Course Objectives: BIO 130.002  Principles of Cell and Molecular Biology
Dr. Stephen Wagner

Course Description: Three semester hours, three hours lecture per week. An introductory cell biology course. Topics include the structure of the cell and cell components, both eukaryotic and prokaryotic. The processes of DNA replication and gene expression including protein processing and routing. Photosynthesis, respiration, and chemotrophy as means of energy production. The cell cycle and its regulation.

Pre-requisite(s): None  Co-requisite: None

- Provide the student the ability recognize and identify the function(s) of cell features and distinguish between: prokaryotic and eukaryotic cells; and between the two types of eukaryotic cells: animal cells and plants cells.
- Identify the major class of biological macromolecule to which enzymes belong and describe their functions.
- Provide students with an understanding of the basic elements of biochemical processes of respiration and photosynthesis.
- Provide students with the understanding of major events of the cell cycle.
- Provide students with an understanding of the Central Dogma (i.e., How the sequence of a strand of DNA correspond to the amino acid sequence of a protein) of molecular genetics.

Student Learning Outcomes (Course Competencies):

Knowledge and Understanding
Students understanding will be evaluated with comprehensive objective exams covering each topic in detail. Students who successful complete Principles of Cell and Molecular Biology will demonstrate:

- The ability, for animal cells, to recognize and identify the function(s) of the following: centrioles, chromatin, Golgi apparatus, lysosome, microfilaments, microtubules, mitochondrion, nucleus, peroxisome, plasma membrane, rough and smooth endoplasmic reticulum, and ribosomes.
- The ability, for plant cells, to recognize and identify the function(s) of the following: cell wall, chloroplast, and central vacuole.
- An understanding of the ability of enzymes to facilitate chemical reactions. Explain how catalysts, including enzymes, affect and are affected by the chemical reactions in which they participate.
- An understanding of the biochemical processes of photosynthesis, glycolysis, citric acid cycle, and oxidative phosphorylation. Define cellular respiration and identify the cellular locations of the various stages of cellular respiration. Distinguish between the light reactions and the Calvin cycle of photosynthesis.
- An understanding of how cells grow and divide. Describe the major events of each of the stages of the cell cycle (interphase, G1, G2, S, mitosis, prophase, prometaphase, metaphase, anaphase, telophase, mitotic phase, and cytokinesis).
- Explain how information flows from gene to protein. Describe the major events including transcription, translation and protein sorting. Explain the function of mRNA and tRNA. Describe how gene expression can be affected at various levels: DNA packing/unpacking and chemical modification.
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.

Course Content (Topical Outline):

• A Preview of the Cell [2 lectures]
• Chemistry of the Cell [2 lectures]
• Macromolecules of the Cell [2 lectures]
• Cells and Organelles [3 lectures]
• Bioenergetics [2 lectures]
• Enzymes: The Catalyst of Life [1 lecture]
• Membranes and Transport [3 lectures]
• Chemotrophic Energy Metabolism [6 lectures]
  o Glycolysis & Fermentation
  o TCA Cycle & Electron Transport
  o TCA Cycle & Electron Transport
  o Photosynthesis
• Intracellular Compartments [2 lectures]
• Cytoskeletal System [2 lectures]
• Structural Basis of DNA [3 lectures]
Instructor: Dr. Stephen Wagner
Department: Biology
Email: swagner@sfasu.edu
Phone: 936-468-2135
Office: 223 Miller
Office Hours: MW 2:00 to 4:00 p.m., T, Th 10:00 to 12:00; 4:00 to 5:00 p.m.

Objectives: Welcome to Biology 130! This is an introductory course that covers cellular structure, organization, and processes. It is a now a freshman course requirement for all biology and pre-professional majors, and is a prerequisite for many of the senior level laboratory courses.

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 15th 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 include Prenursing Microbiology, Cell and Molecular Biology, Microbial Ecology, Industrial Microbiology, Planetary and Space Biology, and SFA 101. I also lead the department's program for EC-8 pre-service teachers and direct a project funded by NASA and the Department of Education to develop this program and a similar program for in-service teachers.

Outside of work I enjoy gardening, walking our dogs Charlie and Gracie, hiking, home improvement, cheering on my school and Cleveland, Ohio teams, attending church, and doing volunteer work. This December my wife Lynn and I will celebrate our 26th anniversary! We have two children, Michael (age 23) and Melissa (age 21) and a daughter-in-law named Katie (age 23). Melissa is a senior in the nursing program here at SFA.

Lecture Text: The World of the Cell, 7th edition, by Becker, Kleinsmith, and Hardin, (c) 2008. If you purchase a new book, you receive an access code to the “The Cell Place” online support resource. You can purchase this separately from Pearson Education at the following url:

http://wps.aw.com/wps/media/access/Pearson_Default/5291/5418611/login.html

Turning Point Personal Response Card: All students are required to use a response device (clicker) for every meeting held for this course. These are readily available for purchase from several bookstores on and off of campus. Because we will use the clicker for attendance, you must bring this to every class period. Attendance will be taken during the first few minutes of class. Therefore if you do not have your clicker or are late to class, you will be counted absent. Please purchase this and bring it to class by the 3rd class day (this Friday).

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 presentation. 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 last week of the semester (December 6 – December 10) 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.

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 fall 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.

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 for 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 is not permitted in class. You may, however, audio 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. Students with excessive unexcused absences and/or tardiness will not receive any additional points. Additionally, students must score at least 57% on an exam order to receive any bonus points assigned to the particular exam.

**Course Evaluation:** All students are required to complete a course evaluation at the end of the semester for both the lecture and lab sections. Failure to complete this evaluation will result in a 1% deduction in your final grade for the course.

**Course Requirements and Grading**

**LECTURE ASSIGNMENTS:** Review questions that emphasize critical thinking and real-world problems will be assigned periodically throughout the semester. Written reports of these questions will be collected and graded. The instructor will provide further details of these reports as they are assigned. These will be worth 50 points of the final grade. **The assignments must be turned in at the beginning of the class period of the day that they are due; late work is not accepted unless you have an excused absence.**

**ATTENDANCE:** To encourage attendance, and thus maximize exposure to the presented material, there will be an attendance grade of 50 points. These points will be based on the percentage of days attended as determined by the turning point technology (see above). Missing any class beyond three class periods will cause the loss of 10 points for each additional absence.

**LECTURE EXAMS:** There will be three lecture exams and a final each worth 225 points (22.5%) of the final grade. These exams will be primarily of an objective nature (multiple choice, matching, true/false) but with some short answer essay-style questions. Most (about 85%) of these exam questions will come from material covered in class with the remainder from reading requirements in the text and other sources. About 70% of the lecture material will originate from the text and about 30% from other sources. Therefore, **don't miss class unless absolutely necessary** or you will miss about 1/3 of the material that will be covered on an exam. The lecture exams will be given according to the attached schedule. Part of the final will be comprehensive in nature.

Please remember that this is an introductory course upon which many of your upper division courses will build. Consequently, it is very important that you build a good foundation of knowledge of cell
structure and function. You should be spending 2-3 hours outside the classroom on this material for every hour in class; in other words consistently spend 6-9 hours/week studying for this course. For this reason, you may see questions based on the book and other materials to which you are directed that there was not time to spend on in class. John Kennedy once said: “we don’t do these things because they are easy, we do them because they are hard.” With that declaration we, as a nation, were inspired to land a man on the moon in 1969!

### Grading Criteria

The final grade will be calculated by the following: Your final grade will be calculated as follows:

- **Lecture Assignments**: 1 @ 50 points = 50 points
- **Attendance Quizzes**: 1 @ 50 points = 50 points
- **Lecture Exams**: 3 @ 225 points = 675 points
- **Final Lecture Exam**: 1 @ 225 points = 225 points

**TOTAL** = 1000 points

Scale: 100-90% = A; 89-80% = B; 79-70% = C; 69-60% = D; Below 60% = F.

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**Be on Time and Do Not Leave Early:** 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.**

**No Food or Beverages in Lecture Hall!** The housekeepers who take care of the lecture halls work very hard to maintain a clean lecture hall and do not make a lot of money doing this. Please help them by not consuming food and beverages other than water while you attend class.
## Fall 2010 Lecture Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Monday</th>
<th>Wednesday</th>
<th>Friday</th>
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</thead>
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| 1    | August 30  
Introduction | September 1  
Foundations (1) | 3  
Foundations (1) |
| 2    | September 6  
Labor Day Holiday! | 8  
Chemistry of the Cell (2) | 10  
Chemistry of the Cell (2) |
| 3    | 13  
Cell Macromolecules (3) | 15  
Cell Macromolecules (3) | 17  
Cells and Organelles (4) |
| 4    | 20  
Cells and Organelles (4) | 23  
Cells and Organelles (4) | 24  
EXAM 1 (Ch. 1-3) |
| 5    | 27  
Bioenergetics (5) | 30  
Enzymes (6) | October 1  
Enzymes (6) |
| 6    | 4  
Membranes (7) | 6  
Membranes (7) | 8  
Membrane Transport (8) |
| 7    | 11  
Membrane Transport (8) | 13  
Glycolysis and Ferment. (9) | 15  
Glycolysis and Ferment. (9) |
| 8    | 18  
Catch up and Review | 20  
EXAM 2 (Ch. 4-9) | 22  
Aerobic Respiration (10) |
| 10   | 25  
Aerobic Respiration (10) | 27  
Photosynthesis (11) | 29  
Photosynthesis (11) |
| 11   | Nov. 1  
Cell Genetics (18) | 3  
Cell Genetics (18) | 5  
Replication and Mitosis (19) |
| 12   | November 8  
Replication and Mitosis (19) | 10  
Meiosis, etc. (20) | 12  
No Class |
| 13   | 15  
Meiosis, etc. (20) | 17  
Catch up and Review | 19  
EXAM 3 (Ch. 8-11, 18, 19) |
| 14   | 22  
Cancer | 24  
No Class – Thanksgiving | 26  
No Class – Thanksgiving! |
| 15   | 29  
Cancer | Dec 1  
Cell Communications (13,14) | 3  
Cell Communications (13,14) |
| 16   | 6  
Cytoskeleton (15) | 8  
Beyond the Cell (17) | 10  
Review |
| 17   | Dec. 13, 10:30 a.m. – 12:30 p.m.  
FINAL EXAM |