# Goal: Design Experiments for Testing

## Research Due: October 5, 2020

## Sample Design Due: November 2, 2020

## Instructions

1. Research methods for testing material, composite, and structural strength
2. Design experimentation methods
   1. Clean, step-by-step instructions for setting up experiments and executing them
   2. Determine what objective and repeatable data we have to collect
   3. Determine what material properties should be collected and what our control case is for various experiments
3. Create mechanical 3D printed parts (e.g. inserts and gears) and verify our chosen samples and test beds

## Comments

* Document your research as you go: your thoughts, hypotheses, ideas for experiments, 3D parts, etc.
* Experiment research
  + Take note of the mathematical and physical analyses - we’d like to add these to our own analysis
  + Relevant graphs and existing data are HUGE as they can help us verify our testing methods
* Designing experiments
  + Be diligent and self-critique as we will have to walk into these labs with these instructions ready to go
  + Scrutinize the experimentation methods and data we’ll be retrieving:
    - Is it repeatable with high accuracy and precision?
    - What are the dimensions of our data? If it’s dimensionless, what does the magnitude represent?
  + Hypothesize before we test:
    - Data is useless if you can’t tell why there may or may not be a trend
    - What trend will the data follow?
    - Why does the data follow that trend?
    - What physics can back up your intuition?
    - Are there equations you can write to prove your thinking?