## Essay

The ability to chemically synthesize DNA allows synthetic biologists to create DNA with any desired sequence. We can add, delete or rearrange DNA sequences and manipulate both individual genes and entire genomes. For example, the group at the J. Craig Venter Institute has proposed creating a minimal genome; we know that many genes in the *M. genitalium* genome are dispensable when removed individually, but they will synthesize a genome that removes all of those genes simultaneously to determine if they are still dispensable when removed in combination.

Imagine that it is 2024 and you are the head of your own Synthetic Genome Institute. You have the technology to synthesize the genome of any organism you wish. Think about the organization of genomes (How are genes arranged in the genome? What sequences are present in genomes besides protein-coding genes? Are they essential for the organism’s survival? Must they be present in a particular order or arrangement?) You are seeking to investigate these types of questions by creating a synthetic genome.

Please write an essay in proper essay format (introduction, body, conclusion) describing the synthetic genome that you propose to create. The essay should be at least 1 page (12-point font) double spaced.

For full credit, your essay must discuss all of the following:

* what type of genome (prokaryotic, eukaryotic or viral) you are synthesizing
* what aspect of genome structure you are hoping to learn more about and why it is important
* what alterations to the genome you are making and whether those changes will involve only a few genetic elements or the whole genome
* the sequence of steps that you will use to create your synthetic genome
* what type of collaborators you will recruit to the project (a chemist? a computer scientist? a statistician?), what you will ask them to do, and why their participation is crucial to the success of the project