Biology 2112
Introduction to Cellular and Molecular Biology

Fall, 2019

Lecture time: M W F, 9:00-9:50 AM
Lecture location: 17 Anderson Hall
Instructor: Rhonda H. Nicholson, Ph.D., Associate Professor for Biology
Office address: 402B Biology-Life Sciences
Office phone: 215-204-9547
Email address: rnichol@temple.edu
Office hours: Monday and Wednesday 1:30-3:00 PM (or by appointment)

COURSE INFORMATION
Biology 2112 examines living systems at the most fundamental levels. Topics include chemical bonds, the unique properties of water, carbon chemistry, the structures and functions of macromolecules, as well as the thermodynamic and kinetic properties of enzymes. At the cellular level, we will study the components of cell-to-cell communication, cellular signaling, and the regulation of the cell cycle. An examination of the processes of DNA replication and gene expression lead into studies on chromosome behavior during meiosis and the field of genetics. This course finishes by surveying three very compelling subjects: cancer, viruses, and biotechnology.

Course and Learning Objectives
- Develop a strong foundation in biological chemistry, cell biology, and genetics
- Apply knowledge of fundamental principles gained in this course to more advanced studies in biochemistry, cell biology and genetics

Communication:
E-mail is the preferred form of communication outside of lecture and office hours. It is very important that you include your name, Temple I.D. number, and subject in your e-mail. Because I check my e-mail regularly, you should receive a response within 24 hours of your first message. Please direct all questions about the lab to your lab instructor or the laboratory coordinator, Dr. Dan Spaeth (spaceman@temple.edu).

It is imperative that you obtain AccessNet and a Temple University e-mail account. This allows access to Canvas through TU portal. Lecture power points, study guides, grades, as well as important course announcements are posted on Canvas. (Obtain an e-mail account by going to http://www.temple.edu/cs. Alternatively, visit the Computer Services Help Desk, Room 106, TECH Center, 12th St. & Montgomery Ave. Call 204-8000 for more information.)

Prerequisites:
The prerequisites of this course are Chemistry 1031 and Chemistry 1032, or the equivalent, with a grade of C or better. Math 1021 (college algebra) and Math 1022 (pre-calculus) are also necessary; you must be able to use logarithms, exponents, and perform simple algebra.

Co-requisite:
You must be enrolled in Chemistry 2201 (Organic Chemistry), or have completed Chemistry 2201 with a grade of C- or better.
Laboratory:
Your laboratory grade is determined by lab quizzes, the quality and promptness of lab reports, as well as laboratory performance. Laboratory attendance is mandatory. If you are absent from your scheduled laboratory, you must attend another section that week. Please see laboratory guidelines.

Course Materials:
The textbook is *Biology, 11th edition, 2017*, by Urry, Cain, Wasserman, Minorsky, Reece; it is available at Temple bookstore or online, new or used. The laboratory manual and laboratory information are posted on Canvas. The laboratory safety manual (also known as “CST Student Guidelines”) is available at the Ritter Hall Copy Center. Mandatory safety goggles are available in the Bookstore.

A copy of the instructor’s power point presentation (or selected segments) will be posted on Canvas. A copy of “Principles of Biochemistry” (Lehninger), 5th edition, will also be available for reference at Paley Library.

2112 Student Obligations:
You are expected to attend every lecture and take careful notes. Lectures will begin precisely at the appointed time. Topics described in the text will be expanded upon significantly in the lecture, with additional materials posted on Canvas or provided by the instructor. You are strongly encouraged to re-copy your lecture notes in order to incorporate important points from the required reading assignments. This exercise will help you to solidify your understanding of what was covered in lecture, solve problems in the quantitative segments of the course, and help you identify areas of uncertainty. Approximately 2 hours of study for every hour of lecture is the suggested minimum. Because your lecture/reading notes are crucial to your success, I strongly advise students to find at least one study partner. Your partner can provide notes in the event of an absence.

In order to help you focus and learn the lecture and reading material, study guides will be posted on Canvas. You must attend the lecture in order to complete the study guides in a satisfactory manner. I emphasize that the lectures will expand significantly on subjects in the text. The examinations will be based on the contents of the lectures and study guides. You are responsible for obtaining study guides and other posted lecture material from Canvas, as well as monitoring Canvas for class announcements and information. Quantitative segments of the course include, molarity, thermodynamics, pH and buffers, enzyme kinetics, and probability related to genetics. Study guides will contain sample problems and their solutions. You will find modified versions of these problems on the examinations. I strongly advise you to read ahead and stay current with lecture notes and study guides. In this course, a foundation is built by layering the current lecture topic upon previous lectures. The amount and depth of material covered is far too great for you to learn effectively, should you fall behind in the readings or fail to attend lecture.

Examinations:
For examinations, you will need ~2-3 sharpened #2 pencils and an eraser. Absolutely no study materials, or calculators will be permitted during examinations. If you are seen in possession of a cell phone or camera-watch in the lecture hall, your examination will be disqualified and you will be subject to student disciplinary action. Direct all questions that arise during an examination to the instructor or your TA. Exchanging information during an examination is a violation of the Temple University Student Code and will result, at a minimum, in a failing grade.

The format of Biology 2112 examinations is multiple choice as well as computation. Examinations will not be returned to you. Examination scores will be posted on Canvas. You will be allowed to go over your examinations and ask questions during scheduled test review sessions. You are also welcome to review your test in my office by appointment.

Tests must be taken during their scheduled time. If you are absent from an examination due to a medical emergency, a letter explaining the circumstances, signed and dated by a physician (unrelated to the student), must be submitted to me as soon as it is reasonably possible. If you miss an examination and I am not notified within 36 hours, you will receive a zero for that examination. If you miss the final due to serious medical and/or legal circumstances, you must provide proper documentation as described above within 36 hours of the scheduled final examination. In this event you must take a make-up examination by
Incomplete:
You must be passing the course and only miss the final examination in order to apply for an “Incomplete”. If circumstances force you to miss the final and apply for an Incomplete, two steps must be taken. First, the professor and the student must sign an “Incomplete Contract” that is held in the Biology Office. Second, for Biology 2112, it is requested that the final examination must be made up by the end of the second week of the following semester (Friday, January 24th, 2020). If you fail to make up an Incomplete within the designated time limit, your grade for the course will be calculated without a final examination score.

Grading:
The final grade will be determined from the examinations and the laboratory as follows:
Examination I= 11%  Examination II=16%  Examination III=16%
Examination IV=16%  Final examination=16%  Laboratory grade=25%

Course withdrawal:
The Last day to drop a course is Monday, September 9th. The final date for course withdrawal (no tuition refund) is Tuesday, October 22nd. The following statement regarding course withdrawal is from the Temple University student bulletin, policy # 02.10.14:

During the first two weeks of the fall or spring semester or summer sessions, students may withdraw from a course with no record of the class appearing on the transcript. In weeks three through nine of the fall or spring semester, or during weeks three and four of summer sessions, the student may withdraw with the advisor’s permission. The course will be recorded on the transcript with the instructor’s notation of “W,” indicating that the student withdrew. After week nine of the fall or spring semester, or week four of summer sessions, students may not withdraw from courses.
- No student may withdraw from more than five courses during the duration of his/her studies to earn a bachelor’s degree.
- A student may not withdraw from the same course more than once.
- Procedure: Withdrawal from a course is accomplished with a Schedule Revision (Drop/Add) form, processed through Temple registration.

Disability disclosure:
Any student who has a need for accommodation based on the impact of a disability should contact me privately to discuss the specific situation as soon as possible. Contact Disability Resources and Services at 215-204-1280 in 100 Ritter Annex to coordinate reasonable accommodations if you are a student with documented disabilities.

Student and Faculty Academic Rights and Responsibilities Policy:
Freedom to teach and freedom to learn are inseparable facets of academic freedom. The University has a policy on Student and Faculty Academic Rights and Responsibilities (Policy #03.70.02). The policy can be accessed through the following link: http://policies.temple.edu/getdoc.asp?policy_no=03.70.02.

Cell Phones:
Cell phones and Bluetooth devices must be off during class! A student who engages in text messaging, answers or places a cell phone call during lecture will be penalized for misconduct in accordance with university regulations.

BIOLOGY 2112 LECTURE SCHEDULE (Note: schedule may be subject to change)
<table>
<thead>
<tr>
<th>LECTURE</th>
<th>DATE</th>
<th>TOPIC</th>
<th>TEXTBOOK CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mon. (8/26)</td>
<td>Introduction</td>
<td>Chapter 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chemical Bonds</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Wed. (8/28)</td>
<td>Water I (Hydrogen bonds)</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>3</td>
<td>Fri. (8/30)</td>
<td>Water II (pH)</td>
<td>Chapter 3</td>
</tr>
<tr>
<td>4</td>
<td>Wed. (9/04)</td>
<td>Functional Groups</td>
<td>Chapter 4</td>
</tr>
<tr>
<td>5</td>
<td>Fri. (9/06)</td>
<td>pH and Buffers</td>
<td>*</td>
</tr>
<tr>
<td>6</td>
<td>Mon. (9/09)</td>
<td>Macromolecules I</td>
<td>Chapter 5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Carbohydrates and Lipids)</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Wed. (9/11)</td>
<td>Macromolecules II (Proteins)</td>
<td>Chapter 5</td>
</tr>
<tr>
<td>8</td>
<td>Fri. (9/13)</td>
<td>Macromolecules III (Nucleic Acids)</td>
<td>Chapter 5*</td>
</tr>
<tr>
<td>9</td>
<td>Mon. (9/16)</td>
<td>Thermodynamics I</td>
<td>Chapter 8*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Laws of Thermodynamics)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Wed. (9/18)</td>
<td>Thermodynamics II</td>
<td>Chapter 8*</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Energy and Enzymes)</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>Fri. (9/20)</td>
<td>TEST 1 (Lectures 1-9)</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Mon. (9/23)</td>
<td>Enzyme Kinetics I</td>
<td>*</td>
</tr>
<tr>
<td>12</td>
<td>Wed. (9/25)</td>
<td>Enzyme Kinetics II</td>
<td>*</td>
</tr>
<tr>
<td>13</td>
<td>Fri. (9/27)</td>
<td>Cells I (Endomembrane System)</td>
<td>Chapter 6</td>
</tr>
<tr>
<td>14</td>
<td>Mon. (9/30)</td>
<td>Cells II</td>
<td>Chapter 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Cytoskeleton and Extracellular Matrix)</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Wed. (10/02)</td>
<td>Membranes</td>
<td>Chapter 7</td>
</tr>
<tr>
<td>16</td>
<td>Fri. (10/04)</td>
<td>Cellular Respiration I</td>
<td>Chapter 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Glycolysis and the Citric Acid Cycle)</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Mon. (10/07)</td>
<td>Cellular Respiration II</td>
<td>Chapter 9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(Oxidative phosphorylation)</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Wed. (10/09)</td>
<td>Photosynthesis I</td>
<td>Chapter 10</td>
</tr>
<tr>
<td>---</td>
<td>Fri. (10/11)</td>
<td>Test II (Lectures 10-15)</td>
<td></td>
</tr>
</tbody>
</table>

* Instructor will provide study material

<table>
<thead>
<tr>
<th>LECTURE #</th>
<th>DATE</th>
<th>TOPIC</th>
<th>TEXTBOOK CHAPTER</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>Mon. (10/14)</td>
<td>Photosynthesis II</td>
<td>Chapter 10</td>
</tr>
</tbody>
</table>
20  Wed. (10/16)  Cell Communication I  Chapter 11
21  Fri. (10/18)  Cell Communication II  Chapter 11
22  Mon. (10/21)  Cell Cycle Regulation/Mitosis  Chapter 12
23  Wed. (10/23)  DNA Replication  Chapter 16
24  Fri. (10/25)  Prokaryotic Gene Regulation  
                CRISPR-Cas system  Chapter 18, 19
25  Mon. (10/28)  Eukaryotic Gene Regulation I  Chapter 18
26  Wed. (10/30)  Eukaryotic Gene Regulation II
                and Transcription  Chapters 17,18
---  Fri. (11/01)  Test III (Lectures 16-23)
27  Mon. (11/04)  Translation  Chapter 17
28  Wed. (11/06)  Meiosis  Chapter 13
29  Fri. (11/08)  Genetics I (Mendel’s Laws)  Chapter 14
30  Mon. (11/11)  Genetics II
                (Complex patterns of inheritance)  Chapter 14
31  Wed. (11/13)  Genetics III
                (Linkage)  Chapter 14
--  Fri. (11/15)  TEST IV (Lectures 24-29)
32  Mon. (11/18)  Genetics IV (Sex Linkage)  Chapter 15
33  Wed. (11/20)  Genetics V
                (Imprinting, and genetic variation)  Chapter 15
34  Fri. (11/22)  Cancer II  Chapter 12, 18*
35  Mon. (12/02)  Cancer II  Chapter 12, 18*
36  Wed. (12/04)  Viruses  Chapter 19
37  Fri. (12/06)  Biotechnology I
                (Recombinant DNA and cloning)  Chapter 20
38  Mon. (12/09)  Biotechnology II
                (Recombinant proteins, forensic genetics)  Chapter 20
--  Mon. (12/16)  FINAL EXAMINATION  (17 Anderson, 8:00 AM - 10:00 AM)
                (Lectures 30-38)