Scientific Research and Design
Dual-Credit Concepts of Biology Bio 121 & Bio 121L
Center High School in partnership with Stephen F. Austin State University
1:10 – 2:00 M-F
Fall 2019

Instructor: Susan Penick
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Center HS Room 213
Conference Period: 2nd period (8:40 – 9:30)
*Preferred contact is via email. All contacts should include your first and last name, class period/section and be professional with proper grammar and punctuation.

Course Description
Scientific Research and Design is a dual-credit lecture/lab science course corresponding to Stephen F. Austin State University’s Concepts of Biology BIO 121/121L. It is a biological principles course which satisfies a fourth-science high school credit and provides 4 hours (with lab) of life science college credit for non-science majors. The course is designed to cover fundamental concepts including origin of life, cell structure and function, growth and reproduction, genetics, evolution and ecology.

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

Required Texts, Materials, or Equipment
- Campbell Essential Biology with Physiology, 5th Edition by Simon, Reece & Dickey

Daily Work/Homework/Quizzes (Lecture)
- There will be scheduled quizzes and occasional homework. Quizzes will come from lecture and assigned text readings. Prepare by reviewing your notes, generating study aids, reading the text pages, and asking questions of Mrs. Penick about any concepts you do not understand fully.

Major Assignments/Tests (Lecture)
- Several major exams will be given in lecture. Dates of exams will be posted. Lecture exams will be objective in nature, consisting of matching, true/false, fill-in-the-blank, multiple choice, and diagram labeling questions that will be answered using a computer test form. Information from lecture notes, text chapters, and in-class discussion will be included on exams.
**Lab Assignments**

- The lab performance grade is based upon your participation in each lab exercise, proper use of the equipment and your adherence to lab safety rules.
- You will have scheduled lab quizzes and practical’s. Points will be deducted from lab grades from the following infractions:
  1. Returning your microscope to the cabinet improperly. The scanning lens should be in the viewing position when you put your microscope away.
  2. Failing to put your microscope slides in the proper place.
  3. Failing to clean your microscope slides before returning them.
  4. Leaving your lab table or glassware messy.
  5. Failing to return instruments to the lab kit.
  6. Failure to bring a lab manual and/or journal to lab.
  7. Bringing food or beverages into lab.
  8. Use of cell phones or other non-lab equipment during lab.
  9. Tardiness. Points may be deducted for extreme tardiness.

**Class Participation**

- During every lab and lecture period you will be evaluated on your performance in class with regard to preparation, adherence to lab safety, attitude, cooperation with lab partners, participation in the exercise and effort. Your class participation is worth points toward your daily grade.

**Course Grading**

Your laboratory grade is determined by daily assignments, scheduled quizzes and a performance grade. Final grade in the course will be calculated as follows:

Lab avg. = 1/3

Lecture avg. = 2/3

Final grade will be calculated as follows: \[ \frac{2(\text{Lecture assignment avg}) + (\text{Lab assignment avg})}{3} \times 100 \]

**The grading for this course will be a result of your efforts in both lecture and laboratory. Your grades from lecture and lab will be computed into a single grade.**

**Explanation of Grading System for both Lecture and Lab:** (Center High School Policy)

- Major Assignments/Assessments/Tests/Lab Practical’s = 40%
- Daily Assignments/Homework/Daily Quizzes/Lab Quizzes = 60%

**You will receive a grade through both Center High School and Stephen F. Austin State University.**

**Grade Cutoffs (SFASU Grading Scale)**

90%+ = A, 80-89% = B, 70-79% = C, 65-69% = D, Below 65% = F

There are NO extra credit assignments in this class.
Course Policies and Information for Students

1. ATTENDANCE POLICY: Students are required to be present when the bell rings. Attendance will be taken every day. More than three tardies constitutes an absence for the class. Center High School’s bell schedule will be the determiner for this. To receive credit or a final grade in a class, a student must attend at least 90 percent of the days the class is offered. A student who attends at least 75 percent but fewer than 90 percent of the days the class is offered may receive credit or a final grade for the class if he or she completes a plan, approved by the instructor, which allows the student to fulfill the instructional requirements for the class.

2. POLICIES ON MISSED EXAMS, MAKE-UP EXAMS OR QUIZZES and LATE WORK:
   
a. Late work – will be due one day following the original due date of the assignment with a 25% reduction on the grade. Late work will not be accepted beyond the one day requirement. A student will receive a zero for any work not turned in during the required time.

b. Make-up work (For Excused Absences) – Make-up work for excused absences shall be made available to all students. Students are responsible for asking for make-up work upon return to class. The number of days allowed for completion of make-up work shall be equal to the number of days missed. In the event of an extended absence, other arrangements approved by the instructor will be made.

c. Any assignments not turned in during the allotted time will follow late work guidelines. Students will not be required to take an exam or turn in an assignment on the day of returning to school if the test or assignment was assigned during the student’s absence. Make-up work may be a revised version of the original assignment.

d. Make-up work (For Unexcused absence) – A student with an unexcused absence may make up all work missed, but will receive a 25% reduction in any grade(s). Students shall receive a zero for any assignment or test not made up within the allotted time. The number of days allowed for completion of make-up work shall be equal to the number of days missed.

e. Make up labs: same policies apply; however, if the lab involves perishable or live materials, there will BE NO MAKE UP LAB. Make every effort to attend!!

3. TECHNOLOGY POLICIES: (per Center High School Handbook)

   a. For safety purposes, the district permits students to possess personal mobile telephones; however, these devices must remain turned off during the instructional day, including during all testing, unless they are being used for approved instructional purposes. A student must have approval to possess other telecommunications devices such as netbooks, laptops, tablets, or other portable computers.
b. To prepare students for an increasingly technological society, the district has made an investment in the use of district-owned technology resources for instructional purposes; specific resources may be issued individually to students. Use of these technological resources, which include the district’s network systems and use of district equipment, is restricted to approved purposes only. **Unacceptable and Inappropriate Use of Technology Resources**: Students are prohibited from possessing, sending, forwarding, posting, accessing, or displaying electronic messages that are abusive, obscene, sexually oriented, threatening, harassing, damaging to another’s reputation, or illegal. This prohibition also applies to conduct off school property, whether the equipment used to send such messages is district-owned or personally owned, if it results in a substantial disruption to the educational environment. Any person taking, disseminating, transferring, possessing, or sharing obscene, sexually oriented, lewd, or otherwise illegal images or other content, commonly referred to as “sexting,” will be disciplined according to the Center High School Student Code of Conduct, may be required to complete an educational program related to the dangers of this type of behavior, and, in certain circumstances, may be reported to law enforcement. In addition, any student who engages in conduct that results in a breach of the district’s computer security will be disciplined in accordance with the Center High School Student Code of Conduct, and, in some cases, the consequence may rise to the level of expulsion.

4. 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.

5. ETHICS/VIOLATIONS OF ACADEMIC INTEGRITY **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 and Center ISD policies on penalties for cheating and plagiarism.

*Definition of Academic Dishonesty*
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. Cheating of any form will result in a zero for the assignment.
Please read the complete policy at http://www.sfasu.edu/policies/academic_integrity.asp

6. Disclaimer
The instructor reserves the right to make modifications to this information throughout the semester.
# Tentative Fall Schedule

*Scientific Research and Design/BIO 121 & 121L Concepts of Biology*

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Lab</th>
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<tbody>
<tr>
<td>Pre semester</td>
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<tr>
<td>1</td>
<td>Syllabus, Themes in Biology, Basic Chemistry Water, pH</td>
<td>The Microscope</td>
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<tr>
<td>2</td>
<td>Organic Chemistry &amp; Molecules, Cells</td>
<td>Organic Molecules</td>
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<tr>
<td>3</td>
<td>Organelles, Prokaryote, Eukaryote Quiz 1 (Syllabus)</td>
<td>Prokaryote Cells</td>
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<td></td>
<td>*Lecture Exam 1</td>
<td>Eukaryote Cells</td>
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<tr>
<td>4</td>
<td>Organelles cont’d</td>
<td>Transport in Cells</td>
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<tr>
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<td>*Lecture Exam 1</td>
<td>Lab Practical Exam 1</td>
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<tr>
<td>5</td>
<td>Membrane Functions, Cell Reproduction, Mitosis, Cancer</td>
<td>Cell Movement</td>
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<td></td>
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<td>Cell Membrane</td>
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<tr>
<td>6</td>
<td>Meiosis, Mendelian Genetics Quiz 2</td>
<td>Mitosis</td>
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<td></td>
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<td>Cytokinesis</td>
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<td>7</td>
<td>Exceptions in Mendelian Genetics, DNA, Transcription, Translation and Genetic Code</td>
<td>Meiosis</td>
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<td>8</td>
<td>Mutations, Viruses, Review, *Lecture Exam 2</td>
<td>Inheritance</td>
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<td>Lab Exam 2</td>
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<td>9</td>
<td>Modern Genetics, Flowering Plant Body Quiz 3</td>
<td>Enzymes</td>
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<td>*Lecture Exam 3</td>
<td>Plants</td>
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<tr>
<td>10</td>
<td>Energy Concepts, Cellular Respiration, Photosynthesis</td>
<td>Photosynthesis</td>
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<td></td>
<td></td>
<td>Cellular Respiration</td>
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<td>11</td>
<td>Energy concepts, cont’d *Lecture Exam 3 Classification</td>
<td>Biological Diversity</td>
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<tr>
<td>12</td>
<td>Prokaryote organisms Protists, Plants, Fungi</td>
<td>Prokaryotes</td>
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<td>Protists –Wastewater lab</td>
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<td></td>
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<td>Fungi</td>
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<tr>
<td>13</td>
<td>Animals, Ecology, Biomes Quiz 4</td>
<td>Ecology</td>
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<td></td>
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<td>Lab Exam 3</td>
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<tr>
<td>14</td>
<td>Biomes</td>
<td>Field study Ecology</td>
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<tr>
<td>15</td>
<td>*Final Exams</td>
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Withheld Grades Semester Grades Policy (A-54)

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

Students with Disabilities

To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and 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. Failure to request services in a timely manner may delay your accommodations. For additional information, go to http://www.sfasu.edu/disabilityservices/.

General Education Core Curriculum

The Texas Higher Education Coordinating Board has identified six core learning objectives: 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. By enrolling in BIO 121 & 121L you are enrolling in a Core Curriculum Course.

Student Learning Outcomes: (SFASU)

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

Texas Core Curriculum Objectives: (SFASU)

- Core Objective 1. Critical Thinking: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information. (SLO’s 2 – 6)
- Core Objective 2. Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication. (SLO – 5)
- Core Objective 3. Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions. (SLO – 3)
- Core Objective 4. Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal. (SLO - 6)

Center High School Learning Outcomes

Texas Essential Knowledge and Skills §130.417. Scientific Research and Design

- Center High School
  (1)Students will:
(B) show the ability to cooperate, contribute, and collaborate as a member of a group in an effort to achieve a positive collective outcome;
(C) present written and oral communication in a clear, concise, and effective manner;
(D) demonstrate time-management skills in prioritizing tasks, following schedules, and performing goal-relevant activities in a way that produces efficient results; and
(E) demonstrate punctuality, dependability, reliability, and responsibility in performing assigned tasks as directed.

(2) The student, for at least 40% of instructional time, conducts laboratory and field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:
(A) demonstrate safe practices during laboratory and field investigations; and
(B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials.

(3) The student uses scientific methods and equipment during laboratory and field investigations.
(A) know the definition of science and understand that it has limitations,
(B) know that scientific hypotheses are tentative and testable statements that must be capable of being supported or not supported by observational evidence. Hypotheses of durable explanatory power which have been tested over a wide variety of conditions are incorporated into theories;
(C) know that scientific theories are based on natural and physical phenomena and are capable of being tested by multiple independent researchers. Unlike hypotheses, scientific theories are well-established and highly reliable explanations, but may be subject to change as new areas of science and new technologies are developed;
(E) plan and implement descriptive, comparative, and experimental investigative procedures, including making observations, asking well-defined questions, formulating testable hypotheses, identifying variables, selecting appropriate equipment and technology, and evaluating numerical answers for reasonableness;
(F) collect and organize qualitative and quantitative data and make measurements with accuracy and precision
(G) analyze, evaluate, make inferences, and predict trends from data;
(H) identify and quantify causes and effects of uncertainties in measured data;
(I) organize and evaluate data and make inferences from data, including the use of tables, charts, and graphs; and
(J) communicate valid conclusions supported by the data through methods such as lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports.

(4) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. The student is expected to:
(A) in all fields of science, analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, so as to encourage critical thinking;
(B) communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials;
(C) draw inferences based on data related to promotional materials for products and services;
(D) explain the impacts of the scientific contributions of a variety of historical and contemporary scientists on scientific thought and society;
(E) evaluate models according to their limitations in representing biological objects or events;

(5) The student formulates hypotheses to guide experimentation and data collection. The student is expected to:
(A) perform background research with respect to an investigative problem; and
(8) The student examines hypotheses generated to guide a research process by evaluating the merits and feasibility of the hypotheses.

(6) The student analyzes published research. The student is expected to:

- (A) identify the scientific methodology used by a researcher;
- (B) examine a prescribed research design and identify dependent and independent variables;
- (C) evaluate a prescribed research design to determine the purpose for each of the procedures performed; and
- (D) compare the relationship of the hypothesis to the conclusion.

(7) The student develops and implements investigative designs. The student is expected to:

- (A) interact and collaborate with scientific researchers or other members of the scientific community to complete a research project;
- (B) identify and manipulate relevant variables within research situations;
- (C) use a control in an experimental process; and
- (D) design procedures to test hypotheses.

(8) The student collects, organizes, and evaluates qualitative and quantitative data obtained through experimentation. The student is expected to:

- (A) differentiate between qualitative and quantitative data;
- (B) record observations as they occur within an investigation;

(9) The student knows how to synthesize valid conclusions from qualitative and quantitative data. The student is expected to:

- (A) synthesize and justify conclusions supported by research data;
- (B) consider and communicate alternative explanations for observations and results; and
- (C) identify limitations within the research process and provide recommendations for additional research.

(10) The student communicates conclusions clearly and concisely to an audience of professionals. The student is expected to:

- (A) construct charts, tables, and graphs using technology in order to facilitate data analysis and to communicate experimental results clearly and effectively.