Course Description
General biological principles and cell functions for biology and other health science majors.

Course Purpose
The general objective of the course is to prepare students in the basics of biology so that they will be prepared to pursue further studies in the area.

Conceptual Framework
The Conceptual Framework in the Professional Education Unit (PEU) at Florida A&M University is an integrated approach to providing educational experiences that result in exemplary professional educators. The Framework is comprised of six themes with the mission of developing high quality classroom teachers, administrators and support personnel. The term "exemplary" refers to the kind of graduates the PEU strives to produce. The figure below provides a diagram of the Exemplary Professional Conceptual Framework:

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**COURSE SYLLABUS**

<table>
<thead>
<tr>
<th>COURSE NUMBER</th>
<th>Course Title</th>
<th>Credits</th>
<th>Clock Hours Per Week: 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>BSC 1010</td>
<td>General Biology I</td>
<td>3.0 Lecture 1.0 Lab</td>
<td>Lecture 3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Laboratory 3.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Demonstration (Yes) N/A</td>
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</tbody>
</table>

Department: Biology  
Prerequisites:
College: Arts and Sciences
Required Textbook(s): Biology, 8th Ed., Campbell and Reece
Faculty Name: Dr. TBA  
Term and Year: Fall 2010
Office Location: TBA  
Campus Telephone: TBA
Office Hours (Others by Appointment)  
Monday TBA  
Tuesday TBA  
Wednesday TBA  
Thursday TBA  
Friday TBA  
Saturday TBA

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F=Florida Educator Accomplished Practices Standards (FEAPS)  
I=Interstate New Teacher Assessment and Support Consortium Standards (INTASC)  
(K)=Knowledge  (S)=Skill  (D)=Disposition

Approved/Revised 10/30/07
DIVERSITY

• CF 1
• Through this focal area, the FAMU professional education candidate will:

| CF: 1.5 (K, S) | Establish a comfortable environment in which all students can learn. | F: 5, 7, 9, 10 | I: 5 |

TECHNOLOGY

• CF 2
• Through this focal area, the FAMU professional education candidate will:

| CF: 2.1 (S) | Use of available technology and software to support student learning. | F: 4, 12 | I: 6 |
| CF: 2.2 (S) | Use technology to manage, evaluate and improve instruction. | F: 1, 4, 10, 12 | I: 6, 7 |
| CF: 2.6 (S, D) | Facilitate access to technology for students. | F: 12 | I: 6 |
| CF: 2.7 (S) | Facilitate the use of technology by students. | F: 4, 12 | I: 6 |

VALUES

• CF 3
• Through this focal area, the FAMU professional education candidate will:

| CF: 3.1 (S) | Work with colleagues in a professional manner. | F: 6 | I: 2, 5 |
| CF: 3.2 (S) | Interact with students, families and other stakeholders in a manner that reflects ethical and moral standards. | F: 11, 6 | I: 9, 10 |
| CF: 3.3 (S, D) | Show respect for varied (groups) talents and perspectives. | F: 5, 6 | I: 3 |
| CF: 3.4 (D) | Be committed to individual excellence. | F: 3, 9 | I: 5, 9 |
| CF: 3.5 (D) | Recognize the importance of peer relationships in establishing a climate for learning. | F: 7, 2 | I: 5, 10 |

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Approved/Revised 10/30/07
CRITICAL THINKING

Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF:</th>
<th>Description</th>
<th>F:</th>
<th>I:</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 (K)</td>
<td>Understand a variety of instructional/professional strategies to encourage student development of critical thinking and performance.</td>
<td>4,7</td>
<td>4</td>
</tr>
<tr>
<td>4.2 (S)</td>
<td>Use a variety of instructional/professional strategies to encourage students’ development of critical thinking and performance.</td>
<td>2,7</td>
<td>4</td>
</tr>
<tr>
<td>4.3 (D)</td>
<td>Value critical thinking and self-directed learning as habits of mind.</td>
<td>4</td>
<td>1,4</td>
</tr>
<tr>
<td>4.4 (K)</td>
<td>Acquire performance assessment techniques and strategies that measure higher order thinking skills of student.</td>
<td>1,4</td>
<td>1,8</td>
</tr>
<tr>
<td>4.5 (S)</td>
<td>Demonstrate the use of higher order thinking skills.</td>
<td>8</td>
<td>4</td>
</tr>
</tbody>
</table>

PROFESSIONALISM

Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF:</th>
<th>Description</th>
<th>F:</th>
<th>I:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 (K)</td>
<td>Know the content</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>5.2 (S)</td>
<td>Use the appropriate pedagogy to provide all students with the opportunity to learn.</td>
<td>7,9</td>
<td>7</td>
</tr>
<tr>
<td>5.3 (D)</td>
<td>Demonstrate commitment to professional growth &amp; development.</td>
<td>3,7</td>
<td>9</td>
</tr>
<tr>
<td>5.5 (S)</td>
<td>Construct learning opportunities that support student development &amp; acquisition of knowledge &amp; motivation.</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>5.6 (S)</td>
<td>Display effective verbal &amp; non-verbal communication techniques to foster valuable interaction in the classroom.</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5.7 (S,D)</td>
<td>Display appropriate code of conduct including dress, language, and respective behavior.</td>
<td>9</td>
<td>5,9</td>
</tr>
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</table>

URBAN/RURAL EDUCATION

Through this focal area, the FAMU professional education candidate will:

<table>
<thead>
<tr>
<th>CF:</th>
<th>Description</th>
<th>F:</th>
<th>I:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4 (S)</td>
<td>Communicate effectively with students’ parents and the community.</td>
<td>5,11</td>
<td>6</td>
</tr>
</tbody>
</table>

Overall Goals of the Course
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.

Specific Behavioral Objectives
From bacteria to bats, toadstools to trees, whippoorwills to whales – the diversity of the living world boggles the mind. Yet, all organisms, over all time (that we are aware of), are united by a common bond. Just as you are descended from your parents, grandparents, and so forth, going back many generations, all forms of life that ever lived on the are (believed to be) tied together by an unbroken lineage that can be traced back through time to the infancy of our planet.

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Approved/Revised 10/30/07
So welcome to biology, "The Study of Life." This course is the first of a two part series. As the description above implies, this course will introduce you to the basic concepts and principles of biology including: basic chemistry and the relationship between chemistry and life, cellular organization, cellular energetics, molecular biology, evolution, development and an introduction to biological diversity.

The students in this general biology (Part I) course should gain an understanding of the principles of:

1. biochemistry,
2. cell biology,
3. energetics,
4. reproduction, i.e., cell division (mitosis vs meiosis)
5. molecular genetics of basic biology.

This information will be used to develop the concepts of evolution, ecology and diversity of the biological world in BSC-1011 (General Biology II).

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Behavioral objectives</th>
<th>INTASC Standards</th>
<th>FEAPs</th>
<th>FTCE SAE</th>
<th>PEU Conceptual Framework</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Exam 1</td>
<td>Students should show a mastery of the biochemical basis for life (the importance of water, knowledge of structure and function of functional groups, why are you called a &quot;carbon-based life-form&quot;?)</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.4: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 6.4</td>
</tr>
<tr>
<td>Lecture Exam 2</td>
<td>Students should demonstrate their knowledge of basic cellular biology (difference between prokaryotic vs eukaryotic cells, types of macromolecules that go into building a cell, knowledge of organelles)</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.1: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 6.4</td>
</tr>
<tr>
<td>Lecture Exam 3</td>
<td>Students need to know the biochemistry of cellular respiration and photosynthesis</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.1: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 6.4</td>
</tr>
<tr>
<td>Lecture Exam 4</td>
<td>Students must understand the mechanisms that accompany each type of cell division and the function each performs in nature.</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.1: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 6.4</td>
</tr>
<tr>
<td>Lecture Exam 5</td>
<td>The object of this exam is to demonstrate mastery of basic genetics and the molecular biology of DNA and RNA</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.1: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7, 6.4</td>
</tr>
<tr>
<td>Comprehensive Final Exam</td>
<td>Students with an “A” can opt out of the final. Other students are given a second chance to demonstrate mastery of topics that they may not have gotten a sufficient grasp of earlier</td>
<td>I: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10</td>
<td>FEAPs: 1.1: 1j, 1k, 1m, 2.1: 2i, 2j, 2k, 3.1: 3b, 3c, 3i, 3j, 3k, 3l, 4.1: 4b, 4c, 4g, 4j, 5.1: 5a, 5b, 5k, 6.1, 7.1: 7b, 7g, 8.1: 8b, 8c, 8f, 9.1: 9f, 9g, 9k, 9l, 9m, 10.1, 11.1, 12.1: 12b, 12c, 12i, 12j, 12k, 12l</td>
<td>FTCE: 1) 1 – 3, 6 – 15, 2) 2, 3) 1 – 9, 12 – 16, 4) 1 – 8, 5) 1 – 4, 8 – 11, 13, 8) 12</td>
<td>CF: 1.5, 2.1, 2.2, 2.6, 2.7, 3.1-3.5, 4.1-4.5, 5.1, 5.2, 5.3, 5.5, 5.6, 5.7</td>
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Approved/Revised 10/30/07
National and State Standards Addressed in the Course

Interstate New Teacher Assessment and Support Consortium (INTASC) Standards

Standard 1: Subject Matter
The teacher understands the central concepts, tools of inquiry, and structures of the discipline(s) he or she teaches and can create learning experiences that make these aspects of subject matter meaningful for students.

Standard 2: Student Learning
The teacher understands how children and youth learn and develop, and can provide learning opportunities that support their intellectual, social and personal development.

Standard 3: Diverse Learners
The teacher understands how students differ in their approaches to learning and creates instructional opportunities that are adapted to learners from diverse cultural backgrounds and with exceptionalities.

Standard 4: Instructional Strategies
The teacher understands and uses a variety of instructional strategies to encourage students' development of critical thinking, problem solving, and performance skills.

Standard 5: Learning Environment
The teacher uses an understanding of individual and group motivation and behavior to create a learning environment that encourages positive social interaction, active engagement in learning, and self-motivation.

Standard 6: Communication
The teacher uses knowledge of effective verbal, nonverbal, and media communication techniques to foster active inquiry, collaboration, and supportive interaction in the classroom. Standard .

Standard 7: Planning
The teacher plans instruction based on knowledge of subject matter, students, the community, and curriculum goals.

Standard 8: Assessment
The teacher understands and uses formal and informal assessment strategies to evaluate and ensure the continuous intellectual, social and physical development of the learner.

Standard 9: Reflection and Professional Development
The teacher is a reflective practitioner who continually evaluates the effects of her/his choices and actions on others (students, parents, and other professionals in the learning community) and who actively seeks out opportunities to grow professionally.

Standard 10: Collaboration, Ethics, and Relationships
The teacher communicates and interacts with parents/guardians, families, school colleagues, and the community to support students' learning and well-being.

Florida Educator Accomplished Practices (FEAPs)

1. ASSESSMENT
   1.1 The preprofessional teacher collects and uses data gathered from a variety of sources. These sources include both traditional and alternate assessment strategies. Furthermore, the teacher can identify and match the students' instructional plans with their cognitive, social, linguistic, cultural, emotional, and physical needs.
   1.PRE.j Interprets, with assistance, data from various informal and standardized assessment procedures.
   1.PRE.k Reviews assessment data and identifies students' strengths and weaknesses.
   1.PRE.l Communicates individual student progress in student, parent, and staff conferences.
   1.PRE.m Develops short- and long-term personal and professional goals relating to assessment.

2. COMMUNICATION
   2.1 The preprofessional teacher recognizes the need for effective communication in the classroom and is in the process of acquiring techniques which she/he will use in the classroom.
2.PRE.i Provides opportunities for students to receive constructive feedback on individual work and behavior.

2.PRE.j Identifies communication techniques for use with colleagues, school/community specialists, administrators, and families, including families whose home language is not English.

2.PRE.k Develops short- and long-term personal and professional goals relating to communication.

3. CONTINUOUS IMPROVEMENT

3.1 The preprofessional teacher realizes that she/he is in the initial stages of a lifelong learning process and that self-reflection is one of the key components of that process. While her/his concentration is, of necessity, inward and personal, the role of colleagues and school-based improvement activities increases as time passes. The teacher’s continued professional improvement is characterized by self-reflection, working with immediate colleagues and teammates, and meeting the goals of a personal professional development plan.

3.PRE.b Participates in and supports the overall school improvement process.

3.PRE.c Uses data from her/his own learning environments as a basis for reflecting upon and experimenting with personal teaching practices.

3.PRE.i Shows evidence of reflection and improvement in her/his performance in teaching/learning activities.

3.PRE.j Seeks to increase her/his own professional growth by participating in training and other professional development experiences.

3.PRE.k Has observed others in the role of steward and can demonstrate some of the skills involved.

3.PRE.l Works as a reflective practitioner and develops the skills to recognize problems, research solutions, and evaluate outcomes.

4. CRITICAL THINKING

4.1 The preprofessional teacher is acquiring performance assessment techniques and strategies that measure higher order thinking skills in students and is building a repertoire of realistic projects and problem-solving activities designed to assist all students in demonstrating their ability to think creatively.

4.PRE.b Identifies strategies, materials, and technologies that she/he will use to expand students’ thinking abilities.

4.PRE.c Has strategies for utilizing discussions, group interactions, and writing to encourage student problem solving.

4.PRE.g Demonstrates and models the use of higher-order thinking abilities.

4.PRE.j Uses technology and other appropriate tools in the learning environment.

5. DIVERSITY

5.1 The preprofessional teacher establishes a comfortable environment which accepts and fosters diversity. The teacher must demonstrate knowledge and awareness of varied cultures and linguistic backgrounds. The teacher creates a climate of openness, inquiry, and support by practicing strategies such as acceptance, tolerance, resolution, and mediation.

5.PRE.a Accepts and values students from diverse cultures and linguistic backgrounds and treats all students equitably.

5.PRE.b Fosters a learning environment in which all students are treated equitably.

5.PRE.k Promotes student responsibility, appropriate social behavior, integrity, valuing of diversity, and honesty through learning activities.

6. ETHICS

6.1 The preprofessional adheres to the Code of Ethics and Principles of Professional Conduct of the Education Profession in Florida.

7. HUMAN DEVELOPMENT AND LEARNING

7.1 Drawing upon well established human development/learning theories and concepts and a variety of information about students, the preprofessional teacher plans instructional activities.

7.PRE.b Uses previously acquired knowledge to link new knowledge and ideas to already familiar ideas.

7.PRE.g Uses alternative instructional strategies to develop concepts and principles and is aware of the rationale for choosing different methods.

8. KNOWLEDGE OF SUBJECT MATTER

8.1 The preprofessional teacher has a basic understanding of the subject field and is beginning to understand that the subject is linked to other disciplines and can be applied to real-world integrated settings. The teacher’s repertoire of teaching skills includes a variety of means to assist student acquisition of new knowledge and skills using that knowledge.

8.PRE.b Increases subject matter knowledge in order to integrate the learning activities.

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8.PRE.c Uses the materials and technologies of the subject field in developing learning activities for students.

8.PRE.f Develops short- and long-term personal and professional goals relating to knowledge of subject matter.

9. LEARNING ENvironments

9.1 The preprofessional teacher understands the importance of setting up effective learning environments and has techniques and strategies to use to do so including some that provide opportunities for student input into the processes. The teacher understands that she/he will need a variety of techniques and work to increase his/her knowledge and skills.

9.PRE.f Provides opportunities for students to be accountable for their own behavior.

9.PRE.g Provides a safe place to take risks.

9.PRE.k Arranges and manages the physical environment to facilitate student learning outcomes.

9.PRE.i Uses learning time effectively, maintains instructional momentum, and makes effective use of time for administrative and organization activities.

9.PRE.m Provides clear directions for instructional activities and routines.

10. PLANNING

10.1 Recognizing the importance of setting high expectations for all students, the preprofessional teacher works with other professionals to design learning experiences that meet students’ needs and interests. The teacher candidate continually seeks advice/information from appropriate resources (including feedback), interprets the information, and modifies her/his plans appropriately. Planned instruction incorporates a creative environment and utilizes varied and motivational strategies and multiple resources for providing comprehensible instruction for all students. Upon reflection, the teacher continuously refines outcome assessment and learning experiences.

11. ROLE OF THE TEACHER

11.1 The preprofessional teacher communicates and works cooperatively with families and colleagues to improve the educational experiences at the school.

12. TECHNOLOGY

12.1 The preprofessional teacher uses technology as available at the school site and as appropriate to the learner. She/he provides students with opportunities to actively use technology and facilitates access to the use of electronic resources. The teacher also uses technology to manage, evaluate, and improve instruction.

12.PRE.b Uses technology tools on a personal basis.

12.PRE.c Demonstrates awareness of and models acceptable use policies and copyright issues.

12.PRE.j Selects and utilizes educational software tools for instructional purposes based upon reviews and recommendations of other professionals.

12.PRE.k Uses technology to collaborate with others.

12.PRE.i Develops professional goals relating to technology integration.

Florida Teacher Certification Examination (FTCE) Subject Area Examination (SAE) Competencies and Skills

1 Knowledge of the investigative processes of science
1.1 Identify components, proper use, and care of light microscopes.
1.2 Distinguish between the types of microscopy (e.g., scanning electron microscopy, transmission electron microscopy, phase contrast) and their applications.
1.3 Identify proper techniques for common laboratory procedures (e.g., dissecting; reserving, staining, and mounting microscope specimens; preparing laboratory solutions; using chromatography; performing gel electrophoresis).
1.4 Calculate measurements in the appropriate metric units.
1.5 Differentiate between assumptions, inferences, observations, hypotheses, conclusions, theories, and laws.
1.6 Interpret empirical data (e.g., charts, graphs, tables, diagrams).
1.7 Differentiate the characteristics and methodologies of scientific and nonscientific knowledge.
1.8 Identify relationships between the variables and possible outcomes of a specific experiment.
1.9 Relate the validity and reliability of scientific knowledge to reproducibility, statistical significance, technological limitations, bias, and types of error.
1.10 Identify the development of biological theories and knowledge through important historical events, creative endeavors of diverse individuals, and experimental evidence.
1.11 Differentiate between qualitative and quantitative data in experimental, observational, and modeling methods of research.
1.12 Determine the elements of a well-designed and controlled experiment.
1.13 Identify evidence of the dynamic nature of science in the face of new scientific information.

2 Knowledge of the interaction of science, technology, and society, including ethical, legal, and social issues
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2.2 Analyze environmental challenges (e.g., ozone depletion, pollution, climate change, health effects) that may result from scientific and technological advances.

3 Knowledge of the chemical process of living things
3.1 Identify the structures, functions, and importance of inorganic and organic compounds (e.g., water, mineral salts, carbohydrates, lipids, proteins, nucleic acids) in cells.
3.2 Apply the laws of thermodynamics to living systems, including the role of enzymes in biological reactions.
3.3 Predict the effects of changes in pH, temperature, substrate concentration, and enzyme concentration on reaction rate.
3.4 Identify substrates, products, and relationships in aerobic respiration (e.g., glycolysis, the Krebs cycle, electron transport), including metabolism of carbohydrates, fats, and amino acids, and in anaerobic respiration (e.g., alcoholic fermentation, lactic acid fermentation).
3.5 Compare end products and energy yields of anaerobic and aerobic respiration.
3.6 Identify the raw materials and products of C3 photosynthesis, as well as factors that affect the rate of light-dependent reactions and the Calvin cycle.
3.7 Identify key differences between C3, C4, and CAM photosynthesis, and the evolutionary and ecological significance of these pathways.
3.8 Anaylze the role of chemiosmosis in photosynthesis and respiration.
3.9 Compare heterotrophy and autotrophy and the roles of these processes in the environment.
3.12 Evaluate the roles of cell recognition (e.g., cell-to-cell signaling, autoimmune diseases, tissue rejection, cancer, pollen or stigma-style interaction) in normal and abnormal cell activity.
3.13 Identify the effect of environmental factors on the biochemistry of living things (e.g., ultraviolet light effects on melanin and vitamin D production).
3.14 Identify the roles of ATP and ADP in cellular processes.
3.15 Compare chemosynthetic and photosynthetic processes and the roles of organisms using these processes in the ecosystem.
3.16 Identify cell-to-cell communication (e.g., electrical, chemical) in living things.

4 Knowledge of the interaction of cell structure and function
4.1 Identify the major scientists and events that contributed to the development of the cell theory.
4.2 Distinguish between the major structural characteristics of prokaryotic and eukaryotic cells.
4.3 Relate the structure of cell organelles to their functions.
4.4 Differentiate the events of each phase of the cell cycle (e.g., G1, S, G2, M) and the regulatory mechanisms of the cycle.
4.5 Compare the mechanisms and results of nuclear division (i.e., karyokinesis) and cell division (i.e., cytokinesis) in plant and animal cells.
4.6 Compare characteristics of the major taxa (e.g., domains, kingdoms, phyla), including cellular characteristics.
4.7 Evaluate the relationships between the structures and functions of cell membrane components.
4.8 Compare active and passive cellular transport mechanisms.

5 Knowledge of genetic principles, processes, and applications
5.1 Evaluate the relationships between structure and function in nucleic acids.
5.2 Sequence the principal events of DNA replication.
5.3 Sequence the principal events of protein synthesis.
5.4 Distinguish between the functions of DNA and RNA.
5.8 Analyze the processes and products of meiosis in plants, animals, and fungi.
5.9 Identify Mendelian laws of inheritance, their relationship to chromosomes, and related terminology.
5.10 Analyze applications of probability and statistical analysis (e.g., chi-square, Punnett square) in genetics.
5.11 Analyze various patterns of inheritance (e.g., sex-linked, sex-influenced, sex-limited, incomplete dominance, codominance, autosomal linkage, multiple alleles, polygenic inheritance).
5.13 Identify the effect of a mutation in a DNA sequence on the products of protein synthesis.

8 Knowledge of the structural and functional diversity of animals
8.12 Analyze the effects of positive and negative feedback loops in human systems (e.g., vertebrate hormones, fight or flight).

10 Knowledge of evolutionary mechanisms
10.1 Compare the current theory of evolution by natural selection with previous scientific theories of evolution (e.g., Lamarck, Darwin).
10.2 Analyze exceptions to and limitations of the biological species concept.
10.4 Apply a taxonomic (e.g., dichotomous) key to a set of objects.

National Science Teachers Association Standards
C2a. Core Competencies. All teachers of biology should be prepared to lead students to understand the unifying concepts required of all teachers of science, and should in addition be prepared to lead students to understand:
1. Life processes in living systems including organization of matter and energy.
2. Similarities and differences among animals, plants, fungi, microorganisms, and viruses.
4. Scientific theory and principles of biological evolution.
7. General concepts of genetics and heredity.
8. Organization and functions of cells and multicellular systems.
10. Regulation of biological systems including homeostatic mechanisms.

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11. Fundamental processes of modeling and investigating in the biological sciences.
12. Applications of biology in environmental quality and in personal and community health.

**C.2.b. Advanced Competencies.** In addition to these core competencies, teachers of biology as a primary field should be prepared to effectively lead students to understand:
19. Historical development and perspectives in biology including contributions of significant figures and underrepresented groups, and the evolution of theories in biology.
20. How to design, conduct, and report research in biology.

**C.2.c. Supporting Competencies.** All teachers of biology should also be prepared to effectively apply concepts from other sciences and mathematics to the teaching of biology including basic concepts of:
22. Chemistry, including general chemistry and biochemistry with basic laboratory techniques.

**Teaching Methods**

Lectures, class discussions, brainstorming sessions, problem centered hands on investigations, research and technologies such as internet, CD-ROM, Blackboard and computer animations

**Topical Outline and Tentative Course Calendar**

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Subject</th>
<th>Chapters</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>8/24</td>
<td>Introduction: Themes in the Study of Life</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The Chemical Context of Life</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>8/31</td>
<td>The Chemical Context of Life</td>
<td>2</td>
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<tr>
<td></td>
<td></td>
<td>Water and the Fitness of the Environment</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>9/7</td>
<td>NO CLASS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9/9</td>
<td>Water and the Fitness of the Environment</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carbon and the Molecular Diversity of Life</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>9/14</td>
<td>EXAM 1-Chapters 1, 2, 3, 4</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>9/16</td>
<td>Structure and Function of Macromolecules</td>
<td>5</td>
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<tr>
<td>5</td>
<td>9/21</td>
<td>Structure and Function of Macromolecules</td>
<td>5</td>
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<tr>
<td></td>
<td></td>
<td>A Tour of the Cell</td>
<td>6</td>
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<tr>
<td>6</td>
<td>9/28</td>
<td>A Tour of the Cell</td>
<td>6</td>
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<tr>
<td>7</td>
<td>9/30</td>
<td>Exam 2-Chapters 5, 6, 7</td>
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<tr>
<td>7</td>
<td>10/5</td>
<td>Introduction to Metabolism</td>
<td>8</td>
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<tr>
<td>8</td>
<td>10/14</td>
<td>Introduction to Metabolism</td>
<td>8</td>
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<tr>
<td></td>
<td></td>
<td>Cellular Respiration-Harvesting Chemical Energy</td>
<td>9</td>
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<td>9</td>
<td>10/19</td>
<td>Photosynthesis</td>
<td>10</td>
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<td>8</td>
<td>10/26</td>
<td>EXAM 3-Chapters 8, 9, 10</td>
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<tr>
<td></td>
<td>10/28</td>
<td>Cell Communication</td>
<td>11</td>
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<td>9</td>
<td>11/4</td>
<td>The Cell Cycle</td>
<td>12</td>
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<td></td>
<td></td>
<td>Meiosis and the Sexual Life Cycle</td>
<td>13</td>
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<tr>
<td>10</td>
<td>11/11</td>
<td>Mendel and the Gene Idea</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>11/11 (Veteran's Day)</td>
<td>NO CLASS</td>
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<tr>
<td>11</td>
<td>11/16</td>
<td>Mendel and the Gene Idea</td>
<td>14</td>
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<td></td>
<td>11/18</td>
<td>EXAM 4-Chapters 11, 12, 13, 14</td>
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<tr>
<td>12</td>
<td>11/23</td>
<td>The Chromosomal Basis for Inheritance</td>
<td>15</td>
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<td></td>
<td>The Molecular Basis for Inheritance</td>
<td>16</td>
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<tr>
<td>13</td>
<td>11/30</td>
<td>The Molecular Basis for Inheritance</td>
<td>16</td>
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<tr>
<td></td>
<td></td>
<td>From Gene to Protein</td>
<td>17</td>
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<tr>
<td>14</td>
<td>12/2</td>
<td>EXAM 5-Chapters 15, 16, 17</td>
<td></td>
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<tr>
<td>15</td>
<td>12/7</td>
<td>REVIEW</td>
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</tbody>
</table>

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Course Evaluation

Class Participation in class activities and hands-on activities, Exams/Final Exams

Grading

1. Calculating your grade out of 400 possible after dropping the lowest of five 100 point lecture exams

- 90-100 A  \(400 \times 0.9 = 360\) (cutoff for A)
- 80-89 B  \(400 \times 0.8 = 320\) (cutoff for B)
- 70-79 C  \(400 \times 0.7 = 270\) (cutoff for C)
- 60-69 D  \(400 \times 0.6 = 240\) (cutoff for D)
- 59 & below = F (less than 240)

Students with an “A” on this scale will be exempt from the Final Exam

2. STUDENTS WHO HAVE TO TAKE THE FINAL ➔ Your grade calculated on the basis of 450 point

- There are 5 lecture exams worth 100 points each. Of these, I will drop your lowest score. If you have an “A”, based on getting 90% of 400 points, you will be exempt from the final.

Example Grade Calculation for Someone Who Takes the Final Exam:

<table>
<thead>
<tr>
<th>NAME</th>
<th>Exam 1</th>
<th>Exam 2</th>
<th>Exam 3</th>
<th>Exam 4</th>
<th>Exam 5</th>
<th>Final Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ima Orez</td>
<td>72</td>
<td>81</td>
<td>56</td>
<td>75</td>
<td>83</td>
<td>36</td>
</tr>
</tbody>
</table>

CALCULATING THE GRADE:
Drop the lowest score: **Drop Grade**
Adding up 4 exam scores: \(72 + 81 + 75 + 83 = 311\) 0
Adding in final exam score ➔ **36.0** (on 100 point scale the **Ima made a 72 ➔ converted to a 50% score of 36**)

Calculating your grade out of 450 possible:

- 90-100 A  \(450 \times 0.9 = 405\) (cutoff for A)
- 80-89 B  \(450 \times 0.8 = 360\) (cutoff for B)
- 70-79 C  \(450 \times 0.7 = 315\) (cutoff for C)
- 60-69 D  \(450 \times 0.6 = 270\) (cutoff for D)
- 59 & below = F (less than 270)

Ima Orez made a “C”.

Course Policies

Policy Statement on Non-Discrimination It is the policy of Florida Agricultural and Mechanical University to assure that each member of the University community be permitted to work or attend classes in an environment free from any form of discrimination including race, religion, color, age, disability, sex, marital status, national origin, veteran status and sexual harassment as prohibited by state and federal statutes. This shall include applicants for admission to the University and employment.

Academic Honor Policy The University’s Academic Honor Policy is located in the FANG Student Handbook, under the Student Code of Conduct-Regulation 2.012 section, beginning on page 55-56.

ADA Compliance To comply with the provisions of the Americans with Disabilities Act (ADA), please advise instructor of accommodations required to insure participation in this course. Documentation of disability is required and should be submitted to the Learning Development and Evaluation Center (LDEC). For additional information please contact the LDEC at (850) 599-3180.

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References

5. Howard Hugh's Medical Institute-Biointeractive: http://www.hhmi.org/biointeractive
7. Virtual Cell Animation: http://vcell.ndsu.nodak.edu/animations

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