T3: Wednesday 12:55 - 4:00 (6W)

Mark Linson

Section 2M4 & 4T4: Thursday 1:30 - 4:20 (5R)

Cynthia Fox

Section 2M5 & 4T5: Wednesday 9:40-12:45 (3W)

Mark Linson

Section 2M6 & 4T6: Friday 12:55 - 4:00 (6F)

Kelsey Adkisson

COURSE DESCRIPTION: BIOL 155. General Biology I. 4-3-3. Principles of biology from the cellular to the ecosystem level, including biochemistry, cell biology, molecular biology, genetics, and evolution. This course is designed for students planning to major in biology or a related discipline. Includes laboratory experiences.

COURSE PREREQUISITES: Eligibility for English 101 or higher and eligibility for Mathematics 101 or higher.

REQUIRED TEXTS: The student is expected to maintain access to the three required texts:

Biology (8th ed.) by P. H. Raven, G. B. Johnson, J. B. Losos, K. A. Mason and S. R. Singer. William C. Brown Publishers, 2008.

Biology Laboratory Manual (8th ed.) by D. S. Vodopich and R. Moore. Wm. C. Brown Pub., 2008.

Biology 155 Laboratory Supplement by David L. Schultz, 2006.

The Raven/Johnson and the Vodopich/Moore texts are available in the University bookstore. The Schultz supplement is available at Copy Connection, Highway One (bayou side) in Thibodaux or on the Biology 155 website: <http://www.nicholls.edu/biol-ds/biol155>

Other course resources: (lectures, Problem Sets, Useful Links, etc.) can also be found on the Biology 155 website.

COURSE GOALS

The course will present the fundamental principles and concepts of biology. The course will emphasize how the concepts were originally conceived and tested and how alternatives were rejected. Students will be challenged to use the concepts to draw conclusions from data, to develop alternative hypotheses to explain observations, to make predictions and design experiments to test competing hypotheses. In addition, the social and medical implications of biological findings will be developed as classroom discussions. In the laboratory, students will learn and use the fundamental concepts of biology to draw conclusions from data, to develop alternative hypotheses to explain observations, to make predictions, and to design experiments to test hypotheses.

COURSE OBJECTIVES

Upon completion of this course, the student will:

- understand the scientific process; distinguish observation, hypothesis, test, and theory
- know the elements of and be able to construct a scientific paper
- know how to use a microscope for studying cells
- recognize and know properties of the major classes of biological molecules
- know the characteristics of living things and each of the major groups of living things
- know the function of cellular organelles
- understand the structure and functions of cell membranes
- be familiar with the laws of thermodynamics and how they relate to biological systems
- understand how enzymes catalyze reactions and how they are important to life
- know how to determine the rate of an enzyme catalyzed reaction
- know how to recognize competitive and noncompetitive inhibitors of enzymes
- know how to use a centrifuge for cellular fractionation
- know how to conduct an experiment for determining the location of biochemical processes within cells
- know a method for separating lipid soluble molecules
- know how to describe the absorption spectrum of a molecule
- understand how cells harvest energy from chemical substances
- understand how plants trap energy in light and use it to build biological molecules
- know the stages of the cell cycle and its role in the life of organisms
- recognize the stages of mitosis and meiosis
- know how to induce and detect successful genetic transformation of bacteria
- know how to determine mode of inheritance from a pedigree
- know the major features of meiosis and its role in the life cycle of organisms
- know the biological costs and benefits of sexual reproduction
- understand and be able to apply the principles of Mendelian genetics and its modern extensions
- understand the chromosomal basis of heredity
- understand the basic principles of population genetics
- know how to determine if a population is in Hardy-Weinberg equilibrium
- be able to predict the evolutionary future of populations given the fitness of different genotypes
- understand the basic principles of evolution
- understand the structure and function of nucleic acids
- understand the mechanics of protein synthesis
- be familiar with the diversity, causes, and consequences of genetic mutations
- have an appreciation for the promise and potential problems of biotechnology
- understand Darwinian evolution and its modern extensions
- understand the purpose and process of systematics
- know how to use and construct a dichotomous key
- know how to formulate an hypothesis of evolutionary relationship
- understand the six kingdom system of classification
- be familiar with biological diversity within the prokaryotes

COURSE CONTENT

The contents of the lecture and laboratory components of the course, including exam and due dates, are described in the **Lecture Schedule** and **Laboratory Schedule** pages which are attached.

COURSE REQUIREMENTS

Each student is required to:

1. attend all course lectures.
2. attend and participate in all sectional laboratory sessions.
3. read and become familiar with material in all assigned readings, including but not limited to "Readings" list (see **Lecture Schedule**) and "Source" list (see **Laboratory Schedule**).
4. Purchase an iClicker (classroom response pad - see below) by the beginning of the third week of class and register your pad either in class or on line. The pads can be purchased in the bookstore.
5. *participate in four lecture examinations. For lecture exams, the student is responsible for recording answers to exam questions on University-approved Scantron answer sheets (available at the University Bookstore) with a No. 2 pencil.
6. *participate in at least seven lecture quizzes. The quizzes will also require Scantron answer sheets and a pencil.
7. *participate in two laboratory examinations.
8. *independently compose and submit a typewritten first and second draft of a laboratory report.
9. conduct himself/herself in a manner courteous to the lecturer, instructors, and fellow students in both the lecture room and the laboratory.
10. accept and abide by all other parts and provisions of this syllabus.
11. accept and abide by all sections of the Laboratory Safety Agreement (distributed during first lab session).
12. turn off your cellular telephone before entering class. Violation of this requirement may, at the instructor's discretion, result in a grade of "F" in this class.

*Participation in all examinations, 7 quizzes, and submission of laboratory reports (numbers 5, 6, 7 and 8 above) are **absolute requirements** for earning graduation credit for the course. A student will automatically earn a failing grade in the course for either (i) failure to take any exam or (ii) failure to submit either draft of the laboratory report. A missed quiz will be assigned a grade of 0.

METHODS OF EVALUATION

1. Final Grades in the course will be based on a weighted average of lecture (70%) and laboratory (30%) grades. Lecture grades will be based on the numeric average of five components, each worth an equal number of points: three hour-long exams, the average of seven quiz grades, and a comprehensive final exam. Laboratory grades will be based on the numeric average of five components, each worth an equal number of points: the laboratory report grade, a midterm exam, a comprehensive final exam, and a participation grade (to include but not be limited to a series of short quizzes). All grading is based on the ten-point scale, where a score of greater than 90% receives the grade of "A," 75-90% the grade of "B," 60-75% the grade of "C," 50-60% the grade of "D," and less than 50% the grade of "F."

Algebraically, the student can monitor progress of his/her final grade by using the following formula:

$$\text{FINAL} = 0.70 [\text{average lecture grade}] + 0.3 [\text{average laboratory grade}]$$

2. Examinations. The four lecture exams will consist primarily if not exclusively of multiple choice questions based on your mastery of fundamental biological concepts. The two laboratory exams will consist of questions that require written explanations, interpretations, and calculations, and will be designed to allow you to demonstrate the mastery of skills you should have acquired as part of the laboratory exercises. Participation in each of these six exams is an **absolute** requirement of the course: No student can earn graduation credit for this course without participation in each exam: A student will automatically earn a failing grade in the course for failure to participate in any lecture or laboratory examination.

3. Laboratory Report. Each student will independently compose two drafts of one laboratory report and submit these drafts on the due dates listed in the **Laboratory Schedule**. These reports will be written (i) in scientific style and format, (ii) will be based upon collecting data and reporting and interpreting results from

laboratory experiments, (iii) and must be typewritten with a word-processor. The final grade on the laboratory report will be the average grade of the first and second draft. Both drafts should be submitted with one-inch margins and double spacing on standard 8.5" x 11" paper. Final grades on each laboratory report will be based on (i) scientific style and content, (ii) clarity of writing and use of proper English grammar, and (iii) timely submission. Laboratory reports submitted past the due date will receive a ten-point deduction per day until submission. The Writing Across the Curriculum Laboratory (WAC Lab; first floor, Ellender Memorial Library) is available to students seeking help in word-processing and creating good reports. Submission of each laboratory draft is an *absolute* requirement of the course. No student can earn graduation credit for this course without submission of each draft. A student will automatically earn a failing grade in the course for failure to submit either laboratory draft.

MAKE-UP PROCEDURE

The lecturer and laboratory instructors make extraordinary efforts to ensure that students facing unforeseen and urgent problems have an opportunity to succeed in the course. As you can imagine, however, this privilege is too often abused, and abuse causes the establishment of stipulations for all students. Understanding that personal problems can arise on dates and occasions important in this course, the lecturer and instructors have developed the following policy for remediation (make-up work):

1. **Discretion.** Lecture-related make-up work is allowable only at the discretion of the lecturer. Laboratory-related make-up work is allowable only at the discretion of the individual sectional laboratory instructor.
2. **Request for Remediation.** Any and all make-up work must be requested by the student. Within 24-hours of missing an exam, a due date, or a laboratory session, the student must contact the lecturer (for lecture exams) or the laboratory instructor (for due dates and sessions) either by phone, email, or in person during office hours to request remediation. In all cases, acceptable reasons for requesting remediation are (i) personal illness, (ii) illness of dependent, (iii) death of immediate family member. In all cases, requests for remediation must be accompanied by documentation substantiating the reason for missed work, to include photocopies of either doctor visit receipts or published death notices; this documentation can be submitted to the lecturer or appropriate instructor when the student returns to the University.
3. **Lecture Exam Remediation.** Participation in each lecture exam is an absolute requirement of the course (see **Course Requirements** above). Following initial contact of the lecturer and receipt of documentation (as described above), the lecturer will schedule with the student a make-up exam to be administered during the week of University Final Exams (Dec 3 – 9, 2009). The make-up exam will cover the same course material as the missed exam, but will not be identical in either content or format to the missed exam.
4. **Laboratory Remediation.** Because the BIOL 155 laboratory is prepared for different experiments each week, it is imperative that students attend their regularly-scheduled sessions or remediate a missed session *in the same week*. If a session is missed, the student must (i) contact his lab instructor to request remediation (as described above) and (ii) seek permission from another lab instructor to attend a remediating lab session in the same week. If a laboratory exam is missed, the student must request permission from another lab instructor to take the exam during a remediating session. Failure to remediate a session will result in a letter-grade reduction from the final grade in the course. Components of the participation grades are of the design of individual instructors and therefore cannot be remediated.

IMPORTANT ADVICE

1. Read assigned readings before attending lecture.
2. Attend lecture and take detailed notes.
3. Review your notes weekly.
4. Work relevant problem sets weekly (see **Problem Sets**).

5. Identify problem areas and seek help.
6. Review all notes and problem sets beginning at least 3 days before the exam

ACADEMIC HONESTY POLICY:

Dishonesty will not be tolerated. Cheating during examination and submission of non-original work are each grounds for dismissal and application of sanctions in accordance with the *Code of Student Conduct of Nicholls State University*. Plagiarism or any other form of dishonesty detected in reports or exams will result in a course grade of F.

SafeAssign Policy: By taking this course, students agree that all assignments are subject to submission to plagiarism checking via SafeAssign, an online plagiarism prevention and detection service in Blackboard. All work submitted will be added to a database of papers. Specifically, this service compares your paper with Internet webpages, articles in databases, and all papers previously submitted from this university or any other. SafeAssign then either confirms the originality of your work or gives the source of plagiarism. In cases of detected plagiarism, the paper and supporting evidence will be handled in compliance with the Student Code of Conduct (http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf).

Students with Disabilities: If you have a documented disability that requires assistance, you will need to register with the Office of Disability Services (Room 100A Peltier Hall, 985-448-4430 TDD: 985-449-7002) for coordination of your academic accommodations.

Academic Grievances: The proper procedure for grade appeals or grievances related to academic matters is listed in Section 5 of the Code of Student Conduct and at the following link:

http://www.nicholls.edu/documents/student_life/code_of_conduct.pdf

Continued learning following an extreme emergency: In order to make continued learning possible following an extreme emergency, students are responsible for:

- Reading regular emergency notifications on the NSU website
- Knowing how to use and access Blackboard (or university designated electronic delivery system)
- Familiarity with emergency guidelines
- Evacuating textbooks and other course materials
- Knowing their Blackboard (or designated system) student login and password
- Contacting faculty regarding their intentions for completing the course.

Faculty responsibilities for emergencies:

- their development in the use of the Blackboard (or designated) software;
- having a plan for continuing their courses using only Blackboard and email;
- continuing their course in whatever way suits the completion of the course best, and being creative in the continuation of these courses;
- making adjustments or compensations to a student's progress in special programs with labs, clinical sequences or the like only in the immediate semester following the emergency.

iClicker (classroom response pad) will be used to record your attendance at lecture and will be used for in-class evaluation of your comprehension of lecture. You will likely use the iClicker in many other courses on campus. Thus this is a one-time purchase. You will also be required to register your iClicker either in class or on line. An additional handout with instructions for the registration process will be given in a separate handout.

IMPORTANT DATES (Fall 2009)

September 7: Labor Day Holiday

October 15-16: Fall Break

October 28: Last day to drop with W grade

November 23-27: Thanksgiving Holiday

December 1: Last Class Day

December 3-9: Final Exams

BIOL 155 LECTURE SCHEDULE (FALL 2009)

LECTURES HELD AT 2M IN 101 GOUAUX HALL

Chapters are from Raven, Johnson, Losos, Mason & Singer, Biology (8th ed)
Changes to the sequence and content of lectures may be changed at the discretion of the lecturer.
Dates of exams are tentative.

<u>Topic</u>	<u>Reading</u>
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A. *Origins and Properties of Life*

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|-----------------------------|-------|
| 1. The Science of Biology | Ch. 1 |
| 2. Atoms and Molecules | Ch. 2 |
| 3. Chemical Building Blocks | Ch. 3 |

B. *Cell Biology*

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|-------------------|-------|
| 1. Cell Structure | Ch. 4 |
| 2. Membranes | Ch. 5 |

Practice Exam 1 – Fri Sep 11 - 4:10 pm

Exam 1 (covers Chapters 1, 2, 3, 4, and 5) – week of **Sep. 14**

C. *Energetics*

- | | |
|--------------------------------|-------|
| 1. Energy, Enzymes, Metabolism | Ch. 6 |
| 2. Cellular Energy Harvest | Ch. 7 |
| 3. Photosynthesis | Ch. 8 |

D. *Reproduction and Heredity*

- | | |
|-----------------------|-------------|
| 1. Cell Division | Ch. 10 |
| 2. Sex and Meiosis | Ch. 11 |
| 3. Mendelian Genetics | Ch. 12 & 13 |

Practice Exam 2 – Mon Oct 19 - 4:10 pm

Exam 2 (covers chapters 6, 7, 8, 10) – week of **Oct 19**

E. *Molecular Genetics*

- | | |
|-----------------------|-------------|
| 1. DNA | Ch. 14 |
| 2. How Genes Work | Ch. 15 |
| 3. Genetic Regulation | Ch. 16 |
| 4. Animal Development | Ch. 53 & 19 |

Practice Exam 3 – Fri Nov 6 - 4:10 pm

Exam 3 (covers chapters 11, 12, 13, 14, 15, 16) – week of **Nov 9**

F. *Evolution*

- | | |
|---------------------------|--------|
| 1. Population Genetics | Ch. 20 |
| 2. Evidence for Evolution | Ch. 21 |
| 3. Origin of Species | Ch. 22 |

G. *Viruses and Bacteria*

- | | |
|-----------------------------|--------|
| 1. The Six Kingdoms of Life | Ch. 26 |
| 2. Viruses | Ch. 27 |
| 3. Prokaryotes | Ch. 28 |

Comprehensive Final Exam

4T lecture: **Fri Dec 4, 1-3 pm**

2M lecture: **Mon Dec 7, 8-10 am**

BIOL 155 LABORATORY SCHEDULE (FALL 2009)

ALL LABORATORY SECTIONS MEET IN 211 GOUAUX HALL

on Tuesday at 9:00 & 1:30, Wednesday at 9:40 & 12:55, Thursday at 9:00 & 1:30 and Friday at 12:55.

Lab activity sources are Vodopich and Moore, *Biology Laboratory Manual*, 8th ed. ("V&M")
and Schultz, *Biology 155 Laboratory Supplement* ("Supplement")

Meeting	Dates	Exercise	Source
1	Aug 25 – 28	Introduction to the Biology 155 Laboratory	
2	Sep 1 – 4	The Microscope The Cell Discussion: Science and the Scientific Method	V&M Ex 2 V&M Ex 3
3	Sep 8 – 11	Diffusion and Osmosis Introduction to the Spectronic 20	V&M Ex 8 Supplement
4	Sep 14 – 18	Enzymes I: Action of Catechol Oxidase	Supplement
5	Sep 22 – 25	Enzymes II: Action of Catechol Oxidase	Supplement
6	Sep 29 – Oct 2	Localization of Respiration and Glycolysis Discussion: Writing Scientific Reports	Supplement V&M App III
7	Oct 6 – 9	Photosynthesis Genetic Transformation I	V&M Ex 12 Supplement
	Oct 12 – 14	Midterm Exam (take exam on any day during any free time from 9 AM to 3 PM)	
8	Oct 20 – 23	Genetic Transformation II Cell Division Lab Report, First Draft Due	Supplement V&M Ex 13&14
9	Oct 27 – 30	Genetic Transformation III Mendelian Genetics Pedigree Analysis	Supplement V&M Ex 16 Supplement
10	Nov 3 – 6	Animal Development Lab Report 1 Returned	V&M Ex 49
11	Nov 10 – 13	Population Genetics and Evolution	Supplement
12	Nov 17 – 20	Systematics and Classification Lab Report, Final Draft Due	Supplement
13	Nov 30 – Dec 2	Final Exam (comprehensive) (take exam on any day during any free time from 9 AM to 3 PM)	

BIOLOGY 155 PROBLEM SETS

What are Problem Sets? The Biology 155 Problem Sets are interactive computer programs that run on IBM compatible computers. Each problem set is a group of multiple choice questions that are designed to test your knowledge of subject matter in a specific area and increase your knowledge of the subject by providing you with additional information. The questions in a problem set are similar in style and content to questions that you will see on Biology 155 lecture exams. If used regularly they should increase your preparedness for exams. However, they are not designed to help you cram for exams. They are most valuable if used on a weekly or twice weekly basis. Schedule a regular time to use them.

How can I get the Problem Sets? The problem sets are available on the Biology 155 web site (<http://www.nicholls.edu/biol-ds/biol155>). You can access them through the internet. Go to the website and follow the directions.

Getting Started: The problem sets can be used on almost any computer (IBM or Apple compatible) running Internet Explorer 4.0 or higher or compatible software. Computers are available at various locations on campus, such as the WAC Lab in the library, or the CENAC Center in Powell Hall. Computer labs and their hours are published regularly in the *Nicholls Worth*.

More on Problem Sets: A problem set is a group of multiple choice questions that cover a limited subject area. The problem sets differ from many banks of test questions because they have detailed explanations for each choice in each multiple-choice question. When you use the problem sets, you are presented with a multiple-choice question and choices. When you make a choice you are given feedback on that choice. If the choice is correct you are given detail on why that choice is correct. If the choice is incorrect, you are given an explanation of why the choice is incorrect, and usually you are given more information on the subject of the question so that you may return to the question to make another choice. You can return to the question as many times as you wish, and you can use each problem set as many times as you wish.

The problem sets are designed to present the questions in the set in random order. Thus, each time you use a problem set, the problems will be presented in a different order. This feature reduces the possibility of memorization of answers, and thus increases the need to read, and reason through, the question to arrive at the correct choice.

Many students find that they learn as much from reviewing the explanations for the incorrect choices as they do from reviewing the explanations for the correct choices. Of course, recognizing incorrect choices is just as important as recognizing correct choices in an examination.

Common Questions About Problem Sets

Can I work on them at home? Yes, if you have internet access or you make your own disk as described on the Biology 155 web site.

Can I print the questions? Yes, but it is a terrible waste of paper. Printed versions of the questions greatly reduce their utility as a study aid since the questions and choices would no longer be randomized.

Do I have to do problem sets to pass the exam? No, but they have been proven to help. Students who discover their usefulness late in the semester commonly regret not having used them earlier. Don't make an example of yourself.