

TITLE OF UNIT

Biology Unit 1 – Cells and DNA Technology, Introduction to Biology Unit 1
Central Question: *What's on the outside? What's on the inside?*

TEXTS

Biology Concepts and Applications, by Cecile Starr, *The Double Helix*, by James D. Watson

TIME ESTIMATE FOR THIS UNIT

This unit is designed to take one quarter. Even though the number of days in a quarter may differ and classes learn at different rates, it won't be a problem because the four units are contiguous and those who finish earlier can continue on with the next unit. The final projects can be completed even if the final point of each class is slightly different. For the faster classes, more detail can be added at each step. For the slower classes, use less detail.

UNIT OBJECTIVES

- To work as individuals and as a part of a small group
 - To develop responsibility for one's part in a group
 - To acquire familiarity with biological systems
 - To understand the function of cells and their organelles
 - To increase one's comfort level with reading, note taking and presenting
 - To enhance research skills
 - To display the importance of thought and creativity in learning
 - To learn the importance of observation and critical thinking in science
 - To consider the role of science in our lives and how it has affected our perceptions
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EXPLANATION OF UNIT

With their first project, the students should begin to think about organization in cells, tissues, organs and organisms in relation to the world. They will be learning about DNA, RNA, and proteins as well as the mechanisms whereby information is passed from one to the other. They should look at how scientists approach a question or problem, especially how they analyze and describe the system of study. They will be responsible for taking notes, both in their binder and at the overhead. In this way, they will be responsible for learning how to be good observers, listeners, and note takers. In addition, it is important to allow the students to express their questions and doubts since that is an integral part of being a scientist. "Why?" is one of the most important questions in science because it provokes thought. Their project also includes group work, which is necessary in science as well. It is important for students to learn how to work within a group, organize their information, and present it in a clear fashion so that others can understand what they've learned.

NOTES:

- Inform the students that they are required to keep an individual binder where they will take notes during the class and keep all of their work and readings. Their binder should be organized in the following sections: vocabulary, notes, labs, readings, essays, projects, tests/quizzes, and journals. Each of the entries into each section should be dated and should be placed in the section according to date. The teacher will check the binders every three weeks (lessons 15, 30 and 45) during all units throughout the school year. The student will be given credit for having an organized binder with ALL of the work included in it. The vocabulary section of the binder should keep track of the new vocabulary encountered in class. They will be responsible for learning this vocabulary because it is key to understanding the concepts they will encounter this year. Biology has its own language and if the students don't understand the language they will not understand the concepts. You will have the students find and look up the meaning of word roots, prefixes and suffixes in order to get a better understanding of how scientific words are put together. They will be tested on this vocabulary during the exercises, as well as the quizzes or exams.
- There should also be a class folder in which data pertaining to the whole class is kept. It should be located where all the students can find it (in the front of the classroom, perhaps) so that they will always have

access to notes when they have been absent. This is where the official note taker for the day, the person who takes notes on the overhead, will place their notes when they have finished.

- Every lecture, the teacher will randomly choose one student to take notes on the overhead. Throughout the quarter, every student will take notes at least once. The teacher will keep track of who has taken notes in her grade book. No student will take notes a second time until every student has gone at least once. Tell students they will be helping each other to become better note takers by giving each other suggestions about what they can improve and praising each other for what they have done well. This not only helps the person at the overhead, but it helps the rest of the students in the class who will be taking notes with them.
- Students will be graded on daily performance, handouts, laboratory experiments and reports, quizzes or exams, essays, as well as the final project, which is a DNA murder mystery in this unit. Give them an overview of the project during the first class and more details later.
- During the first day of classes, the teacher should hand out a syllabus for the unit. There is a sample syllabus in the Appendix of Additional Materials section of the ESubjects web site if you would like to have an example to follow when you create the syllabus. You can use the Biology Outline found in the teacher curriculum portion of our site to create the outline for the unit, semester or the year. You should ask the students to take the syllabus home and have their parent/guardian sign it.
- In these lessons, the Cecile Starr *Biology Concepts and Applications* textbook is being used as source material. You may not have this particular text, in which case any textbook with similar material will do. If you have another textbook, look for images with similar concepts and visuals or use materials from the web sites listed in the lesson plans to match those discussed in these lessons.
- Included in this unit is the independent reading, *The Double Helix* by James Watson. The students should begin reading this book and have it completed by the time the class reaches lesson 23, where they will be required to write an evaluation essay about the book.
- Student groups need to be assigned at the beginning of each quarter. Do it now even though you do not know the students. Tell students they may choose their groups the next time they switch. The group members should remain the same for the quarter unless there are major problems within the group. It is important for the teacher to try to match students that are strong in different areas. In this way, each student will be able to use their strengths to help the others in their group. The function of the assigned groups is for the students to learn how to work well with their peers (including students they may find it difficult to work with) and share responsibilities, which will enable them to work successfully in a group. A skill they will need for the rest of their lives! It is important for the teacher to decide upon the group members too because sometimes you get great groups when the students are allowed to choose, but it leaves out the ones who need more help. In addition, it is important to learn to work with people you like and especially those you don't. It is an integral part of life.
- Make sure you sign up in advance for computer time or laboratory space for the days where it is required (see top of Lesson 1).

FOCUS AND MOTIVATE STUDENTS – WARM-UP ACTIVITY

Each lesson will begin with the review of a homework assignment or with an in-class activity to focus or motivate the students.

ACTIVITIES – INDIVIDUAL AND GROUP – BASIC GUIDELINES FOR INDIVIDUAL AND GROUP ACTIVITIES

1. Because they are sophomores, they should be accustomed to working in groups. Therefore, split the class into groups of 4–5 students. These groups will remain together throughout the unit, unless there are real problems or a change for the final project is desired.
2. Three minutes before the end of each class period have students collect all papers and notes to be graded that evening by the teacher and handed back the next day. Students should then place their papers in the appropriate section of their binders. Make sure to have the official note taker for the day place the notes in the class binder so that absent students can access missed materials.

- Give the students as much autonomy/responsibility for completing their work as possible. They have their assignments and their responsibilities as individuals and as a part of the group. Be as flexible as possible and use terminology and examples the students can relate to.

GROUP ROLES

These will be the roles and their function for the year unless otherwise stated in the lesson.

Recorder – The recorder for each group will be responsible for making sure all written records are complete and handed in. He or she does not have to write everything, just make sure all writing activities are assigned to someone and are completed.

Facilitator – The facilitator will guide the group through each activity and keep group members focused on the current task. If an assignment has to be located on the computer, the facilitator will be prepared to look it up as class starts so the group does not have to wait.

Illustrator – The illustrator will be responsible for making sure all drawings, graphics, maps, and the like are turned in when due and that the whole set is completed and turned in with the full project by the final date of the project. The illustrator is also responsible for supervising the overall display for the group presentation.

Manager – The manager is responsible for getting rulers, markers, colored pencils, and other materials the group needs and for notifying the teacher when the group needs materials that are not available in the classroom. If the group needs to check a book out of the library, the manager will get it.

COGNITIVE OBJECTIVES

KNOWLEDGE	The knowledge students have will be drawn out in brainstorming and broadened as they learn about cells and their organelles as well as transfer of information from DNA to RNA to proteins in order for a cell to do its work, as well how a cell reproduces itself.
COMPREHENSION	Their comprehension will be indicated through brainstorming, their presentations, and their lab reports.
APPLICATION	They apply their understanding as they take notes and work on the assignments and projects.
ANALYSIS	Through research in and out of class and experimentation in the laboratory they have to analyze concepts, research data, and find their significance.
SYNTHESIS	Synthesis is determined by their imagination, research, reading, listening, note taking, and writing skills, which are developed during the course of this unit. In addition, they will continue strengthening their abilities to work in groups during the class time as well as the laboratories. Most importantly, they will be required to use their critical thinking abilities to analyze, understand, and critique methods and experiments as well as biological concepts.
EVALUATION	Evaluation is achieved in the assignments, lab reports, presentations, exams and final project.

LEARNING STYLES

TYPE OF LEARNER	THIS LEARNER WILL ENJOY
LINGUISTIC	<ul style="list-style-type: none"> Reading, researching, and writing. Giving an oral presentation. Recording data and note taking.
LOGICAL – MATHEMATICAL	<ul style="list-style-type: none"> Looking at the patterns in cells and organelles. Considering the relationships between organelles and biological systems. Incorporating the information with current knowledge. Designing and analyzing data from the experiments.
SPATIAL	<ul style="list-style-type: none"> Visualizing aspects of the cell and creating images representing these aspects. Designing posters and the web page.

MUSICAL	<ul style="list-style-type: none"> • Comparing biological systems with musical scores. • Visualizing the rhythms in cells and nature. • Working with music in the background/classroom.
BODILY – KINESTHETIC	<ul style="list-style-type: none"> • Moving around during the laboratories. • Talking through decisions and acting out the murder mystery scenario. • Creating any props needed for the murder mystery scenario.
INTERPERSONAL	<ul style="list-style-type: none"> • Participating in and facilitating or managing the group. • Helping group mates to work through conflicts. • Acting out the murder mystery scenario.
INTRAPERSONAL	<ul style="list-style-type: none"> • Working on the individual activities. • The responsibility for his/her own work and role within the group. • Having freedom to create.

BEHAVIORAL OBJECTIVES

One of the most important behavioral objectives for this unit is for students to become critical thinkers. They must read, listen, and absorb the concepts that are presented by the teacher or another student. They must learn to be excellent note takers and help others to improve their note taking skills. They must learn to do laboratory experiments in a logical fashion as well as record their data, analyze it, and write a critical report about the data. Students will also be learning and practicing responsibility and organization of their time and work. These are skills they will need throughout high school and life.

DOCUMENTATION FOR PORTFOLIO

Students will be placing their formal final projects, essays, labs, and tests in their portfolio as a demonstration of their mastery of the concepts of biology, technology, writing, reading and thinking skills taught in this class. Their portfolio is never to leave the room. It's a good idea for you to make copies of the group work so each student can put this into his or her individual folder also.

MATERIALS

- For this unit, you and the students will need a Biology textbook and *The Double Helix* by James D. Watson.
- An excellent site with an on-line biology book is located at: <http://gened.emc.maricopa.edu/Bio/BIO181/BIOBK/BioBookTOC.html>.
- For each lesson, the Materials section will let you know if other materials are needed.

TARGET VOCABULARY

In this section, you will find the vocabulary that will be used and/or introduced in that lesson. You may want to post this on the board and have students copy it as they come into the room, while you are taking role and beginning the class. It will help to focus the students and free you up to complete the business of the day.