

**Fayetteville State University  
College of Arts and Sciences  
Department of Natural Sciences**

**I.LOCATOR INFORMATION**

**Semester: Fall**

**Year 2012**

**Credit Hours 4.00**

**Course Number and Name: Natural Sciences 120**

**Course Location & Meeting Time**

**Office Hours: TBA**

**Instructor: Dr Jonas E. Okeagu**

**Office Location: LS 216**

**Office Telephone: (910)672-1656**

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## **II. COURSE DESCRIPTION**

NSCI 120 (4-3-2); (Modern Biology), an introductory course covering basic biological concepts that provides the student with a comprehensive survey of biological sciences. Some important areas which will be investigated are: cell structure and reproduction, energy relationships at the cellular level, genetics, DNA, evolution, ecology, bacteria, protists, fungi, plants, and animal organ systems. Prerequisite: NSCI 110

## **III. DISABLED STUDENT SERVICES**

Division of Student Affairs Services for Students with Disabilities;  
<http://www.uncfsu.edu/CFPD.htm>; Phone: (910)672-1222

The university continues to be sensitive to the identification of possible barriers to students with disabilities and attempts to make responsible accommodations for these students. Students with physical disabilities who need assistance in utilizing university services should register with the Center for Personal Development as soon as they are admitted to the university.

## **V. TEXTBOOK**

Audesirk, Audesirk, and Byers; Biology, Life on Earth, 9<sup>th</sup> Edition, Benjamin Cummings, (www.pearsonhighered.com), New York, 2010

Symbiosis Laboratory Manual: Modern Biology, Natural Science 120

## **THE CONCEPTUAL FRAMEWORK OF THE SCHOOL OF EDUCATION**

**The conceptual framework defines the vision of the Department of Biological Sciences which underscores the purpose of the School of Education in preparing its candidates for teaching and leadership roles in a global society. The unit prepares candidates who support student learning within the context of family and community participation for a diverse, technological, and global society. We achieve this vision through teaching, research, and service. Our conceptual framework serves as a lens through which we view our education professionals in the secondary**

**education program. The themes of our conceptual framework include knowledgeable and reflective education professionals; working with families and communities; respect for diversity and individual worth; technological competence and educational applications; and caring dispositions and ethical responsibility.**

## **VI. STUDENT LEARNING OUTCOMES**

**Upon completion of this course each student should be able to:**

**Demonstrates the ability to interpret information and use the scientific method in problem solving situations**

- 1. Demonstrates an understanding of the way the science of biology is split into various divisions.**
- 2. Applies the scientific method to appropriate problem situations by the use of observation and experiment.**
- 3. Arranges the major groups of organisms into distinct categories based on their general characteristics.**

**Demonstrates an understanding of the different kinds of cells, their organization and functioning.**

- 1. Contrasts the theory of spontaneous generation (abiogenesis) with the cell theory (biogenesis).**
- 2. Relates the surface area to volume ratio of cells to their ability to carry on the life processes.**
- 3. Analyzes information about the different types of cells and determines their common characteristics.**
- 4. Illustrates the ways in which the prokaryotic cell differs from the eukaryotic cell.**

**Demonstrates an understanding of the physical and biological processes responsible for the movement of water and solutes in living systems.**

- 1. Uses the Kinetic Molecular Theory to explain active and passive transport through cell membranes.**
- 2. Evaluates the effect of osmosis on different kinds of cells and tissues.**

3. **Assesses the effect of concentration gradients on the movement of water and ions in living systems.**

**Shows the involvement of energy and the laws of energy in life processes.**

1. **Illustrates the ways energy is transferred from one organic system to another.**
2. **Evaluates the relationship between bond energy and stored Chemical/potential energy in organic compounds.**
3. **Assesses the effect of various environmental factors such as temperature, pH and water on the action of enzymes.**
4. **Compares and contrasts the process of photosynthesis with cellular respiration.**

**Applies theories of heredity to illustrate how genetic information is stored and transferred from one living unit to another.**

1. **Contrasts the process of mitosis with meiosis in complex cells.**
2. **Assesses the effect of sexual and asexual reproduction on populations of organisms.**
3. **Uses the laws of genetics to solve genetic problems involving monohybrid and dihybrid crosses.**
4. **Demonstrates an understanding of the ways genetic information is coded and transcribed from DNA.**
5. **Illustrates the process of protein synthesis in a cell containing DNA, RNA and cellular energy.**

**Demonstrates an understanding of biological evolution.**

1. **Describes the factors that can cause a change in the genetic makeup of a population.**
2. **Explains the process of natural selection.**

**3. Explains how species can be formed.**

**Demonstrates knowledge of each of the five kingdoms of life.**

- 1. Knows the main characteristics that distinguish viruses from bacteria and bacteria from Protista.**
- 2. Understands the harmful and beneficial effects of microorganisms.**
- 3. Contrasts the body plan of a fungus with its ecology.**
- 4. Compares vascular, nonvascular, seed and non seed plants.**
- 5. Knows the characteristics of the major animal phyla.**

**Understands the functions of organ systems in the animal kingdom.**

- 1. Identifies the components of blood and traces its flow through the human circulatory system.**
- 2. Explain how the body fights disease.**
- 3. Identifies the organs in the human digestive system and explains their functions.**
- 4. Understands the action of a respiratory system, by identifying its parts and indicating functions.**
- 5. Understands the role of the liver and kidneys in maintaining homeostasis.**
- 6. Sketches a neuron and identifies its cell body, axon, & dendrites.**
- 7. Describes how a nervous impulse is transmitted.**
- 8. Lists the major parts of the vertebrate brain and indicates an important function of each.**
- 9. Understands the effect of various drugs, including alcohol and nicotine on human behavior and the human nervous system.**
- 10. Describes how a muscle contracts**

**11. Names the main endocrine glands, indicates where each is located in the human body, and gives their functions.**

**12. Identifies the parts of the female and male reproductive systems and explains how they function.**

**Understands basic concepts of ecology.**

**1. Understands how density of populations may be regulated.**

**2. Illustrates the flow of energy through an ecosystem.**

**3. Describes the general characteristics of the world's biomes and how nutrient cycles operate in them.**

**4. Demonstrates an understanding of how human activities affect the biosphere.**

**Demonstrates an understanding of vascular plant structure and growth.**

**1. Identifies the major tissues and hormones found in vascular plants and how they relate to structure and function**

**2. Contrasts herbaceous stem development with woody stem development in higher plants.**

**Demonstrates an understanding of vascular plant structure and growth.**

**3. Shows how flowering plants reproduce.**

**4. Arranges the reproductive parts of a flower in correct order.**

### **1. NCDPI, OR SPECIALTY AREA STANDARDS**

<b>Standards Used in this Course</b>	<b>NCDPI Specialty Area Standards</b>	<b>Assessment(s)</b>
<b>1</b>	<b>Science teachers understand the unifying concepts of science.</b>	<b>Lecture and laboratory exams and quizzes.</b>

<b>2</b>	<b>Science teachers understand the nature of science and the development of scientific thought.</b>	<b>Lecture and laboratory exams and quizzes.</b>
<b>3</b>	<b>Science teachers understand the historical development of scientific thought and the application of science in society.</b>	
<b>4</b>	<b>Science teachers understand the math concepts and processes and the technologies that are used in science.</b>	<b>Lecture and laboratory exams and quizzes.</b>

### **7. CORE STANDARDS**

**Include the NCDPI Core Standards and the assessment(s). Only include the standard or standards you will address in this course.**

<b>Standards Used in this Course</b>	<b>NCDPI Core Standards</b>	<b>Assessment(s)</b>
	<b>1. Teachers know the content they teach.</b>	
	<b>2. Teachers know how to teach students.</b>	
	<b>3. Teachers are successful in teaching a diverse population of students.</b>	
	<b>4. Teachers are leaders.</b>	
	<b>5. Teachers are reflective about their practice</b>	
	<b>6. Teachers respect and care about students.</b>	

**DIVERSITY**

<b>Diversity Standards Used in this Course</b>	<b>NCDPI Diversity Standards</b>	<b>Assessment(s)</b>
	<b>1. Teachers understand the central concepts, tools of inquiry, and structures of the discipline(s) they teach and can create classroom environments and learning experiences that make these aspects of subject matter accessible, meaningful and culturally relevant for diverse learners.</b>	
	<b>2. Teachers understand how students' cognitive, physical, socio-cultural, linguistic, emotional, and moral development influences learning and address these factors when making instructional decisions.</b>	
	<b>3. Teachers work collaboratively to develop linkages with parents/caretakers, school colleagues, community members and agencies that enhance the educational experiences and well being of diverse learners.</b>	
	<b>4. Teachers acknowledge and understand that diversity exists in society and utilize this diversity to strengthen the classroom environment to meet the needs of individual learners.</b>	
	<b>5. Teachers of diverse students demonstrate leadership by contributing to the growth and development of their</b>	

	colleagues, their school and the advancement of educational equity.	
	6. Teachers of diverse students are reflective practitioners who are committed to educational equity.	

## 8. TECHNOLOGY

This course will help strengthen and enhance the candidates' technological competence and skill in using technology. Candidates will use a variety of technologies to enhance their knowledge of technology in this course.

	Technological Applications for this Course
x	Productivity tool (Power Point)
	Presentation software
	Internet
	Web page construction
x	e-mail
x	On-line applications
x	Grade book
	Video camera
	Scanner
	Excel
x	Smart board
x	Lap Top and LCD panel
x	Music Stereo and CD

Technology Standards Used in this Course	NCDPI Technology Standards	Assessment(s)
	1. Teachers demonstrate a sound understanding of technology operations and concepts.	
	2. Teachers plan and design effective learning environments and experiences supported by technology.	

	<b>3. Teachers implement curriculum plans that include methods and strategies for applying technology to maximize student learning.</b>	
	<b>4. Teachers apply technology to facilitate a variety of effective assessment and evaluation strategies.</b>	
	<b>5. Teachers use technology to enhance their productivity and professional practice.</b>	
	<b>6. Teachers understand the social, ethical, legal and human issues surrounding the use of technology in PK-12 schools and apply those principles in practice.</b>	

## 10. DISPOSITIONS

<b>Professional Competence</b>		<b>Professional Responsibilities</b>	
	<b>Appreciates and engages in self-reflection</b>		<b>Dresses appropriately for the setting</b>
	<b>Shows a commitment to ongoing learning</b>		<b>Is punctual</b>
	<b>Desires to learn and apply new technologies</b>		<b>Attends class regularly and participates in the class</b>
	<b>Is receptive to new ideas and feedback</b>		<b>Completes assignments and tasks in a timely manner</b>
	<b>Writes and speaks clearly and effectively</b>		<b>Willing to go beyond required assignments</b>
	<b>Uses culturally sensitive language when communicating with families</b>		<b>Shows initiative and motivation</b>
	<b>Respects the privacy of students and their families</b>		<b>Assumes fair share of responsibilities</b>
<b>Professional Dispositions and Qualities</b>		<b>Professional Integrity</b>	
	<b>Believe all children can learn</b>		<b>Displays high and ethical professional standards</b>
	<b>Understands the culture of students and their families</b>		<b>Is honest and dependable</b>

	<b>Values and respects diversity and individual differences</b>		<b>Is courteous and respectful</b>
	<b>Demonstrates flexibility and adaptability</b>		<b>Has a positive professional attitude</b>
	<b>Treats all students fairly and equitably</b>		<b>Accepts and uses constructive criticism</b>
	<b>Is sensitive to the feelings of others</b>		<b>Maintains emotional control and appropriate behavior</b>
	<b>Interacts appropriately and positively with others</b>		

**Other** \_\_\_\_\_  
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## **VI. GENERAL REQUIREMENTS**

### **Evaluation Criteria**

#### **Grades:**

**Grades will be based on the following scale:**

%	grade	%	grade
92-100	A	73-82	C
83-91	B	64-72	D
Below 64		F	

#### **Approximate percentage weight of exams, quizzes and other graded assignments**

Item	%
Hourly Exams/Research Paper	60
Quizzes or other work	10
Lab Work	10
Final Exam	20

## **VI..STUDENT RESPONSIBILITIES**

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The following revisions become effective on August 16, 2007:

- **WN - Withdrawal due to non-attendance - discontinued, effective August 16, 2007.**

**STUDENTS:** Do not expect faculty to withdraw you for non-attendance. Drop or withdraw\* from classes according to the deadlines published in the catalog. \*See warning below about class withdrawals.

**NEW TYPE OF GRADE: INTERIM GRADES** – (New name for “midterm grade,” with additional purposes). Interim grades will be assigned from the first week of the semester until the deadline for class withdrawals. Interim grades are used for informational and warning purposes only; they are not part of your permanent transcript and have no effect on your GPA. Instructors may assign interim grade of F to warn students of poor academic performance or they may assign “X” or “EA” grades. (See below for explanations) After midterm, faculty will assign all students an interim grade of A – F to inform students of their academic status as of midterm.

- **INTERIM GRADE X = NO SHOW** – Assigned to students who are on a class roster, but never attend class. For warning purposes only; NOT a final grade.

**STUDENTS:** Check interim grades early in the semester. If you have an X grade, either begin attending the class or withdraw\* from it. \*See warning below about class withdrawals. If you do not take action in response to an X grade, you will receive a final grade of FN. (See “FN” below)

- **INTERIM GRADE EA = EXCESSIVE ABSENCES** - Assigned to students whose class absences exceed 10% of the total contact hours. For warning purposes only, NOT a final grade.

**STUDENTS:** Check your interim grades often. If you have an “EA” grade for a class, you are in jeopardy of failure if you do not take immediate actions. Either resume attending the class or withdraw from it. \*See warning below about class withdrawals.

### **NEW FINAL GRADE:**

- **FN = FAILURE DUE TO NON-ATTENDANCE** – Assigned to students who are on class roster, but never attend the class. An FN grades is equivalent to an F grade in the calculation of the GPA.

**STUDENTS:** You must attend (or withdraw\* from) all the classes for which you are enrolled. \*See warning below about class withdrawals.

### **WARNING ABOUT CLASS WITHDRAWALS:**

- When you withdraw from a class, you are wasting your money and time. You receive no refund for withdrawing from individual classes and you slow your progress toward degree completion.

- If you withdraw from or fail more than one-third of your classes, you will no longer be eligible for financial aid.
- STRIVE TO EARN CREDIT FOR ALL THE CLASSES IN WHICH YOU ENROLL; WITHDRAW FROM CLASSES ONLY WHEN IT IS ABSOLUTELY NECESSARY!

## VII. ACADEMIC SUPPORT RESOURCES

### TUTORIAL SESSIONS

Students who are earning less than a "C" average will be encouraged to attend tutorial sessions.

## VIII. COURSE OUTLINE\*\*\*

WEEK OF	LESSON
JAN. 9	Orientation
	Scientific method & science
JAN. 16	Biological Molecules LAB# 1: The Process of Scientific Inquiry MLK Birthday Holiday
JAN. 23	Biological Molecules Diffusion, osmosis & transport Cell structure & function LAB # 2: Tool for Scientific Inquiry *
JAN. 30	Energy, enzymes & metabolism Photosynthesis LAB # 3: Macromolecules *
FEB. 6	**** TEST 1 **** Aerobic & anaerobic respiration
	LAB # 4: Microscope *
FEB. 13	Mitosis Meiosis & Genetics LAB # 5: Cellular Respiration/Fermentation *
FEB. 20	Human genetics DNA & Protein synthesis
	LAB # 6: GENETICS HANDOUT (Dry Lab) *

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**FEB. 27    \*\*\* TEST 2 \*\*\***  
**Evolution**  
**Evolution & Classification**  
**LAB # 7: Evolution**  
**MIDTERM EXAMS**

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**MAR. 5    MIDTERM BREAK**

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**MAR. 12**  
**Microorganisms, Animals**  
**Respiratory & circulatory system**  
**LAB # 8: CIRCULATION**

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**MAR. 19**  
**Immunity**  
**Digestion & homeostasis**  
**LAB # 9: DIGESTION \***

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**MAR. 26**  
**Nervous system & senses**  
**Endocrine system**  
**\*\*\*\* TEST 3 \*\*\*\***  
**LAB # 10: SENSORY SYSTEM.**

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**APR. 2    Reproduction/Development**  
**Ecology**  
**LAB # 11: ECOLOGY**

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**APR. 9    Ecology**

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**APR. 16    SPRING HOLIDAY**  
**Fungi & plants**  
**\*\*\*\* TEST 4 \*\*\*\***

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**LAB. REPORT DUE**

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**APR. 23**  
**Plant Structure & Physiology**  
**Final Exam (Graduating Seniors)**

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**APR.28                    LAST                    DAY                    OF                    CLASSES**

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**MAY 3    Final Exam (NSCI 120)**

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**MAY 5            COMMENCEMENT**

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**\*\*\* NSCI 120 LABORATORY SCHEDULE FOR ALL LABS \*\*\***

**LAB 1 = PROCESS OF SCIENTIFIC INQUIRY**

**LAB 2 = TOOLS FOR SCIENTIFIC INQUIRY**

**LAB 4 = MICROSCOPE**

**RESPIRATION**

**LAB 6 = GENETICS**

**LAB 8 = CIRCULATION**

**LAB 10 = SENSORY SYSTEM**

**\* = Laboratory Activity to be Announced**

**LAB 3 = MACROMOLECULES**

**LAB5 = CELLULAR**

**LAB 7 = EVOLUTION**

**LAB 9 = DIGESTION**

**LAB 11 = ECOLOGY**

WEEK OF	MON.	TUE.	WED.	THURS.	FRI.
JAN. 9	*	*	*	*	*
JAN. 16	1	1	1	1	1
JAN. 23	2	2	2	2	2
JAN. 30	*	3	3	3	3
FEB. 6	3	4	4	4	4
FEB. 13	4	5	5	5	5
FEB. 20	5	6	6	6	6
FEB. 27	6	7	7	7	7
MAR 12	7	8	8	8	8
MAR. 19	8	9	9	9	9
MAR. 26	9	10	10	10	10
APR. 2	10	11	11	11	11
APR. 9	11	*	*	*	*

**\*\*\* This is a tentative schedule. The instructor reserves the right to alter it at any time. It is your responsibility to be in class and check your blackboard page in order to keep pace with any changes made to the schedule or assignments.\*\*\***

## **IX. TEACHING STRATEGIES**

The principal teaching strategies will be lecture, discussion, and laboratory exercises.

## **X. REFERENCES**

All general biology students are encouraged to use the library and to do supplemental reading in the biological sciences. The following science periodicals provide a source of current information in a format appropriate for both the major and non-major biology student.

1. Discover
2. Science Digest
3. Scientific American
4. Science
5. Science News
6. Nature
7. Natural History

**World Wide Web Site:**

**Audesirk Companion Web Site: <http://www.prenhall.com/audesirk3>**