F25.037 Design Optimization for Fracture Resistance

Overview

3D printing is being increasingly used nowadays as a manufacturing tool to build various everyday use equipment ranging from household items to kids toys among others, enabling convenience of life. The power of this new method of manufacturing can only be fully realized when it is used with design optimization of these components. However, fractures and cracks can appear in these designs if they are not addressed properly during optimization. In this project, we will investigate design optimization techniques, such as topology optimization, which tries to optimize the material placed inside the design domain to provide maximum structural performance to design against fracture. We will also test their practical manufacturability using 3D printers available at the lab.

What the student will DO and LEARN

The student will learn optimization techniques and perform design analysis. They will use codes developed at the lab to perform the computation and finally how to use 3D printers to manufacture the designed components. They will also write reports and prepare presentations based on their research. This training will help the student acquire necessary skill sets early in their academic journey that will provide them with a competitive edge in their future career.

Additional benefits

The students will participate in research group meetings and present their findings at regular intervals improving their scientific communication skills.

Additional qualifications

Previous experience with coding is desired.

This position is partially-funded by NAU's LSAMP program, so acceptance to this position is contingent upon LSAMP-eligibility

Time commitment

6 hrs/week for 30 weeks