

Lab Section: _____ Name: _____

Pre-lab Homework Lab 1: Issues in Genetics

1. Briefly define/explain the following terms in your own words. You may use any resource you can find, textbook, website, instructor, etc., but you need to try to use your own words!.
 - Cell:
 - Nucleus:
 - DNA:
 - Gene:
 - Genetic Disorder:
 - Biotechnology: (list some examples)
2. Write a short description of your background in biology. This could include what previous classes you have had, any interesting experiences you have had that relate to biology, or anything that you think is important and related to biology that would help us understand your background.
3. What are your goals for taking this class? Why are you in this class? What do you hope to learn? Is this class a prerequisite for other classes you need for a degree? Which ones?

Name: _____

Date/Lab time: _____

Lab 1: Issues in Genetics**LAB SYNOPSIS:**

- We will address some social issues dealing with biotechnology and society.
- We will be answering questions while watching a video on the Human Genome Project.
- We will review the services offered by the PCC library to aid in researching a topic.

OBJECTIVES: After successfully completing this lab, a student will be able to:

- List characteristics of a topic that make it a good issue.
- Describe several contemporary issues involving genetics.
- Use the resources available at PCC to find information about issues.

Overview:

Biology 102 covers topics of biotechnology (biotech). Due to the nature of biotechnology and its effect on humans, the Earth and other organisms, issues of biotechnology often have moral considerations. Bioethics is the study of controversial ethics that comes from advances in biology and medicine. Bioethicists are concerned with the ethical questions arising from the interactions of biotechnology, medicine, politics, law, and philosophy.

Science is the objective study of natural phenomena. It is concerned with facts, principles, and methods. Bioethics governs what we actually do with the knowledge gained by science.



Figure 1. DNA

Some ethical questions resulting from the knowledge gained by science:

- Is it right for a company to profit from selling cells from a cancer patient? What if those cells are used to cure diseases? Skloot, R. (2010). *The Immortal Life of Henrietta Lacks*. New York, NY: Crown Books.
- If it is ok to clone your deceased dog, is it also ok to make a clone of your deceased child? <http://myfriendagain.com>
- Should infertility treatments resulting in multiple pregnancies (ex. quadruplets, septuplets, octuplets) be given to women, even if this leads to greater risks of birth defects and developmental problems to her unborn children? Manninen, B. A. (2011). Parental, Medical, and Sociological Responsibilities: “Octomom” as a Case Study in the Ethics of Fertility Treatments. *J Clinic Res Bioeth.* <http://www.omicsonline.org/2155-9627/2155-9627-S1-002.pdf?aid=3418>

Exercise 1: Biological Issues

An issue is a topic where people with good background knowledge about the topic disagree about how it should be handled.

1. Within your group, look over and discuss one or more of the questions posed above. Are all group members in agreement as to the answers to these questions? Is there a single answer to these questions?

2. Own your own, come up with 3 other social issues arising from biotech. (these can be from personal experience or from recent media)

3. Compare your list with others in your group. Discuss and/or brainstorm other issues that arise from biotech. Write down those that seem especially interesting.

4. What makes biotech issues different from some other topics covered in biology? (i.e. how different from macromolecules, photosynthesis or the function of lysosomes?)

5. Look over the definition of science in the overview above. Do you think that the field of science is designed in studying issues of ethics?

6. What is the role of non-scientists in the discussion of issues of biotechnology?

7. Do you think it is important for non-scientists to understand the basic concepts in biology when they discuss these issues? Why? Why not?

8. How should the competing interests of industry, politics, the science and society resolve these complicated ethical issues? (This is a big question. You are not expected to have an answer in the format of this class. But the goal of this assignment is to get you thinking about these issues and how they relate to the topics in this course.)

Exercise 2: Miracle Cure?

Video: Miracle Cure? A Decade of the Human Genome. (2010). Runtime 60 min.

“Horizon follows three people, each with a genetic disease, as they go behind the scenes at some of Britain’s leading research labs to find out what the sequencing of the human genome has done for them – and the hope this remarkable project offers all of us.”

1. Three people suffering from genetic disorders are introduced in this first segment – write down their names and why they are a part of this documentary.

Person	Genetic Issue

2. What is the “unique publication” that Sophie visits? What is she looking up?

3. What success did gene therapy have with Reese?

4. How long did it take to map the first human genome? How long does it take now?

5. How are they working on categorizing cancers? What is the goal of this?

6. Why did they put Jellyfish genes in mice?

7. What is a gene chip? What can it tell you?

8. What is the difference in the behavior of the mouse that Tom visits from most of the other mice being studied?

9. What trial is Kevin involved in? When is the trial expected to be completed?

10. What is the trick they are using to try to build a new treatment for cancer?

11. Cystic Fibrosis is caused by a single gene mutation. Why is the genetics of alcoholism so challenging to understand?

Post video questions:

12. Think about the topics that you saw in the video. What do you think is the most interesting topic that was presented in the video? Why do you think it is interesting?

13. If you potentially had a genetic predisposition for a disease like breast cancer or alcoholism would you do a genetic test like the one that Tom completes? Why/Why not? See supplemental below for Angelina Jolie's answer.

Supplemental: Since this video's original airing in 2010:

- January, 2013. The cystic fibrosis gene therapy from the video was unsuccessful. It seems the lungs are very good at preventing the uptake of viruses containing the corrected gene.
- March, 2013. Study into the genomics of cancer has revealed over 80 new gene alleles. People who carry those genes are at a higher risk of breast, prostate and ovarian cancers.
- May, 2013. Based on result of genetic testing, Angelina Jolie undergoes double mastectomy to avoid possibility of developing breast cancer.

Review of PCC's Electronic Resources:

In Biology 101, you had a tour of the PCC library system that was designed to show you how to use the resources available to you.

This short review is to remind you of these resources and to give you some ideas for how to find information about current issues in biology. Do this activity within your group.

1. How can you access magazine articles online through the PCC library website?
2. What do you need to access this from home?
3. What other databases are available for you through the library?
4. What other options do you have for finding information about current issues in biology?
5. How can you access information and web links your instructor(s) post for you?