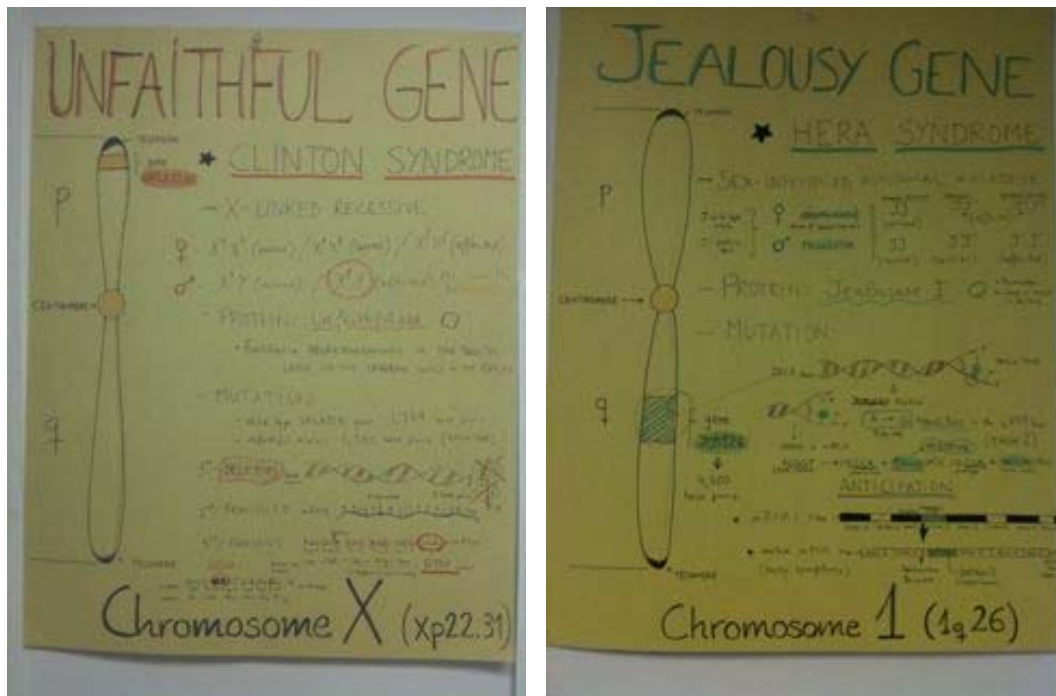


Using a Design a Gene Project to enhance student learning in a non-majors Human Genetics biology class

Kathy Zoghby
University of Richmond
kzoghby@richmond.edu

The idea of this project came from the students themselves. In a class discussion, I asked them the age-old choice of flying, or invisibility as a trait they would like to possess. As a genetics course, I tried to get them to think about what it would mean to be able to fly, or to be able to become invisible. What processes would be involved in expressing these phenotypes? The assignment I am discussing came from this class.

I use team-based learning in this class, so the teams are formed at the beginning of the semester. By the time they are working on this project, they have (for the most part) a highly functioning group dynamic. These projects are highly anticipated, and each team tries to outdo the others, which leads to highly enjoyable and amazing presentations.



These posters were used as evidence in the trial for a divorce. The male figure claimed he could not help himself, and used genetics as evidence. There are many, many examples, and I will discuss some of them as time allows. Over the past 2 years, the students have presented genes for frogs to become princes, The Pinocchio gene, the "I cannot get up for a 9 am class gene", etc. Each semester surprises me, and each semester the students tell me how much these projects helped them put genetics into perspective and help them understand how those nucleotides make them who they are.

TEAM GENE PROJECT

This project is designed for you to apply the concepts learned this semester around the theory of the Central Dogma of Biology: DNA → RNA → Protein → Phenotype.

Your team will come up with a creative expression for this flow of biological information. You need to address each of the following points in your presentation:

In your teams, you will design a gene, and characterize the protein it codes for, characterize the expression of this protein in terms of cells, tissues, timing, etc. How is this protein inherited? What would a pedigree look like if this “disease” affected a family? Etc. This protein will be imaginary, and you can propose different mechanisms of expression, etc, as long as you then compare to “normal” conditions. You will present these projects the last week of classes. You will have time to work on these projects during class or lab – I will let you know when so you can bring your laptops.

The idea is to incorporate as much detail as you can while creating your own, unique protein and building a story around that protein. You cannot change the rules of genetics in your creation – how we inherit genetic information, how genes are turned into protein products, and how proteins can impact the phenotype by disrupting cellular or tissue or organ functions in our bodies.

You may present your project as a poster, as a power point, as a skit, etc. Creativity is welcomed, and in fact, expected. Your team will have 25 minutes for your presentation. You may give quizzes; ask questions of your classmates, etc. The 25 minutes are for you to use as you would like in order to make sure we understand your created gene/protein. As we get closer to the presentations, make sure I am aware of your final presentation format.

Deadlines:

1. March 24th – team discussion and finalize your “protein”
2. March 31st and April 7th - work on project and presentation
3. April 14th – team projects ready and presented to class

This will be your largest team grade. As such, you all need to contribute equally to your team. If you are absent during the planning sessions, this will impact your team, and it will impact the percentage of the grade that you get on this project.

Exploring New Microorganisms

As part of our exploration into microbiology, you and a partner will “discover” a new microorganism and present this discovery to the class. Using everything that you have learned over the semester, each pair will come up with a creative organism to demonstrate the role of microorganisms. The idea is to incorporate as much detail as you can while creating your own, unique microbe and building a story around that microbe. The only rule is that you cannot change the rules of biology in your creation. You may present your project as a poster, as a power point, as a skit, etc. Each pair will have 10-15 minutes for your presentation. You may give quizzes, ask questions of your classmates, etc. The time is free for you to use as you would like in order to make sure we understand your created microbe. As we get closer to the presentations, make sure I am aware of your final presentation format.

Your presentation should describe:

1. The name of the organism
2. The classification of the microbe (bacteria, archaea, fungi, etc.)
3. The morphology (i.e. shape) of the organism, including any surface structures
4. The habitat of the microbe (soil, water, inside an animal, etc.)
5. The basic metabolism of the microbe (autotroph, heterotroph, etc.)
6. Any mechanism of controlling the growth of the organism
7. Any special metabolic processes that the organism is capable of carrying out.

Timeline:

Monday, March 29	Decide on partner and a tentative organism name
Monday, April 12	Turn in a one page summary of your presentation, including format
Monday, April 19-21	Presentation days (order will be randomly assigned)

Each of the first six points above will constitute 10% of the grade for this project, with point 7 being worth 15%. You will receive 5% of the grade for turning in a topic by 3/29 and 10% of your grade for your summary by 4/12. The remaining 10% of your grade will be for the quality of your presentation.

The link for the one group that made a video is:

<http://www.youtube.com/watch?v=CN4AtmPbrKs>