

**BIO 101      BIOLOGICAL SCIENCE FOR SCIENCE MAJORS I****4 cr. (3-2)****COURSE DESCRIPTION:**

This course is designed for science majors. It is a lecture-lab course which includes the following: an introduction to biochemistry, molecular genetics, cell structure, function, and processes. The scientific method is presented in lab.

**PREREQUISITES:** None**COURSE OBJECTIVES:**

Students will:

1. Describe and discuss the organization of living systems at the molecular, cellular, and organismal levels.
2. Compare and contrast the structure and function of organisms belonging to each of the six living kingdoms.
3. Describe principles of chemistry and thermodynamics that are important to the organization and function of living systems.
4. Identify and describe the components of eukaryotic and prokaryotic cells. Discuss the importance of membranes in regulating, organizing and facilitating cellular biological processes.
5. Compare and contrast chemical pathways for acquiring and transforming energy and matter at the cellular level. Clearly distinguish between the mechanisms and purposes of photosynthesis, respiration, and fermentation.
6. Describe prokaryotic and eukaryotic cell growth and division. Differentiate between the characteristics and outcomes of asexual versus sexual nuclear division in eukaryotes.
7. Demonstrate both a theoretical and practical understanding of the principles of inheritance in plants and animals, including humans. Both predict and analyze the outcomes of simple Mendelian matings.
8. Describe the structure and behavior of genes at the molecular, chromosomal, cellular, and organismal levels. Relate their behavior to Mendel's laws of inheritance.

9. Describe the techniques, products and applications of molecular biotechnology in basic science, medicine, agriculture, and/or industry.
10. Identify or describe some potential effects of biotechnology on humanity, including some ethical difficulties created by growing knowledge and technology in the field of biology.

### **Lab Objectives:**

1. Demonstrate an understanding of scientific principles by the collection, qualitative and quantitative analysis, interpretation, and presentation of experimental data. Demonstrate an ability to communicate scientific information orally and in written assignments.
2. Show a theoretical and practical understanding of common biological techniques such as light microscopy, enzyme activity assays, restriction mapping of DNA or PCR analysis, computer modeling, and analysis of Mendelian traits in animals or plants.

### **COURSE OUTLINE:**

Exam dates may be revised in response to unforeseen circumstances.

<b>Lecture Topics</b>	<b>Dates</b>	<b>Chapters</b>
I. The Organization of Life (Chapters 1-4)	June 8	Syllabus Chapter 1
	June 10	Chapters 1 & 2 CD ROM - Biochemistry
	June 15	Chapters 2 & 3
	June 19	Chapter 3 & 4 <b>Synopsis 1 due</b>
II. Energy Transfer and Living Systems (Chapters 5-8)	June 22	<b>Exam 1 - Chapters 1 -3</b> Chapter 4 CD ROM – The Plasma Membrane
	June 24	Chapter 5 & 7 CD ROM – Enzymes <b>Synopsis 2 due</b>
	June 29	Chapter 7 & 8 CD ROM – Cellular Respiration
	July 1	<b>Exam 2 Chapters 4,5 &amp; 7</b> Chapter 8
	July 6	Chapter 9 CD ROM - Photosynthesis

Lecture Topics	Dates	Chapters
III. Cell Growth and Inheritance (Chapters 10, 11, 16)	July 8	<b>Exam 3 Chapters 8 &amp; 9</b> Chapter 10 CD ROM - Meiosis; Mitosis
	July 13	Chapter 11 & 16 CD ROM - Mendel's Principles
	July 15	<b>Exam 4 Chapters 10, 11 &amp; 16</b> Chapters 12 & 13
IV. Molecular Genetics and Biotechnology (Chapters 12 -15)	July 20	Chapters 13 & 14 CD ROM- The Molecule of Life CD ROM - From DNA to Protein
	July 22	Chapters 14 & 15
	July 27	<b>Exam 5</b>
	July 29	<b>Review</b>
	July 30	<b>Final Exam</b>

### Lab Schedule

Date	Lab Topics
June 9	Lab Safety, Microscope I Safety handout, Ex. 1.1 – 1.3 pages 5 – 13
June 11	Microscope II Ex. 1.5 pages 15 – 24
June 16	Scientific Investigation, Ex. 2.1 – 2.2 pages 28 – 35
June 18	*Scientific Investigation II, Ex. 2.3 page 35 – 39
June 23	*Diffusion and Osmosis Ex. 3.1 – 3.2 pages 59 – 71
June 25	Enzyme I Ex. 4.1 – 4.2 pages 87 - 93
June 30	*Enzyme II Ex. 4.3 pages 94 – 105
July 2	*Photosynthesis Ex. 5.1 – 5.3 pages 113 – 123
July 7	*Carbohydrate Metabolism Handout
July 9	Mitosis Ex. 6.1 - 6.3 pages 135- 146
July 14	Meiosis, Modeling handout, Ex. 6.4 pages 146 - 152
July 16	Mendelian Genetics Handout
July 21	PCR I Handout
July 23	*PCR II Handout
July 28	Plant Genetic Paper due

**COURSE REQUIREMENTS:**

1. You are required to attend lecture and lab. If you are late to class, you should give the instructor a **note** at the **end** of class so that you are counted tardy rather than absent. (PLEASE don't skip classes—nothing is more disastrous for your grade). You miss 10 points per lab absence plus assignments and quiz points for absences from lecture.
2. You must turn in assignments on time. Your instructor may not accept late papers or assignments; this means you will receive 0 points for the assignment. Should an emergency arise, you should contact your instructor **as soon as possible** to inform him or her of the problem.
3. **Exams.** There will be five lecture exams and one cumulative final exam. If your instructor chooses, he or she may make a homework assignment one component of one or more of the regular exams. The four best lecture exams will count. There will **not** be any make up exams after the class has taken the exam. If you must miss a lecture exam for any reason, you can arrange to take the exam early.
4. There will be at least ten unannounced quizzes throughout the semester. Your top ten scores will be used in computing your final grade. These quizzes **may not be made up**. Most of the quizzes will be given at the beginning of the class. If you are tardy, then you will not be allowed to take them.
5. Your final grade will reflect your performance in **both** lecture and lab. You receive one overall grade for both parts of the class.
6. **Big Paper.** You will write a research paper based on the data gathered in one lab experiment (Genetics). The due date is listed in the Lecture Outline. The paper must be written and cited in the style of *Infection and Immunity*. (Examples are available on reserve in the LRC). These papers must be typewritten, in the appropriate format, and turned in on time. You will receive additional information about this assignment.
7. **Little Papers.** Two **brief** synopsis (summaries) of articles on cells, physiology, tissue culture, genetics, or molecular biology. **No other topics are acceptable!** Each synopsis should be 5-10 sentences long and should be in clear, formal written English. There should be **no direct quotations**—not even a part of a sentence.

You must clearly identify the article by title, authors, journal name, date, volume number, and page numbers. You may choose a 2-3 page article from any scientific journal dated 2003 or later in the LRC. These are worth 10 points each if well done.

8. Lab Reports. You will turn in five lab reports over the starred exercises. Each should be neatly written and submitted within one week of the completion of each lab. There will be one report each for exercises 1, 2, 4, 6, PCR, and Respiration Lab. The format for laboratory reports is described throughout the manual and is summarized in Appendix A of the manual. **You may turn in reports only over exercises which you actually performed!**
9. Lab. The laboratory component of your grade will be determined by attendance, participation, lab reports, video question assignments, and performance on quizzes and/or skill demonstrations. Your instructor will give you more details about laboratory grading.

Classroom Behavior. Disruptive behavior in the classroom or laboratory is unacceptable. You will be asked to leave if you behave in a way that makes either teaching or learning difficult. "Disruptive behavior" includes, but is not limited to, conversing during lectures or exams, profanity, abusive language, or rude/abusive behavior directed towards **anyone** in the classroom. Students and teachers alike are expected to treat others with respect and civility. Please be familiar with your rights and responsibilities as outlined in the John A. Logan College Handbook of Student Rights and Responsibilities.

Student Success Center. Tutors may be obtained through the Student Success Center. Contact the staff in C219 if this service is desired. John A. Logan College will make reasonable accommodations for students with documented disabilities under Section 504 of the Rehabilitation Act of 1973, and the Americans with Disabilities Act of 1990. Any student with a disability that may have some impact on work in this class, who feels she/he needs an accommodation, should make an appointment with the Coordinator of Services for Students with Disabilities on campus, Jennifer Frost, Room C219B, Ext. 8516. Before services can be provided, this advisor must determine eligibility and arrange appropriate academic adjustments. ***It is the student's responsibility to register in advance of a school term with this office and to turn in a schedule each term to ensure that there is every opportunity for success in this class.***

English Writing Center/Tutoring. For assistance with writing assignments in any college course, students are encouraged to visit "The Write Place" in Room E109. English instructors are available for one-on-one tutoring each semester during hours posted at the center.

Financial Aid. Students who receive financial assistance and completely withdraw from classes prior to 60% of the semester being completed (approximately 2-3 weeks after midterm) could be responsible to return a portion of their Federal Pell Grant award. Prior to withdrawing from courses, students should contact the Financial Aid Office.

Course Withdrawal Information. It is expected that you will attend this class regularly. If you stop attending for any reason, you should contact your advisor and withdraw officially to avoid the posting of a failing grade (an E) to your transcript. It is also advisable to discuss the situation with your instructor before dropping.

### **METHOD OF EVALUATION:**

Tests/Homework – 4 at 100 points .....	400
Final Exam .....	150
Lecture Quizzes .....	100
Two Synopses.....	20
Genetics Paper .....	80
Lab Attendance and Participation .....	50
Lab Questions, Quizzes and Skills .....	50
Lab Reports – 5 at 30 points .....	150
Total Points .....	1000

### **Minimum Grading Scale:**

A 900+.....	(90%+)
B 800-899.....	(80-89%)
C 700-799.....	(70-79%)
D 600-699.....	(60-69%)

This is a minimum scale (i.e., if you get 800 points, you are guaranteed at least a B). The scale may be adjusted upwards in response to unforeseen events.

### **METHOD OF PRESENTATION:**

Lecture, discussion, readings, assigned worksheets and problem sets, written papers and lab reports, supervised laboratory work, videos.

### **TEXTS:**

Biology, 8<sup>th</sup> edition. Solomon, Berg, Martin and Villee. Saunders College Publishing.  
Symbiosis. (Lab Manual). Morgan/Carter. Benjamin Cummings, Publishers.  
 Study Guide (recommended but not required).  
Chemistry for Biology (recommended but not required).

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**DATE:** Summer, 2009

**John A. Logan College Telephone Numbers**

Carterville and Williamson County .....	985-3741 (operator)
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Carbondale and Jackson County .....	549-7335 (operator)
	457-7676 (direct extension access)
Du Quoin .....	542-8612
West Frankfort.....	937-3438
Crab Orchard, Gorham, & Trico areas .....	1-800-851-4720
TTY (hearing-impaired access) .....	985-2752

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