Course Description

BSC 1409 is a course for non-biology majors designed to apply the principles of biology to humans as a functional unit of our social organization. Fundamental principles of humans, as in all living organisms, include physical and chemical properties of life, organization, function, and evolutionary adaptation. This course will explore basic biological concepts in a manner that stresses relevance to the human population by focusing on current issues and should engage the student in thought-provoking analyses to reflect and integrate into societal interactions.

Required Course Textbook and Laboratory Materials

Required Course Textbook

Known for its unique “Special Topic” chapters and emphasis on everyday health concerns, the Fourth Edition of Biology of Humans: Concepts, Applications, and Issues continues to personalize the study of human biology with a conversational writing style, stunning art, abundant applications, and tools to help students develop critical-thinking skills. The authors provide students a practical and friendly introduction for understanding how their bodies function and for preparing them to navigate today’s world of rapidly expanding and shifting health information. Special Note: The lecture textbook has been chosen to participate in the new rental program offered by the University bookstore. Students wanting to save some money may want to check into this new option.

Required Laboratory Materials

How to Redeem Your Lab Kit

Students will be given a purchase voucher from the University bookstore. Students will then visit www.esciencelabs.com/redeem and enter the code you received from your bookstore provider to have your kit shipped to you. Your code will begin with your school’s abbreviation “TAM”
followed by more letters (ie: TANXXXXXXX).

Please contact eScience Labs LLC with any further questions at info@esciencelabs.com or at (303)741-0674.

Standard Processing and Shipping Policy:

Your order will begin processing in our warehouse the day that you redeem your kit. Standard Processing is 3-5 business days. When your kit leaves the eScience Labs LLC warehouse, you will receive an email from UPS with your tracking information on it. Standard Shipping for UPS takes 3-5 business days to ship.

Please Note: The eScience laboratory kit has hand-selected activities that correspond with the coursework (do not include ecology, evolution, and emphasis on prokaryotes, etc.) thus the kit is not one of eScience standardized kits. The only means of purchasing the kit is through the redemption voucher program through the University.

Course Objectives

1. Students will understand and be able to effectively apply biological concepts which relate to their lives in everyday thoughts and decisions.
2. Students will be able to identify the main structures pertaining to the body and its systems.
3. Students will become versed in the basic terminology employed in various specialized fields of biology and to clarify the process of science.
4. Students will be able to discuss recent articles pertaining to an aspect of society and effectively communicate their findings in writing.
5. Students will be able to effectively communicate in a distance learning environment.
6. Students will employ self-discipline and time organization in meeting class requirements.

Student Learning Outcomes

Students will understand the basic structure and function of the organ systems of the human body. As a means to measure the student’s learning in the class, a course pretest and posttest will be given; however, they are merely a measurement of learning and are not calculated into the course grade.

Attendance

As in any class, a vital indicator of a student’s success is attendance, therefore, your presence and participation will be essential. This is an online course so no traditional lecture class attendance or laboratory attendance is required. Virtual classrooms are available to the student through eCollege discussions and communications aiding participation in a distance learning environment.

If students miss an exam or laboratory assignment due to an excused absence, it is the student’s responsibility to contact the instructor so that upon receipt of excused documentation a time might be scheduled to complete the assignment. Students are invited to visit the instructor during
designated office hours or by appointment if a personal meeting is preferred for assistance or discussion.

You have chosen to pursue advanced knowledge and voluntarily committed to this distance learning environment. Your chosen field of study has emphasized the importance of this class as one of your required courses. Your participation and adherence to the course requirements, therefore ultimately, support your personal commitment.

**eCollege Technical Support**

**eCollege Technical Concerns:** Please contact the eCollege HelpDesk, available 24 hours a day, seven days a week, by sending an email directly to helpdesk@online.tamuc.org. You may also reach the HelpDesk by calling (toll-free) 1-866-656-5511 or 720-931-3847 (direct), or through the Online Chat by clicking on the "Tech Support" tab within your eCollege course.

**Obligatory Statements**

Plagiarism is a criminal activity. The student must cite all sources of information. The copying of material, whether parts of sentences, whole sentences, paragraphs, or entire articles, will result in a grade of zero and can result in further disciplinary action. You are being educated to be credible in your field of study. If you plagiarize or cheat, you lose the credibility that is precious to any field. As in any unacceptable behavior, actions are accompanied by a result/consequence. As a consequence of plagiarism or cheating in this course, the result/consequence to your action will be an “F” for the course and could also incur further institutional disciplinary consequences.

All students enrolled at Texas A&M University-Commerce shall follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. This policy is enforced both in traditional and virtual classroom environments. The student should refer to the University’s Student’s Guide Handbook, Polices and Procedures, and Conduct.

The American with Disabilities Act (ADA) is a federal anti-discrimination statute which provides comprehensive civil rights protection for persons with disabilities. Among other aspects, this legislation requires that all students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you have a disability requiring accommodation please contact: Office of Student Disability Resources or Services, Texas A&M University-Commerce, Gee Library, Room 132, phone (903) 886-5150 or (903) 886-5835, fax (903) 468-8148, or email StudentDisabilityServices@tamu-commerce.edu.

**Early Intervention for First-Year Students**

Early intervention for freshmen is designed to communicate the University’s interest in their success and a willingness to participate fully to help students accomplish their academic objectives. The university through faculty advisors and mentors will assist students who may be experiencing difficulty to focus on improvement and course completion. This process will allow students to be knowledgeable about their academic progress early in the semester and will provide faculty and staff with useful data for assisting students and enhancing retention. Grade reports will be mailed by the end of the sixth week of the semester.


Course Grading

**eCollege Discussion Forum**

Students are encouraged to participate in a “virtual learning” classroom environment through weekly discussions; however, participation in this peer learning is *optional* and is not factored into the course grading. The following suggestions are ideas for discussion forums: (1) discuss *one* of the learning objectives noted for the week’s assigned reading(s) on the week’s opening page in eCollege; (2) discuss some aspect presented in the reading that has a personal interest or meaning to you (e.g. disease or condition affecting a family member or friend, how it may relate to your chosen degree, etc.); or (3) highlight a news article or reading that pertains to information presented in the week’s learning. Students are invited to comment on the postings of fellow students which may relate to interesting chapter learning(s) and/or questions for instructor or other students. Student’s postings should reflect good communication and writing skills. All students should remember virtual classrooms comply with the University’s adherence to follow the tenets of common decency and acceptable behavior conducive to a positive learning environment. I will be looking at eCollege daily to answer questions and learn along with each of you.

**Lecture Course Exams**

There will be a total of seven exams (six intermittently throughout the course and the final exam) this semester. The final exam will *not* be comprehensive and will cover only those chapters indicated on the course schedule. The thought-process behind this scheduling was to allow students to have smaller “chunks” of biological information in which to be tested over at one time. The course schedule for exams was created so that the *majority* would be given every other week. A schedule of exam dates and times is provided. I encourage students to place the information on exam dates within view so as to not allow exam dates to be missed and negatively affect their course grade.

Exam study guides for each of the chapters covered in the course this semester can be found within eCollege under *Doc Sharing*. Students should focus their study of the concepts presented on these documents in preparation for exams. Students should work these study guides as they progress through the assigned week’s reading(s). Students who may have difficulty with a question may choose to post the question and answer in the Discussion forum for the week in which the chapter(s) is covered so that other students or the instructor can give guidance if further research is required to arrive at the correct response. *Note:* Once the week of assigned reading has passed, I will not be reviewing discussion board forums.

Students will be permitted to make-up an exam or other assignment, but it will require an *official excuse* as outlined in the University’s Student’s Guide Handbook, Policies and Procedures, and Conduct. All make-up work (e.g. assignments or exams) MUST be taken within two (2) days of the date noted on the student’s official excuse of returning to school. It is the student’s responsibility to provide the instructor with the proper excused documentation and to schedule a time with the instructor to complete the make-up exam and/or assignment. All assignments not taken or not in compliance with excused absences will be recorded as a score of zero.
eCollege Lecture Exam Dates

<table>
<thead>
<tr>
<th>Date</th>
<th>Exam Open</th>
<th>Date</th>
<th>Exam Close</th>
<th>Chapters Covered on Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 9</td>
<td>5:00 a.m.</td>
<td>September 10</td>
<td>11:59 p.m.</td>
<td>Chapter 2, Chapter 3, and Chapter 4</td>
</tr>
<tr>
<td>September 30</td>
<td>5:00 a.m.</td>
<td>October 1</td>
<td>11:59 p.m.</td>
<td>Chapter 19, Chapter 20, and Chapter 21</td>
</tr>
<tr>
<td>October 14</td>
<td>5:00 a.m.</td>
<td>October 15</td>
<td>11:59 p.m.</td>
<td>Chapter 5, Chapter 6, and Chapter 7</td>
</tr>
<tr>
<td>October 28</td>
<td>5:00 a.m.</td>
<td>October 29</td>
<td>11:59 p.m.</td>
<td>Chapter 8, Chapter 9, and Chapter 10</td>
</tr>
<tr>
<td>November 11</td>
<td>5:00 a.m.</td>
<td>November 12</td>
<td>11:59 p.m.</td>
<td>Chapter 11, Chapter 12, and Chapter 13</td>
</tr>
<tr>
<td>November 25</td>
<td>5:00 a.m.</td>
<td>November 26</td>
<td>11:59 p.m.</td>
<td>Chapter 14, Chapter 15, and Chapter 16</td>
</tr>
<tr>
<td>December 9</td>
<td>5:00 a.m.</td>
<td>December 10</td>
<td>11:59 p.m.</td>
<td>Chapter 17 and Chapter 18</td>
</tr>
</tbody>
</table>

Lecture Course Grading

Grade Determination

<table>
<thead>
<tr>
<th>Chapter Tests (Total of 6)</th>
<th>75%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>100%</td>
</tr>
</tbody>
</table>

eScience Laboratory Assignments and Exams

The laboratory portion of the course will be performed “at home” Students should redeem their eScience voucher through the process outlined on pages one and two of the syllabus. There is a CD included with your eScience kit which has each laboratory protocol in a document form. The midterm exam and the final exam for the course will be taken from the introductory information presented for each of the labs. The midterm exam will cover the assigned labs from the beginning of the semester through the laboratory due October 13th (The Scientific Method through Mitosis and Meiosis). The final exam will derive from the laboratory assignment due October 20th (Mendalian Genetics) through the end of the semester. Each of the exams will consist of 25 multiple choice questions in which students will have one hour to complete. The midterm exam is to be taken between Sunday, October 14th and Saturday, October 20th at 11:59 p.m. The final exam is scheduled to be taken between Sunday, December 2nd and 1 Saturday, December 8th at 11:59 p.m. Both the midterm exam and the final exam are located under the tab in the Course Menu of eCollege entitled eScience Laboratory Assignments and Exams.

The first laboratory assignment is due the end of Week 2. If the eScience kits were ordered at the beginning of the coursework as required, all students should have them in ample time to complete. Although the due date for the Week 2 assignment is September 8th, ONLY for this week am I extending to September 15th to accommodate students who may have registered late or did not order their eScience kits at the beginning of the course. The dates on all other laboratory assignments are as noted on the syllabus. For those registering in the class late or were late in ordering their kits, it will just entail extra time devoted Week 3 to catch up.
Each of the eScience laboratory assignments has a due date (please refer to your syllabus for the detailed information on dates and estimated time to complete). These are due Saturday at 11:59 p.m. on the date noted on the syllabus. **All laboratory assignments will be available at the first of the semester** to allow students some flexibility in personal scheduling; however, late assignments will **NOT** be accepted.

**SPECIAL NOTE:**

1. Students should read and understand the section on **Laboratory Safety** and **Good Laboratory Techniques** (Appendix). If you have safety questions about specific chemicals or materials provided with the kit, students should contact the instructor immediately before beginning any experiment.

2. Students should review their eScience kit upon arrival and ensure that all materials required for the assignments are included. If materials are missing, students should contact eScience at the phone number provided on the syllabus. Students are **required** to acknowledge they have read, understand, and agree to comply with the laboratory safety guidelines before progressing with the laboratory assignments. The document should state "I, _________________ have read and understand the laboratory safety guidelines to be employed in the coursework. I further agree to comply with safety guidelines and policies and should I have questions concerning the chemicals or materials utilized in the assignment, I will contact Susan Gossett before proceeding." The document should also include your CWID. It is to be uploaded into the Dropbox under Laboratory Safety.

**Drop Box Assignment Procedure**

For each laboratory assignment, there are pages located within the laboratory protocol from the CD included with the eScience kit in which you will be asked to record your experimental data and respond to specific questions. **SPECIAL NOTE: ONLY** upload the laboratory pages which contain experimental information (e.g. such as tables or requested drawings) or question answer/responses. Do **NOT** include copies of the pages outlining the laboratory information or procedural pages **UNLESS** a portion of them contain some of your experimental data. Students can scan the data/response pages into their computer and then upload to the appropriate drop box (Drop box located in the top header of eCollege). For students who do not have a scanner, they may choose to convert from a pdf format to a Word document; however, please note that graphs and/or drawings will either have to be scanned or may take a picture and upload as a jpeg. The assignments must be complete, thus any omission of the laboratory activity required data will result in lost points.

**Laboratory Activity Questions**

Most of the activities are self-explanatory and should pose no problems in completing. Should students have questions regarding the activities they may call or email eScience:

888 – 375 – 5487  Monday through Friday, 8:00 am – 5:00 a. m. MST
info@esciencelabs.com  Students should receive a response with 24 hours including weekends and holidays.
Laboratory Course Grading

<table>
<thead>
<tr>
<th>Grade Determination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laboratory Assignments (Total of 14)</td>
</tr>
<tr>
<td>Midterm Exam</td>
</tr>
<tr>
<td>Final Exam</td>
</tr>
</tbody>
</table>

Final Course Grade

The final course evaluation will be derived from the lecture grade portion (75%) and your laboratory grade (25%). Please take your assignments and exams seriously; remember they reflect 25% of your final grade for this course. Special Note: As this course is designed to include both textbook and laboratory activities and learning, students must actively participate in both assigned sections to pass the class. Students that do not participate in the laboratory section of the class will be given an “F” at the course end regardless of the grade earned for the online lecture coursework.

Course Grading Scale – Lecture and Laboratory Combined

<table>
<thead>
<tr>
<th>Grade</th>
<th>Score Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>90 - 100</td>
</tr>
<tr>
<td>B</td>
<td>80 - 89</td>
</tr>
<tr>
<td>C</td>
<td>70 - 79</td>
</tr>
<tr>
<td>D</td>
<td>60 - 69</td>
</tr>
<tr>
<td>F</td>
<td>59 or lower</td>
</tr>
</tbody>
</table>

Course Teaching Method

Chapter objectives for the week’s assigned reading(s) will be posted by week on eCollege. Additionally, the accompanying PowerPoint for the chapters is located under the Doc Sharing heading. The textbook and resources have a wealth of information to support your distance learning and success in this course. I will be communicating with you through the eCollege system so you should develop a habit to periodically check eCollege for assignment updates, information, or other course variables. Inherent in any online class is an individuals’ personal dedication. I encourage each of you to develop a habit early in the semester and keep up to date on your reading and studying. If you find yourself in need of assistance, please do not hesitate to stop by and visit with me. If you haven’t already done so, familiarize yourself with eCollege usage.

Academic Success Center ...where minds meet

The Academic Success Center (ASC) is focused on providing academic resources to help each student reach their intellectual potential and achieve academic success. They provide excellent resources available on their website to increase your ability to study effectively, facilitate time management strategies, and enhance your learning. The Academic Success Center also offers on campus tutoring. Please visit their website for more information: http://asc@tamuc.edu
## Course Schedule of Lecture Assignments

*Note:* Learning objectives for each of the assigned chapters are located on the assigned week’s homepage in eCollege.

<table>
<thead>
<tr>
<th>Week</th>
<th>Assignment Due Date</th>
<th>Class Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>September 1</td>
<td>Introduction to Course, Syllabus Review, Class Introduction, and eCollege Tutorial (if not already taken), and Course Tutorial</td>
</tr>
<tr>
<td>1</td>
<td>September 1</td>
<td><strong>Course Pretest (Required)</strong></td>
</tr>
<tr>
<td>1</td>
<td>September 1</td>
<td>Chapter 2—Chemistry Comes to Life</td>
</tr>
<tr>
<td></td>
<td>September 1</td>
<td>Chapter 2a—Food Safety and Defense</td>
</tr>
<tr>
<td>2</td>
<td>September 8</td>
<td>Chapter 3—The Cell</td>
</tr>
<tr>
<td>2</td>
<td>September 8</td>
<td>Chapter 4—Body Organization and Homeostasis</td>
</tr>
<tr>
<td>3</td>
<td>September 10</td>
<td><strong>Test I over Chapter 2, Chapter 3, and Chapter 4 Scheduled to be taken September 9th or September 10th</strong></td>
</tr>
<tr>
<td>3</td>
<td>September 15</td>
<td>Chapter 19—Chromosomes and Cell Division</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 19a—Stem Cells—A Repair Kit for the Body</td>
</tr>
<tr>
<td>4</td>
<td>September 22</td>
<td>Chapter 20—Genetics and Human Inheritance</td>
</tr>
<tr>
<td>4</td>
<td>September 22</td>
<td>Chapter 21—DNA and Biotechnology</td>
</tr>
<tr>
<td>5</td>
<td>September 29</td>
<td>Chapter 21a—Cancer</td>
</tr>
<tr>
<td>5</td>
<td>September 29</td>
<td>Chapter 5—The Skeletal System</td>
</tr>
<tr>
<td>6</td>
<td>October 1</td>
<td><strong>Test II over Chapter 19, Chapter 20, and Chapter 21 Scheduled to be taken September 30th or October 1st</strong></td>
</tr>
<tr>
<td>6</td>
<td>October 6</td>
<td>Chapter 6—The Muscular System</td>
</tr>
<tr>
<td>7</td>
<td>October 13</td>
<td>Chapter 7—Neurons: The Matter of the Mind</td>
</tr>
<tr>
<td>7</td>
<td>October 13</td>
<td>Chapter 8—The Nervous System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 8a—Drugs and the Mind</td>
</tr>
<tr>
<td>8</td>
<td>October 15</td>
<td><strong>Test III over Chapter 5, Chapter 6, and Chapter 7 Scheduled to be taken October 14th or October 15th</strong></td>
</tr>
<tr>
<td>8</td>
<td>October 20</td>
<td>Chapter 9—Sensory Systems</td>
</tr>
<tr>
<td>9</td>
<td>October 27</td>
<td>Chapter 10—The Endocrine System</td>
</tr>
<tr>
<td>9</td>
<td>October 27</td>
<td>Chapter 10a—Diabetes Mellitus</td>
</tr>
<tr>
<td>10</td>
<td>October 29</td>
<td>Chapter 11—Blood</td>
</tr>
<tr>
<td>10</td>
<td>November 3</td>
<td>Chapter 12—The Cardiovascular and Lymphatic Systems</td>
</tr>
<tr>
<td></td>
<td>November 3</td>
<td>Chapter 12a—Cardiovascular Disease</td>
</tr>
<tr>
<td>11</td>
<td>November 10</td>
<td>Chapter 13—Body Defense Mechanisms</td>
</tr>
<tr>
<td>11</td>
<td>November 10</td>
<td>Chapter 13a—Infectious Diseases</td>
</tr>
<tr>
<td>12</td>
<td>November 12</td>
<td><strong>Test V over Chapter 11, Chapter 12, and Chapter 13 Scheduled to be taken November 11th or November 12th</strong></td>
</tr>
<tr>
<td>12</td>
<td>November 17</td>
<td>Chapter 15—The Digestive System</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chapter 15a—Nutrition and Weight Control</td>
</tr>
</tbody>
</table>
13 November 24  Chapter 16—The Urinary System
13 November 24  Chapter 17—Reproductive Systems
14 November 26  Test VI over Chapter 14, Chapter 15, and Chapter 16
                  Scheduled to be taken November 25th or November 26th
14 December 1  Chapter 17a—Sexually Transmitted Diseases and AIDS
15 December 8  Chapter 18—Development throughout Life including 18a—Autism
                  Spectrum Disorders
16 December 8  Course Posttest (Required)
16 December 10 Final Exam over Chapter 17 and Chapter 18
                  Scheduled to be taken December 9th or December 10th
* The instructor reserves the right to administer revisions to the class schedule if circumstances require.

### eScience Laboratory Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Due Date</th>
<th>Laboratory Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>September 8</td>
<td>Lab 1: The Scientific Method</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 1 hour</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Concepts to explore:</strong> Testable observations, Hypothesis, Null hypothesis, Experimental approach, Variables, Controls</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Experiments</strong> This lab includes several critical thinking activities that test student knowledge of the scientific method. No materials are required.</td>
</tr>
<tr>
<td>3</td>
<td>September 15</td>
<td>Lab 5: The Chemistry of Life</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 1 hour (plus 24 hours preparation time)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Concepts to explore:</strong> Atoms, Elements, Compounds, Chemical bonds, Molecules/Macromolecules, Energy and metabolism, Acids and bases, The effects of surface area and volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Experiments</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experiment 1: What Household Substances are Acidic or Basic?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Students use pH paper to test a variety of household substances to determine their acidity. Vinegar and sodium bicarbonate are provided as controls.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experiment 2: The Effect of Surface Area and Volume</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Students prepare agar blocks stained with an acid indicator, place various size/shape blocks into a beaker of vinegar, and examine the effects of surface area to volume ratios on the diffusion of vinegar into the block.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Lab 10: Cell Structure &amp; Function</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Time:</strong> 1 hour (plus 24 hours for observation)</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Concepts to explore:</strong> What is a cell?, Prokaryotes, Eukaryotes, Cell structure, Function of cell structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Experiments</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Experiment 1: Identifying Cell Structures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Students identify and label parts of the cell.</td>
</tr>
</tbody>
</table>
Experiment 2: Create a Cell
  • Students make models of plant and animal cells and incorporate household items to use as cell structures.

4 September 22  Lab 6: Diffusion
Time: 1.5 hours
Concepts to explore: Diffusion, Rate of diffusion, Direction of diffusion, Concentration gradient, Membrane permeability, Dialysis
Experiments
Experiment 1: Diffusion through a Liquid
  • Students observe the diffusion of two dyes of known molecular weights through a viscous medium and calculate the rate of diffusion for each.
Experiment 2: Concentration Gradients and Membrane Permeability
  • Utilizing a dialysis bag, students observe the directional movement of glucose and starch through the selectively permeable membrane.

5 September 29  Lab 7: Osmosis
Time: 1 hour (plus 3 hours for observation)
Concepts to explore: Osmosis, Hypertonic, Isotonic, Osmotic pressure
Experiments
Experiment 1: Direction and Concentration Gradients
  • Students investigate the effect of solute concentrations on osmosis using a semi-permeable membrane.
Experiment 2: Tonicity and the Plant Cell
  • Students explore the effects of tonicity in a biological system using potatoes.

6 October 6  Lab 13: DNA & RNA
Time: 2 hours
Concepts to explore: DNA structure, Nucleotides, Amino acids, Proteins, Genetic code, Mutation, RNA, Transcription, translation
Experiments
Experiment 1: Coding
  • Students use beads to understand how DNA can code for nucleotides.
Experiment 2: Transcription and Translation
  • Students use beads to create codons and amino acids.
Experiment 3: DNA Extraction
  • Students extract DNA from a piece of soft fruit.

7 October 13  Lab 11: Mitosis
Time: 1 hour
Concepts to explore: Chromosomes, Cell cycle, Mitosis, Interphase, Metaphase, Anaphase, Telophase, cytokinesis
Experiments
Experiment 1: Observation of Mitosis in a Plant Cell
  • Students examine digital slide photos of an onion root tip slide and identify the number of cells in each stage of mitosis.
Lab 12: Meiosis  
**Time:** 1.5 hours  
**Concepts to explore:** Meiosis, Diploid cells, Haploid cells, Chromosomal crossover  
**Experiments**  
Experiment 1: Following Chromosomal DNA Movement  
Students use Pop-It beads to simulate the movement of chromosomes through the stages of meiosis.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
</table>
| 8 October 20 | **Laboratory Mid-Term Exam**  
Scheduled to be taken October 14 until October 20th at 11:59 p.m.                          |

8 October 20  
**Lab 14: Mendelian Genetics**  
**Time:** 1.5 hours  
**Concepts to explore:** Gregor Mendel, Law of segregation, Homozygous, Heterozygous, Independent assortment, Dominant vs. recessive, Incomplete dominance, Co-dominance, Genotype, Phenotype, Monohybrid cross, Dihybrid cross, Punnett square  
**Experiments**  
Experiment 1: Punnett Square Crosses  
• Students set up and complete Punnett square crosses, based on their random selection of beads from a beaker (representing genotypes of the parents).

9 October 27  
**Lab 24: Structure**  
**Time:** 1 hour (plus 7 additional days for observation)  
**Concepts to explore:** Tissue, Organs, Organ systems, integumentary system, Skeletal system, Muscular system  
**Experiments**  
Experiment 1: Examining the Multiple Cell Layers of the Skin  
• Students view digital slide pictures of the skin.  
Experiment 2: Investigating Compact vs. Spongy bone  
• Students view digital slide pictures of compact and spongy bone.  
Experiment 3: Calcium in Bones  
• Students examine the effect of heat and acid on the structural integrity of bone.  
Experiment 4: Muscle Structure  
• Students view digital slide pictures of smooth, skeletal, and cardiac muscle.  
Experiment 5: Agonists and Antagonists  
• Students investigate the muscles that work together to articulate movements of the body.

10 November 3  
**Lab 8: Respiration**  
**Time:** 1 hour (plus 2 hours preparation time)  
**Concepts to explore:** Cellular energy, Respiration, Anaerobic respiration, Aerobic respiration  
**Experiments**  
Experiment 1: Fermentation by Yeast  
• Students investigate rate of respiration in the presence of five
carbohydrates, measured by CO2 production.

Experiment 2: Aerobic Respiration in Beans
- Students evaluate respiration in beans by comparing CO2 production between germinated and non-germinated beans.

11 November 10  Lab 9: Enzymes
**Time:** 1 hour (plus 2 hours preparation time)
**Concepts to explore:** Enzymes, Selectivity, Catalysts, Activation energy, Activation site, Reaction sites, Activators, Inhibitors

**Experiments**
- **Experiment 1: Effect of Enzyme Concentration**
  - Students investigate the effects of catalase concentration on the amount of oxygen produced by yeast cells mixed with H2O2.
- **Experiment 2: Effect of temperature on Enzyme Activity**
  - Students study the role of temperature in enzyme function.
- **Experiment 3: Enzymes in Food**
  - Students identify foods that contain the enzyme amylase.

12 November 17  Lab 26: Nervous & Sensory System
**Time:** 1.5 hours
**Concepts to explore:** Nervous system, Sensory system, Neurons, Glial Cells, Dendrites, Axons, Synapse, CNS, PNS, ANS, Somatic Nervous System

**Experiments**
- **Experiment 1: Observation of a Neuron**
  - Students view digital slide pictures of a neuron
- **Experiment 2: Limits and Capabilities of the Eye**
  - Students measure the near point and experiment with after images.
- **Experiment 3: Limits and Capabilities of the Skin**
  - Students examine which areas of the body are most sensitive.
- **Experiment 4: Brain Mapping**
  - Students map out the brain using a swim cap.

13 December 1  Lab 25: Circulatory & Respiratory System
**Time:** 1 hour
**Concepts to explore:** Circulatory system, The heart, Blood, Respiration, Respiratory System

**Experiments**
- **Experiment 1: Mechanism of Breathing**
  - Students explore how changing the volume of the intrapleural space can alter the relative pressure, forcing the lungs to expand or contract.
- **Experiment 2: Breathing Measurements**
  - Students measure the circumference of their chest after exhalation and inhalation, and calculate their resting breathing rate.
- **Experiment 3: Observation of Blood**

14 December 8  Laboratory Final Exam
**Scheduled to be taken December 2nd until December 8th at 11:59 p.m.**