Biology 1333: Introduction to Biology I

Description of Course Content
Emphasis is on fundamental principles, concepts, and topical subjects related to biology. This course is for non-science majors and with 1334, will satisfy the laboratory science requirements for students in the Colleges of Liberal Arts and Business Administration and in the School of Social Work.

Note: Modern Biology is an integrative discipline, incorporating elements of Mathematics, Chemistry, Computer Science, and Writing. We expect that you have at least a basic understanding of each of these elements.

This course satisfies the University of Texas at Arlington core curriculum requirement in life and physical sciences. The italicized student learning outcomes required of core courses below will be assessed for each student in the laboratory portion of the course. The final lab report will be assessed to determine how a student has mastered critical thinking, communication, and empirical and quantitative skills. A teamwork assessment (peer evaluation) will be completed by each student in lab to determine how students work together in lab groups to achieve the student learning outcomes described below.

Student Learning Outcomes
- understand crucial biological processes and structures that maintain life
- gain a familiarity with biological concepts related to issues of health, social and environmental concerns by investigating case studies in lecture
- learn the scientific process by designing and conducting experiments, collecting and analyzing data, and presenting results, in both written and oral formats
- Critical Thinking Skills: to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information;
- Communication Skills: to include effective development, interpretation and expression of ideas through written, oral and visual communication
- Empirical and Quantitative Skills: to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions
- Teamwork: to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal

Required Textbooks and Other Course Materials

Biology for a Changing World, Shuster et al. 2012, W.H. Freeman and Scientific American or

Course Format
This course will be taught with 2 hours of lecture each week and a 2-hour lab. Lecture and lab material will be integrated as much as possible.
Grading
BIOL 1333 is a 3-credit hour course. There will be 2 exams and a final exam in lecture; those points will be worth 2/3 of your course grade. The lab is worth 1/3 of your course grade.

Tentative Course Outline (from Scientific American book)
Unit 1: What is Life Made of? Chemistry, Cells, and Energy
Chapter 1………………………The Process of Science
Chapter 2………………………Chemistry and Molecules of Life
Chapter 3………………………Cell Function and Structure
Chapter 4………………………Nutrition, Metabolism, Enzymes

Lecture Exam 1 (30% of lecture grade)
Chapter 5………………………Energy Flow and Photosynthesis
Chapter 6………………………Dietary Energy and Cellular Respiration

Unit 2: How Does Life Perpetuate? Cell Division and Inheritance
Chapter 7………………………DNA Structure and Replication
Chapter 8………………………Genes to Proteins
Chapter 9………………………Cell Division and Mitosis

Lecture Exam 2 (30% of lecture grade)
Chapter 10……………………..Mutations and Cancer
Chapter 11…………………….Single-Gene Inheritance and Meiosis
Chapter 12……………………..Complex Inheritance
Chapter 13……………………..Stem Cells and Cell Differentiation

Cumulative Final Exam (40% of lecture grade)

Laboratory
The laboratory is designed to provide all students with opportunities to investigate biological processes in an inquiry-based fashion. Students will be expected to work as teams in lab groups (usually of four students) to conduct experiments and participate in the scientific process.

Signature Assignments. Signature assignments in core courses aid instructors and curriculum evaluators in assessing student development in the areas of critical thinking, communication, empirical and quantitative skills, and teamwork. The lab report (described below) will serve as the signature assignment for this course along with the peer evaluation of teamwork.

Assignments
1. One lab report will be required during the semester. This will be graded according to a rubric (posted on the course Blackboard page) to assess student focus, organization, meeting the requirements of the assignment, ability to analyze and synthesize data, and style. In particular, GTAs will look for evidence of critical thinking skills and empirical and quantitative analysis,
along with the ability to communicate clearly in writing. Lab reports will be based on group work, but must be written up individually.

2. Each lab group will give one oral presentation based on the results of one of their inquiries. This presentation will be graded using a rubric to evaluate oral communication skills of the group.

3. Each student will evaluate her/his peers in her/his lab group for teamwork skills once towards the end of the semester.

4. Five quizzes will be given in lab to assess student understanding of key concepts learned in lecture and lab.

5. Additional writing exercises will be assigned including two group proposals prior to carrying out experiments, a draft of the lab report described above, and written results sections of additional experiments.

### 1333 Proposed Lab Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topic</th>
<th>Exercise(s)</th>
<th>Assignment(s) Due</th>
<th>Safety?</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td>Lab 1: Scientific Method</td>
<td>Hand-eye coordination experiment Design an experiment</td>
<td>Group assignment worksheet</td>
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<td>2</td>
<td></td>
<td>Labor Day: No Labs</td>
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<td>3</td>
<td></td>
<td>Lab 2: Scientific Writing</td>
<td>Data analysis and presentation Scientific writing Setup Plant Exp</td>
<td>Bring laptops</td>
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<td>4</td>
<td></td>
<td>Lab 3: Photosynthesis Respiration</td>
<td>Elodea experiment Proposal writing Set up plant competition exp.</td>
<td>Group Proposal #1 Hand-eye Results</td>
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<td>5</td>
<td></td>
<td>Lab 3 Week 2: Photosynthesis Respiration</td>
<td>Elodea perform exp. First Plant Harvest Begin Lab Report</td>
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<td>6</td>
<td></td>
<td>Lab 4: Microscopes Peer Review</td>
<td>Microscopes and Cells Conduct Peer Review</td>
<td>Report Draft Cells Group Worksheet</td>
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<td>7</td>
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<td>Lab 5: Osmosis and Diffusion</td>
<td>Elodea and Dialysis tubing experiments</td>
<td>Lab Report 1 Peer Review</td>
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<td>Week</td>
<td>Lab</td>
<td>Activity</td>
<td>Notes</td>
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<td>8</td>
<td>Lab 6:</td>
<td>Food testing</td>
<td>Osmosis Figures and Conclusions</td>
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<td>Macromolecules</td>
<td>Bring 2 food items</td>
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<td>9</td>
<td>Lab 7:</td>
<td>Tyrosinase and bromelain experiments</td>
<td>Group Proposal #2</td>
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<td>Proteins and Enzymes</td>
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<td>10</td>
<td>Lab 7 Week 2:</td>
<td>Tyrosinase: conduct experiments</td>
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<td>Proteins and Enzymes</td>
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<td>11</td>
<td>Lab 8:</td>
<td>Harvest Plants</td>
<td>Tyrosinase Results</td>
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<td>Plant Competition Scientific Presentations</td>
<td>Analyze Plant Data</td>
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<td>Scientific Presentations</td>
<td>Intro</td>
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<td>12</td>
<td>Lab 9:</td>
<td>Group PPT Presentations</td>
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<td>Scientific Presentations</td>
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**Grading**

- 25% Lab report
- 40% Individual Assignments (quizzes, follow-up questions, results)
- 20% Group assignments (proposals, worksheets)
- 15% Presentation