



### Experimental Design Activity

**Work through the following examples for more understanding on the different methods of experimental design.**

*A new procedure is being tested at a national laboratory for restoring a patient's tissue after suffering tissue loss as a result of severe burns. The idea is that cells can be taken from the patient's healthy skin, and later grown on a spider web-like material that can be implanted at the injury site. However, the timeline for how quickly this design can regrow viable tissue is in question.*

Research (Experiment) Question: *What is the timeline (how long does it take) for cells grown on the web-like structure to become viable skin tissue?*

#### **Scientific Method**

Based on this question, create a hypothesis for a scientific method based experiment. Remember, the scientific method is based on proving (or disproving) that a certain assumption (hypothesis) is true. (Hint: Choose a particular target time for your hypothesis, which will prove to be either true or false)

#### ***Hypothesis:***

For your hypothesis, list below the variables that you will need to measure to prove/disprove your hypothesis. Using the information from 'Experimental Design Definitions' document, label each variable as dependent or independent.

#### ***Variables:***

Using the variables listed above, briefly list out a set of steps you will use as an experiment to evaluate your hypothesis. Consider the following questions: 1) What do I have to measure/observe and how will I make this measurement? 2) How will I change the independent variable to observe changes in the dependent variables? 3) How many times should I repeat these steps?

#### ***Experimental Plan:***



### **Engineering Design Method**

Based on the research question above, create a design goal that will inform your experiment design. Remember, when creating an engineering design goal, you are attempting to discover a set of conditions under which a certain idea is true. (Hint: Given a particular target time (goal), what conditions must my variables meet in order to fulfill this goal?)

### ***Design Goal(s):***

Based on the design goals listed above, what are the variables that you must consider? Please label which variables you will change (independent) and which ones you will observe (dependent) to evaluate your progress toward the design goals.

### ***Variables:***

Given the design goal(s) and variables you can manipulate to achieve this goal, please briefly list a set of experiments that you will conduct to observe the interaction between your variables. Remember, a key component of engineering design is the incorporation of feedback. How will the results from your first experiment inform what you do for your second experiment? Include a plan for incorporating feedback in your list below. How many times will you evaluate each step to ensure proper representation of your data?

### ***Experimental Plan:***

Discuss your experimental design plans with your research mentor, comparing and contrasting the approaches for scientific and engineering design methods. What type of research will be conducted for your research experience?