BIO 121
Concepts of Biology

Course Description: A concepts-oriented course for the non-science major. Study of the origin of life, the cell, growth and reproduction, genetics and evolution.

Number of Credit Hours: 4

Course Prerequisites and Corequisites: Prerequisite none; Corequisite BIO 121L.

Program Learning Outcomes:

There are no specific program learning outcomes for this major addressed in this course. It is a general education core curriculum course and / or a service course.

General Education Core Curriculum Objectives/Outcomes:

Texas State Exemplary Educational Objectives in the Natural Sciences addressed by this course are:

Objective one requires that students “Understand and apply method and appropriate technology to the study of natural sciences.”

Objective two states that students must be able “To recognize scientific and quantitative methods and the differences between these approaches and other methods of inquiry and to communicate findings, analyses, and interpretations both orally and in writing.”

Objective three states that students must be able “To identify and recognize the differences among competing scientific theories.”

Objective four states that students must be able “To demonstrate knowledge of the major issues and problems facing modern science, including issues that touch upon ethics, values, and public policies.”

Objective five states that students must be able “To demonstrate knowledge of the interdependence of science and technology and their influence on, and contribution to, modern culture.”

Student Learning Outcomes:

Students who complete Concepts of Biology will be able to:

1. Explain the scientific method and critically evaluate scientific information (EEO 1, 2, 5).
2. Identify the chemical basis for life and the characteristics that distinguish living things from inanimate matter (EEO 3, 4, 5).
3. Illustrate how genetic information is passed from parents to offspring and how this genetic information is expressed by cells (EEO 2, 4, 5).
4. Classify the diversity of life forms from the species to kingdom level (EEO 2, 4).
5. Analyze biological interactions that occur from the sub-cellular to the ecosystem level of organization (EEO 1, 2, 4, 5).
6. Discuss the role of evolution in the history of life on Earth (EEO 1, 3).

Program Learning Outcomes:

Each of the student learning outcomes listed above address the Biology Department Program Learning Outcome #1: Demonstrate a good knowledge base in biological concepts and be able to integrate knowledge with critical thinking skills to become problem solvers. Knowledge base will include: levels of complexity (molecular/cellular through population/communities/ecosystems); biological principles and processes.
Outline of Topics:

- **Introduction to biology (5%)**
  - characteristics of life
  - categorization of organisms based on their distinguishing characteristics
  - ecosystem organization and energy flow
  - steps of the scientific method

- **Introductory chemistry concepts important to life (10%)**
  - structure and function of atoms
  - bonding arrangements
  - properties of water
  - structure and function of the 4 major groups of organic compounds

- **Cell structure (10%)**
  - prokaryotic and eukaryotic cells
  - cellular organelles and their function
  - structure and function of the plasma membrane
  - mechanisms of transport through cellular membranes

- **Cell division (10%)**
  - the cell cycle
  - mitosis in plant and animal cells
  - methods of asexual reproduction
  - sexual reproduction and the stages of meiosis

- **Principles of genetics (10%)**
  - Mendelian inheritance and genetics problems
  - multiple alleles
  - codominance
  - polygenic inheritance
  - sex determination
  - X-linkage
  - pedigree analysis to study genetic disorders
  - cause and effects of chromosomal mutations

- **DNA structure and function (10%)**
  - Watson and Crick model
  - DNA replication
  - RNA structure and process of transcription
  - translation
  - effect of gene mutations
  - genetic engineering and biotechnology

- **Plant structure (5%)**
  - cell types, tissues, organs
  - sexual reproduction in Angiosperms
• Cellular metabolism (10%)
  o role of enzymes
  o importance of ATP
  o photosynthesis
    ▪ pigments, light-dependent reactions, Calvin cycle
  o aerobic cellular respiration
    ▪ glycolysis, Krebs Cycle, electron transport phosphorylation
  o anaerobic respiration
• Biodiversity (10%)
  o Taxonomy
  o Kingdoms of living organisms
• Principles of ecology (10%)
  o ecological communities
  o species interactions
  o process of succession
  o energy flow and nutrient cycling
  o biomes and their characteristics
  o aquatic ecosystems
  o impact of humans on natural ecosystems
• Principles of evolution (10%)
  o historical development of evolutionary ideas
  o evidence of evolution
  o evolutionary mechanisms
  o role of natural selection in evolution
  o the species concept and the process of speciation

General Education Core Curriculum
This course has been selected to be part of Stephen F. Austin State University’s core curriculum. The Texas Higher Education Coordinating Board has identified six objectives for all core courses: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, Teamwork, Personal Responsibility, and Social Responsibility. SFA is committed to the improvement of its general education core curriculum by regular assessment of student performance on these six objectives. Assessment of these objectives at SFA will be based on student work from all core curriculum courses. This student work will be collected in your LECTURE sections Brightspace d2L, through a Dropbox. The chart below indicates the core objective addressed by this course:

<table>
<thead>
<tr>
<th>Core Objective</th>
<th>Definition</th>
<th>Course Assignment Title</th>
<th>Date Due</th>
</tr>
</thead>
<tbody>
<tr>
<td>Empirical and Quantitative Skills</td>
<td>To include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions.</td>
<td>Spring 2019 Ex. 7 Inheritance</td>
<td>May 1, 2019</td>
</tr>
</tbody>
</table>
BIO 121, Section 004, Spring 2020
Concepts of Biology

Instructor: Dr. Stephen Wagner
Department: Biology
Email: swagner@sfasu.edu
Phone: 936-468-2135
Office: 223 Miller or 207 Miller
Office Hours: Tuesday 2:00-5:00; Wednesday 4:00-5:00 Friday 10:30-11:30 or by appointment.
Class Meeting Time and Place: 9:30 – 10:45, Tues, Thurs, Rm. 233 Miller Sci.

Objectives: This course is an introduction to the basic principles that govern biological systems. We will study biochemistry, the cell, physiology, metabolism, growth and reproduction, genetics, taxonomy, evolution, and ecology.

Instructor's Background: My name is Dr. Stephen Wagner. I have a B.S. in Environmental Biology from Heidelberg College, an MS in Microbiology from North Carolina State University, and a Ph.D. in Agronomy (Soil Microbiology) from Clemson University. I spent two years as a postdoctoral research associate with the USDA, working on herbicide biodegradation. This is my 24\textsuperscript{th} year at SFA. My major research interest is microbial ecology, emphasizing bioremediation, plant-microbe interactions, and effects of management practices on soil ecology. Besides this course my courses have included Microbiology, Pre-nursing Microbiology, Cell and Molecular Biology, Microbial Ecology, Industrial Microbiology, Applied and Environmental Microbiology, Planetary and Space Biology, and SFA 101.

Outside of work I enjoy gardening, walking our dogs Charlie Brown and Gracie, hiking, home improvement, cheering on my school and Cleveland, Ohio teams, attending church, and doing volunteer work. We have two children who are both married: Michael (age 33) and our daughter-in-law Katie (age 32) who live in Katy and have a two girls named Lillian (4) and Ella (2); Melissa (age 30) and our son-in-law Matt (age 30) who live in Melissa and have 3 children – Oliver (6) and Isaac (almost 4) and Evelynn (1 in April).


Attendance Policy: You are expected to attend all lectures and exams. Because this course is a science activities course that usually will involve group activities, your attendance and participation in the class is very important. Absences are only excused as outlined in the university handbook:

“Regular and punctual attendance is expected at all classes, laboratories, and other activities for which a student is registered. For those classes where attendance is a factor in the course grade, the instructor shall make his/her class policy known in writing at the beginning of each term and shall maintain an accurate record of attendance. Regardless of attendance, every student is responsible for course content and assignments.

It is University policy to excuse students from attendance for certain reasons. Among these are absences related to health, family emergencies, and student participation in certain University-sponsored events. Students are responsible for providing documentation satisfactory to the instructor for each class missed. Students with acceptable excuses will be permitted to make up work for absences to a maximum of three weeks of a semester or one week of a six-week summer term when the nature of the work missed permits.”

In the case of absences caused by participation in University-sponsored events, announcement of such absences by the Vice President for Academic Affairs will constitute an official excuse. Faculty members should submit a written explanation of the absence, including the date, time and an alphabetical listing of all students attending to the office of the Vice President for Academic Affairs for publication.
You must make prior arrangements if you have to miss an exam or activity. Please contact me before the exam if there is any problem. I will use a different format for makeup exams than the format used for the exams given to the rest of the class. All makeup exams will be given during the scheduled final exam period to students who provide documented proof for a legitimate excused absence as described by university policy. Students who are late for an exam will not be permitted to take the exam and will only be allowed to take a makeup exam if there is a legitimate excuse (as described by university policy) for being late. Oversleeping is NOT a legitimate excuse. Additionally, and most importantly, you must have proper documentation in order to make up any work in lecture or lab.

Office Hours: Your success in this course as well as here at SFA is very important. Should you have questions or need additional help I maintain an open door policy and encourage every student to talk freely about any issue that concerns them. My office hours for the summer are listed above. If I am not in my office, I will leave a note as to my whereabouts. Also check rooms 101 (BIO Dept. office), or 207 and 208 (labs). Unless there is an emergency, the time immediately before and after (15 min) our lecture class does not constitute time that I am available to help you. Additionally, please note that if you contact me by cell phone I am not permitted to return your call if it is a long-distance number.

Academic Integrity (A-9.1): Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism. I expect everyone to do her own, original work. This includes all exams, quizzes, and assignments. We will take appropriate disciplinary action, as described in the University Student Handbook, against anyone that does not comply with this policy.

Definition of Academic Dishonesty
As stated in the university handbook:

"Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one's paper without giving the author due credit."

Acceptable Student Behavior: Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

Students with Special Needs: Students who require special accommodations for this course will be provided such accommodations within established university guidelines. Students who are requesting support services from SFA are required to submit documentation through the Office of Disability Services to verify eligibility for reasonable accommodations; the institution must review and evaluate that documentation. To obtain disability related accommodations and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, Room 325,
468-3004/ 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided.

Please note that the only way you can get extra time to finish exams and/or work for the course is to be verified by ODS that you are eligible to receive this accommodation.

Use of Electronic Devises: Use of computers and/or other wireless devises are only permitted in class for note-taking purposes and must have prior approval for use. You may also audio and/or video record the lectures. Listening to a biology lecture repeatedly may not be “easy listening” but it can help you learn the material. Use of calculators will not be permitted for any exams. Ringing, playing, or singing cell phones or someone responding to one are a huge interruption during lectures; if you own or use one, please turn it off for lectures or do not bring it into the lecture hall. Additionally, it is now university policy that repeated disruptions is grounds for dismissal from a course taught at SFASU.

Extra Credit, Bonus Points: Opportunities for extra credit or bonus points will not be given to individual students but rather to all students as a whole. These opportunities will be announced in and for the most part involve work done within the MasteringBiology platform. Total points for bonus work will not exceed 1.5% of the cumulative points for the course (15/1000 points). Students with excessive absences and/or tardiness will not receive any additional points.

Course Requirements and Grading:
The grade in the lecture portion of this class is based on the following criteria. Please remember that lecture and laboratory grades are computed into one grade; the same grade is recorded for both lecture and lab. The lab portion counts 1/3 (33%) while the lecture portion counts 2/3 (67%) of your final grade. There will be 1000 points possible for the entire course as summarized below.

1. Lecture Exams (375/1000 pts): Three lecture exams are scheduled during the semester. The syllabus lists the scheduled dates of these exams. Each exam is worth 125 points of the total points for the course.
2. Quizzes (150/1000 points): Two, 30-minute quizzes will be given at the end of first and last two weeks of the course (final exam). These quizzes will assess your comprehension of the past 4 to 6 lectures covered in class.
3. Attendance (45/1000 pts): In order to encourage participation in the course you will receive some credit for attending class. Attendance will be compiled at the end of the term. The total is worth 45 points of the total points for the course.
4. Mastering Biology Assignments (100/1000 pts): “Mastering Biology” a tutorial resource, developed by the publisher of your book provides you access to a multitude of material to help you master the course! You will be required to complete several assignments using this resource. Please follow the instructions in your student access kit to enroll in my course. The URL for the website is masteringbiology.com and the course ID is: MBWAGNER
5. Lab Grade (330/1000 pts.): As noted above, you will receive a separate lab grade that will be used to calculate one final grade for the course. Therefore, this is worth 330 points of the total points for the course.
6. General Education Core Curriculum: This course has been selected to be part of Stephen F. Austin State University’s core curriculum. The Texas Higher Education Coordinating Board has identified six objectives for all core courses: Critical Thinking Skills, Communication Skills, Empirical and Quantitative Skills, Teamwork, Personal Responsibility, and Social Responsibility.
Although the core objective indicated in the chart below is being met during this semester, we will not be assessing the objective (other than assessing assigned work as part of your lab grade) during this year.

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<td>Spring 2020 Ex. 7 Inheritance</td>
<td>na</td>
</tr>
</tbody>
</table>

**Summary of Course Grade**

1. 3 Lecture Exams @ 125 points = 375 points
2. 2 Lecture Quizzes@ 75 points = 150 points
3. Attendance @ 45 pts. = 45 points
4. Mastering Biology Assignments @ 100 pts. = 100 points
5. Lab Grade @ 330 points = 330 points
6. Total = 1000 points

**Grading Scale**

- 895-1000 pts. Or 90 - 100% = A
- 795-894 pts. Or 80 - 89% = B
- 695-794 pts. Or 70 - 79% = C
- 595-694 pts. Or 60 - 69% = D
- < 594 pts Or Below 60% = F

Be On Time! You are disrupting the class if you come in late, leave early or walk out of the class during lecture time. Keep in mind that all your classmates paid the same amount of money that you did to take the course and deserve the best course we can possibly give them! Also, if you need an extra hour of sleep don’t use this course to catch up. At times emergencies or extenuating circumstances may be a factor; I will be considerate of these situations. Please let me know if you have to come in late or leave the lecture early. **If you make a habit of disrupting the class I will subtract points from your final attendance grade.**

**Laboratory.** You will receive a separate syllabus and instructions concerning your lab when it meets for the first time. Your lab instructor will be Gene Sullivan. **Labs for this course start meeting during the second week of class. Please follow the instructions for your first lab on your lab section’s D2L before you meet Wednesday or Thursday of next week.**

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**No Food or Beverages in Lecture Hall!** The housekeepers for the lecture halls work very hard to maintain a clean lecture hall and do not make a lot of money doing this. Unless necessary because of dietary needs, please help them by not consuming food and beverages other than water while you attend class.
BIO 121 Spring 2020 Course Schedule  
(tentative and subject to change)

<table>
<thead>
<tr>
<th>SUBJECT</th>
<th>DAYS</th>
<th>CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. The Chemical Role in Life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td>1/21, 23</td>
<td>1</td>
</tr>
<tr>
<td>B. Essential Chemistry for Biology</td>
<td>1/28, 30</td>
<td>2</td>
</tr>
<tr>
<td>C. Molecules of Life</td>
<td>2/5, 2/7, 2/11</td>
<td>3</td>
</tr>
<tr>
<td>Quiz 1: February 11, 2020</td>
<td></td>
<td></td>
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<tr>
<td>D. A Tour of the Cell</td>
<td>2/13</td>
<td>4</td>
</tr>
<tr>
<td>E. Membrane Structure and Function</td>
<td>2/18</td>
<td>4 and 5 (pp. 83-87)</td>
</tr>
<tr>
<td>II. The Genetic Role in Life</td>
<td></td>
<td></td>
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<tr>
<td>A. Cell Cycle, Mitosis</td>
<td>2/20</td>
<td>8</td>
</tr>
<tr>
<td>B. Meiosis and Gametogenesis</td>
<td>2/25</td>
<td>8</td>
</tr>
<tr>
<td>Exam 1: February 27, 2020</td>
<td></td>
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<tr>
<td>C. Patterns of Inheritance</td>
<td>3/3, 5</td>
<td>9</td>
</tr>
<tr>
<td>March 10, 12 Spring Break No Classes!</td>
<td></td>
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<tr>
<td>D. DNA Structure and Function</td>
<td>3/17</td>
<td>10</td>
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<tr>
<td>E. Cancer</td>
<td>3/19</td>
<td>8, 11</td>
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<tr>
<td>IV. The Metabolic Role in Life</td>
<td></td>
<td></td>
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<tr>
<td>A. The Working Cell</td>
<td>3/24</td>
<td>5</td>
</tr>
<tr>
<td>B. Photosynthesis</td>
<td>3/26</td>
<td>7</td>
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<tr>
<td>Exam 2: March 31, 2020</td>
<td></td>
<td></td>
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<tr>
<td>C. Cellular Respiration</td>
<td>4/2</td>
<td>6</td>
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<tr>
<td>IV. The Biodiversity Role in Life</td>
<td></td>
<td></td>
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<tr>
<td>A. Microbial Life</td>
<td>4/7</td>
<td>14, 15</td>
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<tr>
<td>April 9 No Classes, Easter Holiday</td>
<td></td>
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<tr>
<td>B. Fungi</td>
<td>4/14</td>
<td>16</td>
</tr>
<tr>
<td>C. Plants</td>
<td>4/16</td>
<td>16</td>
</tr>
<tr>
<td>Exam 3: April 21, 2019</td>
<td></td>
<td></td>
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<tr>
<td>D. Plants II and Animals</td>
<td>4/23, 28</td>
<td>16, 17</td>
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<tr>
<td>D. Review and Course Closure</td>
<td>4/30</td>
<td>TBD</td>
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<tr>
<td>Final Exam and Makeup Work -- Quiz 2: May 7 8-10:30 am</td>
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