**BIO 110 – General Biology**

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**Requirements:**
1. Textbook*: *Campbell Biology In Focus, 2nd Ed.* (Urry et al. 2015; Pearson Ed., Inc.)
2. An Access Code* for *Mastering Biology* (Pearson) is needed for online homework.
3. The Laboratory Manual is available for download on D2L.

*A package including a custom version of the textbook and an access code is available in the bookstore.

**Catalog Description:**
BIO 110 covers the concepts general to all living organisms such as cell structure and function, genetics, evolution and ecology. This course is designed for majors in biology and related scientific areas. The course includes 2 1-hour lectures and 1 3-hour laboratory per week.

**My Goals & Approach:**
BIO 110 is an introductory/survey biology course for science majors, therefore a lot of facts and details are involved. However, studying science is not just about memorizing facts. It is also about understanding the process by which scientists think and learn about the world around us. In this course, I hope that you:
- Learn about biology at multiple levels of organization.
- Learn about the process of doing science.
- Understand evolution as the theme that unifies all of biology.

Finally, I hope that you retain the information and perspective gained in this course after the course is over. Toward that end, I will make an effort to contextualize and connect the material presented throughout this course as part of the large (and growing) field of biology. All of this is done within the framework of encouraging you to think rather than memorize.

**General Education Learning Objectives:**
BIO 110 is an approved course in the West Chester University General Education program. It is designed to help you meet the following General Education goals:
- Gen Ed Goal #1: Communicate effectively
- Gen Ed Goal #2: Think critically and analytically
- Gen Ed Goal #3: Employ quantitative analysis and mathematical models

**Biological Learning Objectives:**
Students successfully completing BIO 110 will meet the following learning objectives:
- Demonstrate competency in key biological content and concepts at the molecular, cellular, organismal, and ecosystem levels.
- Demonstrate a general knowledge of the fundamental terminology, concepts, and processes common to all living systems, whether plant, animal, fungus or microbe.
- Demonstrate knowledge of basic laboratory techniques utilized in modern biological research.
- Demonstrate an understanding of the means by which a researcher recognizes the potential of a given project, creates an experimental design, performs the experiment, and interprets the collected data.
- Demonstrate competency in quantitative reasoning and critical/analytical thinking.
- Develop an awareness of science as a human endeavor with social consequences and responsibilities.
Meeting & Assessing Student Learning Outcomes:

Communicate effectively: Students will express themselves effectively in presentations in lab and demonstrate comprehension of and ability to explain information and ideas accessed through reading. In the first lab students give a presentation and are graded according to a rubric. Each lab (except the first) begins with a quiz based uniquely on the introduction to each lab as written in the lab manual. Students are also asked, as part of lab “Apply Your Knowledge” exercises, to construct sentences using a set of key words thereby illustrating the ability to communicate the connections among key concepts.

Think critically and analytically: Students will construct and analyze arguments in terms of the premises, assumptions, contexts, conclusions, and anticipated counter-arguments; students will also be required to reach sound conclusions based on a logical analysis of evidence and develop creative approaches to assignments. Based on experimentally generated data presented in lecture and laboratory, students are challenged to analyze results and interpret their meaning. Throughout the semester, questions are posed, and students are challenged to answer them, based not on what they feel or what they would like the answer to be, but on the data presented. Weekly lab assignments ask students to “Apply Their Knowledge” whereby they demonstrate learned information and the ability think critically and analytically. Additionally, some exam questions require students to think about the concepts that have learned rather than simply recognize memorized information.

Employ quantitative analysis and mathematical methods: Students will employ quantitative methods to examine a problem in the natural world and apply the basic methods and thought processes of the scientific method for the natural sciences. In lecture and laboratory precise measurements are made or illustrated, interpreted, and used to explain/understand all manner of biological phenomena. In lecture, students are presented with data to interpret. In laboratory, students form hypotheses, run experiments, generate data, analyze this data, and interpret the meaning of this data in terms of whether their hypotheses are supported or not. Additionally, as examples of mathematical methods, several laboratories employ statistical hypothesis testing and the ecology lectures & laboratory use mathematical models to illustrate population growth and regulation.

Biological knowledge: Throughout the course, fundamental details describing the organization, structure and function at all levels of life are presented and discussed with emphasis placed on the process/development of biological knowledge. Student comprehension of this knowledge is assessed by lecture and laboratory exams.

Attendance Policy:
Attendance in lecture and laboratory is mandatory. Any material covered in lecture (laboratory) is fair game for the lecture (laboratory) exams, whether it is in the required readings or not.

Grading:
A letter grade will be assigned based on your performance in the course. Grades are calculated as a percentage of the total points available (900), rounded to the second decimal, and defined as follows: A = 90.00-100%; B = 80.00-89.99%; C = 70.00-79.99%; D = 60.00-69.99%; F ≤ 59.99%. (+) and (-) will be assigned according to University policy. All grades, including other grades (e.g., NG, Z), will follow policy described in the Undergraduate Catalog.

The course grade is made up of the following performance measures:

<table>
<thead>
<tr>
<th>Performance Measure</th>
<th>Points</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture Exams</td>
<td>300</td>
<td>33%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>180</td>
<td>20%</td>
</tr>
<tr>
<td>Weekly Homework</td>
<td>120</td>
<td>(~13%)</td>
</tr>
<tr>
<td>Laboratory Quizzes</td>
<td>45</td>
<td>5%</td>
</tr>
<tr>
<td>Laboratory Assignments (AYKs)</td>
<td>105</td>
<td>(~12%)</td>
</tr>
<tr>
<td>Laboratory Exams</td>
<td>150</td>
<td>(~17%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>900</td>
<td></td>
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</tbody>
</table>
Exams:
There will be 3 in-class (lecture) exams covering the material in equal proportions and 1 cumulative (final) exam. The final exam will be roughly 50% new material (covered in the last quarter of the course) and 50% cumulative. These exams will be in a multiple-choice format and graded with a ScanTron sheet. There will also be two laboratory exams that will cover material presented in laboratory. No exam (lecture or laboratory) may be taken at a time other than the assigned time without permission from Dr. Auld and proper documentation (see policy below). Note: If you arrive late for an exam and other students have already completed the exam, you will not be allowed to take the exam.

Exam Grade Change Policy:
All concerns/inquiries regarding changes to exam grades must be submitted within 1 week of when the exam scores are announced. After 1 week, no changes to exam scores will be made.

Exam Make-up Policy:
If you are unable to take an exam at the regularly scheduled time due to an excused absence (see Excused Absences Policy), proper documentation (e.g., doctor's excuse) must be provided in hard copy (no e-mail attachments) in order for a make-up exam to be arranged. Additionally, you must contact the instructor (Auld for all lecture exams, lab instructor for laboratory exams) within 48 hours after the exam or you forfeit your chance for a make-up. Missed exams without proper documentation will be marked as a score of 0.

Weekly Homework:
Weekly homework assignments must be completed online using the Mastering Biology system. Access to this system can be purchased as a package with the textbook or independently. You must enroll in the course using the course ID posted on the syllabus (http://darwin.wcupa.edu/faculty/auld/Main/BIO110). Assignments must be completed by posted due date. Late assignments will not receive any credit.
Course Outline:
This is a survey course of biology covering the following topics:

1. Fundamentals & Building Blocks:
   - **Science** (process, observation, hypothesis, falsification, data, inference, theory)
   - **Evolution** (unifying theme in biology, unity, diversity, evidence, mechanisms)
   - **Natural selection** (process, individual variation, inheritance, fitness, adaptations)
   - **Phylogenies** (common descent, clades, homology, analogy)
   - **Chemistry** (atoms, elements, molecules, charge, polarity, bonding)
   - **Molecules** (water, carbon-based, functional groups, carbohydrates, lipids, amino acids, nucleotides)
   - **Polymerization** (polysaccharides, polypeptides, polynucleotides, microtubules)

2. Cells & How They Work:
   - **Structure** (nucleus, prokaryotes/eukaryotes, animals/plants, organelles, cytoskeleton, junctions, cell cycle, mitosis, cytokinesis)
   - **Function** (membranes, gradients, passive & active transport, signaling)
   - **Processes** (exergonic/endergonic reactions, enzymes, redox reactions, glycolysis, aerobic respiration, fermentation, photosynthesis)

3. Reproduction & Transfer of Information:
   - **Sex** (ploidy, meiosis, fertilization, independent assortment, recombination, sex determination)
   - **Genetics** (genotype/phenotype, Mendel's laws, crosses, linkage)
   - **DNA** (chromosome structure, DNA structure & replication, mutations)
   - **Gene expression** (transcription, modification, translation)
   - **Mutation** (point, reading frame, synonymous/nonsynonymous)

4. Change & Context:
   - **Evolutionary processes** (populations, selection, migration, mutation, drift)
   - **Speciation** (species concepts, pre/post-zygotic isolation, allopatric, sympatric)
   - **Populations** (climate & biomes, density-dependence/independence)
   - **Communities** (interspecific interactions, trophic structure, diversity)
   - **Ecosystems** (energy flux, nutrient cycling)
Lecture Schedule by Topic (Chapter):
For exam dates see the syllabus online.

- Introduction (1)
- Evolution (19-20)
- Atoms & Molecules (2-3)
  **Exam 1**
- Cells & Cellular Functions (4-6)
- Respiration & Photosynthesis (7-8)
  **Exam 2**
- Mitosis & The Cell Cycle (9)
- Sex: Meiosis & Fertilization (10)
- Genetics (11-14)
  **Exam 3**
- Populations & Species (21-22)
- Ecology (40-42)
  **Exam 4**

Laboratory Schedule:
For exam dates see the syllabus online.

- *Lab 1:* The Scientific Method & Common Descent
- *Lab 2:* Data Analysis & Interpretation
- *Lab 3:* Organic Molecules
- *Lab 4:* Cells & Microscopy
- *Lab 5:* Membranes & Diffusion
  **Lab Exam 1**
- *Lab 6:* Cell Cycle & Division
- *Lab 7:* Genotypes & Phenotypes
- *Lab 8:* Population Genetics & Evolution
- *Lab 9:* Molecular Genetics
- *Lab 10:* Population Ecology
  **Lab Exam 2**
Statements Common to All WCU Undergraduate Syllabi:

ACADEMIC & PERSONAL INTEGRITY
It is the responsibility of each student to adhere to the university’s standards for academic integrity. Violations of academic integrity include any act that violates the rights of another student in academic work, that involves misrepresentation of your own work, or that disrupts the instruction of the course. Other violations include (but are not limited to): cheating on assignments or examinations; plagiarizing, which means copying any part of another’s work and/or using ideas of another and presenting them as one’s own without giving proper credit to the source; selling, purchasing, or exchanging of term papers; falsifying of information; and using your own work from one class to fulfill the assignment for another class without significant modification. Proof of academic misconduct can result in the automatic failure and removal from this course. For questions regarding Academic Integrity, the No-Grade Policy, Sexual Harassment, or the Student Code of Conduct, students are encouraged to refer to the Department Undergraduate Handbook, the Undergraduate Catalog, the Ram’s Eye View, and the University website at www.wcupa.edu.

STUDENTS WITH DISABILITIES
If you have a disability that requires accommodations under the Americans with Disabilities Act (ADA), please present your letter of accommodations and meet with me as soon as possible so that I can support your success in an informed manner. Accommodations cannot be granted retroactively. If you would like to know more about West Chester University’s Services for Students with Disabilities (OSSD), please visit them at 223 Lawrence Center. The OSSD hours of Operation are Monday – Friday, 8:30 a.m. – 4:30 p.m. Their phone number is 610-436-2564, their fax number is 610-436-2600, their email address is ossd@wcupa.edu, and their website is at www.wcupa.edu/ussss/ossd.

EXCUSED ABSENCES POLICY
Students are advised to carefully read and comply with the excused absences policy, including absences for university-sanctioned events, contained in the WCU Undergraduate Catalog. In particular, please note that the “responsibility for meeting academic requirements rests with the student,” that this policy does not excuse students from completing required academic work, and that professors can require a “fair alternative” to attendance on those days that students must be absent from class in order to participate in a University-Sanctioned Event.

REPORTING INCIDENTS OF SEXUAL VIOLENCE
West Chester University and its faculty are committed to assuring a safe and productive educational environment for all students. In order to meet this commitment and to comply with Title IX of the Education Amendments of 1972 and guidance from the Office for Civil Rights, the University requires faculty members to report incidents of sexual violence shared by students to the University’s Title IX Coordinator, Ms. Lynn Klingensmith. The only exceptions to the faculty member’s reporting obligation are when incidents of sexual violence are communicated by a student during a classroom discussion, in a writing assignment for a class, or as part of a University-approved research project. Faculty members are obligated to report sexual violence or any other abuse of a student who was, or is, a child (a person under 18 years of age) when the abuse allegedly occurred to the person designated in the University protection of minors policy. Information regarding the reporting of sexual violence and the resources that are available to victims of sexual violence is set forth at the webpage for the Office of Social Equity at http://www.wcupa.edu/_admin/social.equity/.

EMERGENCY PREPAREDNESS
All students are encouraged to sign up for the University’s free WCU ALERT service, which delivers official WCU emergency text messages directly to your cell phone. For more information, visit www.wcupa.edu/wcualert. To report an emergency, call the Department of Public Safety at 610-436-3311.

ELECTRONIC MAIL POLICY
It is expected that faculty, staff, and students activate and maintain regular access to University provided e-mail accounts. Official university communications, including those from your instructor, will be sent through your university e-mail account. You are responsible for accessing that mail to be sure to obtain official University communications. Failure to access will not exempt individuals from the responsibilities associated with this course.