

## Expository Writing 20: Engineering Life

### Course Overview

Biology traditionally has encompassed the study of organisms and living systems, and as evidenced by the myriad tomes, articles, and symposia devoted to subjects as diverse as microbiology, physiology, and genetics, our knowledge of these and other areas is vast. However, some have predicted that the emerging field of synthetic biology will require us to develop new ways of thinking about, researching, and regulating the science of life. With synthetic biology, a field that uses approaches from genetic, molecular, and computer engineering to construct and redesign “biological parts, devices, and systems,” scientists not only can—but have—reconfigured existing biological components for specific purposes.<sup>1</sup> Currently, for example, researchers are able to create synthetic proteins that destroy cancer cells, are able to extract portions of DNA to provide diagnostics for Zika and Ebola, and are able to engineer microbes to create fuel.<sup>2</sup> One scientist has suggested as a motto for this new field: “Life is what we make it.”<sup>3</sup>

But while the potential benefits of synthetic biology are impressive, the field unsurprisingly has attracted controversy. Scholars have raised such questions as whether synthetic biologists are desecrating the “natural,” and if so, whether this is necessarily harmful. We will explore these queries in our first essay unit, using the following sources to guide our discussion: “The Case Against Perfection” by political philosopher Michael Sandel, “A Bias for the Natural?” by psychologists Kristi Lockhart, Frank C. Keil, and Justine Aw, and “Choosing Disabilities and Enhancements in Children: A Choice Too Far?” by Timothy F. Murphy, whose research focuses on bioethics. For the second essay unit, we will examine scientists’ efforts to resurrect extinct species, a subject that helps us think through the broader critique that synthetic biology is diverting resources from more pressing areas of research. We will draw from a range of sources:

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<sup>1</sup> Committee on Science, Technology, and Law; Policy and Global Affairs; Board on Life Sciences; Division on Earth and Life Sciences; National Academy of Engineering; National Research Council, *Positioning Synthetic Biology to Meet the Challenges of the 21st Century: Summary Report of a Six Academies Symposium Series* (Washington, D.C.: National Academies Press): 7. The report from the National Academies adopts this definition from <http://syntheticbiology.org>.

<sup>2</sup> For an excellent examination of the research on synthetic biology currently being conducted at Harvard, see Jonathan Shaw, “Engineering Life: Synthetic Biology and the Frontiers of Technology,” *Harvard Magazine*, Jan.-Feb. 2020. Accessed Aug. 16, 2021. <https://www.harvardmagazine.com/2020/01/engineering-life-synthetic-biology>. For a more general overview, also see Martin M. Hanczyc, “Engineering Life: A Review of Synthetic Biology,” *Artificial Life* 26, no. 2 (2020): 260–273.

<sup>3</sup> *Positioning Synthetic Biology to Meet the Challenges of the 21st Century*, 8. The scientist who proposed this motto is Huanming Yang, who serves as the director of the Beijing Genomics Institute.

*The Rise of the Necrofauna* by science writer Britt Wray, *Nature's Ghosts* by historian Mark Barrow, and *De-Extinction and the Genomics Revolution: Life on Demand* by Amy Lynn Fletcher, whose most recent research focuses on biotechnology. For the third and final unit, students will devise a research project about the ethics of synthetic biology and will deliver a short presentation about their research to the class.

## Course Goals

In this course, you will learn to build arguments that show a rigorous intellectual engagement with a range of materials. Ideally, by the end of the semester, you will have developed your abilities to think and write critically about pertinent biomedical and social issues. The assignments for this class also are designed to help you identify your strengths as a writer, your scholarly voice, and your intellectual interests.

This class is built on three premises:

- **Writing is a process.** You will take notes on your reading; write and revise response papers; write drafts of your essays; and fully revise those essays. This continued process of drafting and revision is the primary work of this class and is the primary way your writing grows stronger. It is worth noting that while inspiration is the moment we all hope for in our writing, it comes most readily when that inspiration is earned—in other words, when you have dedicated *sustained* effort to that process of reading, thinking, questioning, drafting and revising. This course also will ask you to be reflective about that process and about what you want to accomplish in each assignment.
- **Writing is thinking.** The evolving writing process also allows you to develop your thinking with greater depth and meaning. Writing is one of the best ways to *figure out* your ideas, and so you should expect your ideas and arguments to evolve during the writing process.
- **Writing is a conversation.** When you write, you are often in conversation with the sources you are writing about. You are likewise in conversation with your audience. You will express your ideas in your response papers, drafts and revisions. Your classmates and I will be responding to those ideas, telling you what their strengths are, and where they can grow stronger.

## Grades

The majority of your grade comes from your three papers, according to the following breakdown: the first essay will count for 30 percent of your grade, the second essay for 30 percent, and the third for 30 percent. The standard for each essay also becomes more demanding as we progress because you are building on fundamental skills and techniques with each essay.

Class participation counts for seven percent of your grade and the capstone project at the end of the semester counts for three percent.

### *Grading Rubric*

**A:** A-level writing is excellent work. This is an ambitious, perceptive essay that grapples with interesting, complex ideas, delineates the bounds of the argument, and explores well-chosen evidence revealingly. It provides an insightful thesis that controls the entire essay. An A-level paper also unfolds logically and is structured well with strong topic sentences and transitions. The discussion improves, rather than underscores, the reader's and writer's knowledge (i.e. it doesn't simply repeat what has been taught). There is a context for all the ideas; someone outside the class would be enriched, not confused, by reading the essay. Its beginning provides context for and logically leads into the thesis. Its end is something more than a summary, and it indicates implications, relevance, or future directions. The stakes of the argument are apparent. The language is clean, precise, and often elegant. In sum, the author engages the reader and enhances his or her understanding of the topic at hand.

**B:** B-level writing is good, sometimes very good. There is a thesis present, although it might not be as clear or connected to the body of the essay as it could be. The ideas are solid and progressively explored but some thin patches require more analysis and/or some stray thoughts do not fit in. The language is generally clear and precise but occasionally not. The evidence is relevant, but there may be too little. The context for the evidence also may not be sufficiently explored. There also may be insufficient analysis of the evidence provided. The beginning of the essay might not provide very good context and/or it might make logical jumps between the scope of the context and the scope of the thesis. The structure of the essay might create some confusion for the reader.

**C:** C-level writing is adequate and satisfactory. However, it is a piece of writing that has problems in one of these areas: conception (there's at least one main idea but it's fuzzy and hard to get to); structure (confusing); use of evidence (weak or non-existent--the connections among the ideas and the evidence are not made and/or are presented without context, or add up to platitudes or generalizations); and language (the sentences are often awkward, dependent on unexplained abstractions, sometimes contradict each other). The essay may not move forward but rather may repeat its main points, or it may touch upon many (and apparently unrelated) ideas without exploring any of them in sufficient depth. Punctuation, spelling, grammar, paragraphing, and transitions may be a problem. This essay may be largely a plot summary of the text. It also could be chiefly a personal reaction to something: well-written, but scant intellectual content and mostly opinion or conjecture.

**D:** A D is earned by work that is unsatisfactory and that indicates minimal command of the course materials. Essays of this type are often shorter than they are required to be meaning that they don't engage meaningfully with the ideas. They also could be extremely problematic in many of the areas mentioned above: aims, structure, use of evidence, language, etc.

**F:** F-level work is unsatisfactory and unworthy of course credit. Essays of this type do not address expectations of the assignment.

## **Harvard College Writing Program Policies**

### *Communication*

*Email:* I often use e-mail to communicate course announcements. As part of your participation in the course, I ask that you check your Harvard e-mail account daily; you are responsible for the information I send there.

*Conferences:* We will have three conferences throughout the semester. They will take place in between the first draft and final version of each essay. These conferences are our chance to work closely on your writing and to focus your work in revision. Please come to each conference prepared—having reviewed your essay, considered your questions, and begun to think about revision possibilities and strategies. You should plan on taking notes during our discussions. Since the schedule during conference days is so tight, missed conferences may not be rescheduled. In addition to our formal conferences, you are of course free to come see me during office hours about your developing ideas or to set up another time to meet if office hours aren't convenient.

### *Class Participation*

One of the benefits of Expos is its small class size. That benefit is best realized when every student participates fully in the class; as in any seminar, you learn much more from formulating, articulating, and questioning your own thoughts than from simply listening to what others have to say. Our time together is largely devoted to discussion and small-group work. Therefore, you are responsible for being in class, prepared and on time, each time we meet. "Being prepared" means that you have given careful thought to the reading and writing assigned for the day, and that you are ready to offer ideas and questions to open our discussion.

### *Completion of Work*

Because your Expos course is a planned sequence of writing, you must write all of the assigned essays to pass the course, and you must write them within the schedule of the course—not in the last few days of the semester after you have fallen behind. You will receive a letter reminding you of these requirements, therefore, if you fail to submit at least a substantial draft of an essay by the final due date in that essay unit. The letter will also specify the new date by which you

must submit the late work and be copied to your Resident Dean. If you fail to submit at least a substantial draft of the essay by this new date, and you have not documented a medical problem, you are eligible to be officially excluded from the course and given a failing grade.

### *Attendance*

Because Expos has a shorter semester and fewer class hours than other courses, and because instruction in Expos proceeds by sequential writing activities, your consistent attendance is essential. If you are absent without medical excuse more than twice, you are eligible to be officially excluded from the course and given a failing grade. On the occasion of your second unexcused absence, you will receive a letter warning you of your situation. This letter will also be sent to your Resident Dean, so the College can give you whatever supervision and support you need to complete the course.

Apart from religious holidays, only medical absences can be excused. In the case of a medical problem, you should contact your preceptor before the class to explain, but in any event within 24 hours: otherwise you will be required to provide a note from UHS or another medical official, or your Resident Dean. Absences because of special events such as athletic meets, debates, conferences, and concerts are not excusable absences. If such an event is very important to you, you may decide to take one of your two allowable unexcused absences; but again, you are expected to contact your preceptor beforehand if you will miss a class, or at least within 24 hours. If you wish to attend an event that will put you over the two-absence limit, you should contact your Resident Dean and you must directly petition the Expository Writing Senior Preceptor, who will grant such petitions only in extraordinary circumstances and only when your work in the class has been exemplary.

### *Academic Integrity*

Throughout the semester we will work on the proper use of sources, including how to cite and how to avoid plagiarism. All the work that you submit for this course must be your own, and that work should not make use of outside sources unless that is explicitly part of the assignment. Any student submitting plagiarized work is eligible to fail the course and to be subject to disciplinary action by the Honor Council. You must affirm your awareness of the Harvard Honor Code on all drafts and revisions for this course.

### *Collaboration*

The following kinds of collaboration are permitted in this course: developing or refining ideas in conversation with other students and through peer review of written work (including feedback from Writing Center tutors). If you would like to acknowledge the impact someone had on your essay, it is customary to do this in a footnote at the beginning of the paper. As stated in the Student Handbook, “Students need not acknowledge discussion with others of general

approaches to the assignment or assistance with proofreading.” However, all work submitted for this course must be your own: in other words, writing response papers, drafts or revisions with other students is expressly forbidden.

### *Electronic Submissions*

You will submit at least some of your work electronically this semester. As you send or upload each document, it is your responsibility to ensure that you have saved the document in a form compatible with Microsoft Word. It is also your responsibility to ensure that the file you are sending is not corrupted or damaged. If I cannot open or read the file you have sent, the essay will be subject to a late penalty and may be considered an Honor Council violation.

### *Late Submissions*

Across Expos sections, there is an expectation that you will turn in all assignments on time. Your work will be graded down by half a grade each day it's late – i.e. an A paper will receive an A- if it's one day late, a B+ if it's two days late, and so on.

### *Extensions*

You have one “free” extension per semester and may have an extra 24 hours to submit one paper without penalty.

### *Office Hours*

Office hours will be held from 4:30 to 5:30 PM on Mondays and Wednesdays. Please email me if you would like to meet outside of these times, and I will do my best to accommodate you.

### *Revision Policies*

After our draft conferences, I am happy to have one follow-up meeting to discuss a specific issue in your essay revision, i.e., the introduction and thesis statement, topic sentences, or a paragraph with which you are struggling.

### *Disability Accommodations*

Everyone is welcome in my classroom. If you have any concerns about any issue, great or small, please do not hesitate to reach out to me. If you need disability-related accommodations, please contact the Harvard Accessible Education Office. If you have questions, please visit their website: <http://aeo.fas.harvard.edu>.