

**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: Reducing Alzheimer's symptoms in *C. elegans* by reducing the production of reactive oxygen species

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 experimental models that use *Caenorhabditis elegans*. *C. elegans* is a small nematode that can be handled using *in vitro* techniques to provide a full picture of neurotoxicity inside an animal. In this project the student will study how different amino acids affect worm mobility in control and AD worms in the presence of zinc and copper compounds. The results of these studies will be used to better understand the role copper/zinc and copper/zinc chelates in neurotoxicity in an effort to advance drug development technologies for Alzheimer's disease. The work proposed here will focus on AIM 2 of the project description below and expand into zinc in addition to copper.