**BIOTECHNOLOGY APPLICATION PROJECT**

Scientists have amazing tools and technologies at their disposal. With our greater understanding of biology and genetics, we are now able to use living organisms to solve some of the problems we face in our modern society. Your assignment is to determine a problem or a need that we face in the 21st century and design a solution using biotechnology.

*Example #1*

*Problem: Increased development leads to increased soil erosion, especially when roads are built, leaving hillsides bare.*

*Solution: Genetically engineered algae with cohesive properties that can be sprayed on affected areas. The algae is cheap to grow in large quantities and easy to apply with minimal impact on the environment.*

*Example #2*

*Problem: Strong, durable materials for use in industry, military-grade armor textiles, etc. are difficult and expensive to manufacture.*

*Solution: Transgenic goats can produce spider silk proteins in their milk. The proteins are extremely durable and easy to separate from the milk to produce threads for further manufacturing.*

The project requirements are as follows:

1. Define the problem.
   1. Who does the problem effect? In what areas is this problem the most prevalent?
   2. What measures are currently in place to address this problem and why are they ineffective/where can they be improved?
   3. What are the constraints to this problem? Example: money, time, labor, resources, etc.
2. Outline the solution.
   1. How does biology play a role in your solution?
   2. Describe the special characteristics of your organism(s). For example, if your organism is transgenic then explain what gene(s) is introduced and describe the process of producing the organism.
   3. Describe the steps of implementing your solution from start to finish.
   4. One of the big selling points of biotechnology is the cost effectiveness of using biological processes to make a product rather than designing machinery to mimic the same effect. How is your solution more cost effective than current/alternative measures?
   5. Another big selling point is minimal negative impacts on the environment. How is your solution eco-friendly?
   6. Are there any ethical concerns with your chosen solution? If so, please address the concern.
3. Provide a visual aid. Ideas include:

* A 3-D model illustrating what your solution will look like once implemented.
* A diagram illustrating the process of creating your transgenic/genetically manipulated organism.
* A flow chart of the implementation process for your solution.
* Some kind of “before and after” that demonstrates the efficacy of your solution.

1. Share your sources.
   1. Include a reference page with at least FIVE credible sources in APA format.

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|  | **Score** | | | | |
| **Criteria** | **5** | **4** | **3** | **2** | **1-0** |
| **Problem (x2)** | **Well defined with all 3 requirements thoroughly addressed.** | **Defined with all 3 requirements sufficiently addressed.** | **Somewhat defined with all 3 requirements addressed.** | **Unclear with only some requirements addressed.** | **Inaccurate or confusing. Most requirements missing.** |
| **Solution (x3)** | **All components are thorough and scientifically sound.** | **Most components are thorough and scientifically sound.** | **Some required components lack detail and/or are inaccurate.** | **Many required components lack detail and/or are inaccurate.** | **Most required components lack detail and/or are inaccurate.** |
| **Visual Aid** | **Visual is meaningful and well made.** |  | **Visual is somewhat meaningful and well made.** |  | **Visual is irrelevant/ inaccurate. Sloppily made.** |
| **Effort** | **Project clearly demonstrates thoughtful effort.** |  | **Project demonstrates satisfactory effort.** |  | **Project demonstrates a lack of effort.** |
| **Presentation (x2)** | **Presentation sells the solution. Thoughtful, well-rehearsed.** | **Presentation is thoughtful, rehearsed.** | **Presentation is rehearsed. May lack substance.** | **Presentation lacks thought and preparation.** | **Presentation incomplete or fails to address the assignment.** |
| **TOTAL** | **\_\_\_\_\_\_\_\_\_/45** | | | | |

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| **GROUP SCORE SHEET** | | |
| **Students** | **Initial Score** | **Final Score** |
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**RUBRIC**