UNC CHARLOTTE
The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

UNC Charlotte – Lee College of Engineering Senior Design Program
Company Information

Company Name	UNC Charlotte ME	**Date Submitted**	*11/07/2019*
Project Title	Hierarchical bioinspired structures as potential energy absorbers **(UNCC_ABSORB)**	**Planned Starting Semester**	Spring 2020

Funding:

What is the source of funds that will be used to cover all of the direct costs of this project?
Self/ME Department

Is this source of funds already secured? Yes ___x____ No _____

Technical Contact(s)*

	Technical Contact 1	**Technical Contact 2**	**Technical Contact 3**
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*We would like to have more than one technical contact, so there is a back-up in case of travel, sickness, job re-assignment, etc.

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	**Number**	**Discipline**	**Number**
Mechanical	4	Electrical	0
Computer	0	Systems	0
Other ( )	0		

Project Overview and Requirements:

Description of project and desired staffing.

Natural protective materials always offer insights toward ultra-lightweight, tough, stiff, flexible designs in engineering fields. We may design unprecedented artificial materials via emulating their unique structures. For instance, seashells, consisting of complicated cross-lamellar structures, are acknowledged for one of the toughest body armors in nature. Pomelo peel, known as natural protective barrier for pulp and seed inside, has been proved to be potential impact resistance material owing to its hierarchical structures. In this project, students are required to design several kinds of hierarchical bioinspired structures to obtain good impact resistance and energy absorption performance. An integrated research approach combining structural design, numerical simulation, additive manufacturing and experimental study is considered to comprehensively understand mechanical properties of desired bioinspired structures. Students with solid mechanics and finite element analysis background will be potential candidates for this project.

Expected Deliverables/Results:

Deliverables include:

- Literature review
- CAD and finite element models of the bioinspired structures
- 3D printed bioinspired structures
- Experiment and finite element simulation analysis of the designed structures
- A spreadsheet that compares mechanical properties of different bioinspired designs

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- Interest in structural material design and 3D printing
- Solid mechanics background (good standing in MEGR 2144)
- Familiarity in finite element analysis