Thinking Critically about Synthetic Biology’s Pros and Cons

Focusing on Intellectual Standards of Logic, Relevance, and Fairness

Earlier this semester you defined synthetic biology based on your research. In Chapter 12, you will read about traditional genetic engineering general, which involves taking genes from one organism and inserting them into another organism’s DNA. Synthetic biology is a new form of genetic engineering. Rather than cutting a physical gene from an organism’s DNA to move it somewhere else, we are now able to use any DNA sequence that is stored in a computer. These could be sequences from real genes in existing organisms, or we can modify them however we imagine, or even design a gene from scratch on a computer. Regardless of where the sequence comes from, we then create physical DNA with the desired sequence and insert it into a living organism. That’s synthetic biology. This makes it possible to create genes that do not exist anywhere in nature, and then add them to an organism. Someday, we could even make entire genomes from scratch.

This synthetic biology could provide a lot of benefits, but it could also produce new dangers. For this assignment, you’ll critically think about the real pros and cons of synthetic biology and draw a conclusion about whether the benefits are worth the risks. For your assignment, you’ll do the following:

1. Very briefly summarize what synthetic biology is as it relates to genetic engineering. Strive for clarity and accuracy.
2. Fairly analyze the pros and cons of synthetic biology using relevant information. (As you write, be aware of how your point-of-view creates bias and try to write objectively).
3. Given the pros and cons, decide how you think we should proceed.

To get started, check out this page from SYNBERC containing a written description of synthetic biology and links to four videos: http://www.synberc.org/what-is-synbio. The first two videos linked from that page are especially good places to start.
But, you’ll need more sources of information to get a balanced perspective and make sure you really know what’s going on. Try to find multiple sources that talk about the same idea so you can consider the information they all present. Practice critical thinking, evaluate the information and arguments you come across. Not all sources are equally reliable.

**Grading rubric:**

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<th>Points</th>
<th>Description</th>
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<tr>
<td>6 Points</td>
<td>detail (precision), and correctness (accuracy) of information</td>
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<tr>
<td>6 Points</td>
<td>Logic, fairness, organization (Do your conclusions flow from the facts?)</td>
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<td>4 Points</td>
<td>Correct use of English, no quotes</td>
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<td>4 Points</td>
<td>At least eight high-quality sources, referenced correctly in APA format</td>
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**CITE YOUR SOURCES!** Giving proper credit means citing them in the text every time you state a fact as well as in your reference section. Your reference section does not count towards the 600 words, everything else does. You will need to cite at least eight sources, and you may need to cite more in order to do a good job addressing the pros and cons with reliable information. For each source, make sure you can identify the author as either a person (or people) or an organization. DO NOT cite Wikipedia. Instead, you could use Wikipedia as a starting place. Who is cited by Wikipedia? Go to those sources and others. The best sources for accurate information are primary sources (firsthand information). Reading multiple sources and comparing them to each other before you write will help you accurately determine the truth. Again, avoid using direct quotes. It’s almost always better to use your own words. Summarizing multiple sources for a single fact makes it easier to use your own words and avoid plagiarism. Just don’t forget to cite them all!

**As before, we’ll be using APA style to cite sources.** The Online Writing Lab (OWL) at Purdue University has amazing resources for learning how to write and cite in APA style. Check it out here: [http://owl.english.purdue.edu/owl/resource/560/01/](http://owl.english.purdue.edu/owl/resource/560/01/)

Since our assignment is so brief (600 words maximum), you do not need a cover page or an abstract.

Each source you use should be cited right in the sentence where you use the information (an in-text citation), and then a longer citation is added to a list at the end of your assignment (your Reference section).
This webpage explains how to cite sources in-text:
http://owl.english.purdue.edu/owl/resource/560/02/

This page explains how to format your list of references at the end of the assignment:
http://owl.english.purdue.edu/owl/resource/560/05/

Example: If you want to point out that giraffes are not green, you might find a source by Graham Smith, who (let’s pretend) wrote an article in 2006 where he records his observation that “giraffes are a dark reddish-brown divided by a reticulated pattern of pale tan that merges in their extremities to form solid tan lower legs and face.” Instead of quoting him, you could write the following sentence in your paper:

Giraffes are not green (Smith, 2006, p. 321).

You would cite this at the end of your paper in your References section like this:

References


Attempting to correctly cite online sources can be very confusing. The OWL has a great page on how to cite electronic sources here: http://owl.english.purdue.edu/owl/resource/560/10/