***Liquid Crystal/nanoparticle composite materials*. (Mentor: Linda Hirst; co-mentors: Sayantani Ghosh, Jason Hein)** The REU students will work on a project aimed at designing **quantum dot-liquid crystal (QDLC) hybrid materials** via liquid crystalline ligand self-assembly and inter-particle networking. CdSe/Zn quantum dots will be surface functionalized with **custom synthesized liquid-crystalline ligands**, followed by dispersion in nematic liquid crystal. This approach will allow the directed soft assembly of dynamic and optically unique materials in a **switchable matrix**. Such materials can be fluid or gel-like; making them easy to adapt to a variety of applications, and additionally responsive to electric or magnetic-field manipulation *in situ.* The materials we aim to create will have tunable and switchable dielectric properties, specific absorption and emission and can incorporate magnetic and metallic nanoparticles. This interdisciplinary project combines hard and soft condensed matter physics. Having at least one year of introductory physics and some college chemistry, REU students will learn about the fundamental physics of liquid crystal phases and nanomaterials, prepare the composites and carry out materials characterization using fluorescence and polarized microscopy, scanning photoluminescence confocal microscopy and differential scanning calorimetry.