

**Dr. James Girard Summer Undergraduate Research Program  
Faculty Mentor – Project Application**

**Due Date: January 17, 2020 by 5pm**

**Faculty Name: Dr. Mallory Havens**

**Department: Biology**

**Research Project Title: Determining how amino acids in the presence of copper and/or zinc alter amyloid-beta aggregation for insight into drug development for the treatment of Alzheimer's disease**

**Research Project Abstract (Please provide an overview of your project -- this will be shared with students as a project description; maximum 250 words):**

Alzheimer's Disease (AD) is a neurodegenerative disorder that is currently the sixth leading cause of death in the United States. Unfortunately, due to the neurodegeneration of brain cells in AD patients, there are no treatment options currently available that effectively cure or prevent progression of the disease. This project focuses on studying the mechanistic interactions and biochemistry involved in Alzheimer's Disease in an effort to advance drug development in this area. The peptide that will be investigated in this study, the amyloid beta peptide ( $A\beta$ ), has been discovered in high concentrations as aggregated beta sheets, or amyloid plaques, in AD patients. When the brain experiences oxidative stress, this peptide can react with free metal ions such as  $Cu^{2+}$ , to create reactive oxygen species (ROS) that are neurotoxic. This process is initiated by a reduction of  $Cu^{2+}$  to  $Cu^+$  at the active site of  $A\beta$  followed by reaction with oxygen to produce dangerous hydroxyl radicals ( $\bullet OH$ ) via Fenton decomposition. The work being proposed herein focuses on investigating the role of copper/zinc and copper/zinc chelates in amyloid-beta aggregation in an effort to advance drug development technologies for Alzheimer's disease. Amyloid-Beta aggregation will be determined via SDS-PAGE and western blotting. The work proposed here will focus on **AIM 1** of the project description below and expand into zinc in addition to copper.