KCEL Individual Mini-Grant Application

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Grant Title	CrawFly Workshop
What are the basic pedagogical ideas, problems, or questions you will examine during the grant period?	Critical training in neuroscience occurs in the laboratory. In recognition of that, our neuroscience program has emphasized laboratory-based experiments that are suitable for our students to conduct by learning a variety of skills required to become a practicing neuroscientist. Several years ago, the author secured a grant from the NSF to develop innovative laboratory experiences at the undergraduate level in the area of neurophysiology. That effort has resulted in the development and introduction of a set of lab modules into our curriculum. Many of those experiments exploit invertebrate preparations that are relatively inexpensive and tractable in the hands of undergraduate students. Invertebrates, owing to the principles of evolution are equally suitable to demonstrating universal neurobiological mechanisms while obviating some of the practical and ethical issues encountered when using vertebrates. This proposal seeks funding for the author to attend and actively participate in a week-long workshop called CrawFly, hosted by Cornell University in Ithaca NY from June 18-22. Faculty from around the world who work on popular and cutting edge neuroscience techniques in invertebrates will lead the workshop. Participants will spend a majority of the time in the laboratory working through all of the procedural details needed to set up and conduct those experiments when they return to their home campus. This workshop is well timed to advance our neurophysiology curriculum to the next stage by adapting some of these techniques to our context.
Please describe what course(s) you will focus on during the mini-grant period and how you anticipate incorporating the mini-grant project into that course or those courses.	Neurobiology (BIO384), the flagship upper level requirement of the neuroscience program has an intensive laboratory experience. This course is typically offered once every fall and is taught by the author. The emphasis of the laboratory component of the course is on recording of physiological signals in in vitro and in vivo preparations to demonstrate fundamental principles in bioelectrical signaling, cellular communication and systems-level behavior. Introduction of modern research approaches that have only recently been adapted to teaching environments would extend the repertoire of technical skills mastered (hopefully!) by our students and broaden the number of concepts made clearer by hands-on experiences. For example, the recent advent of optogenetics, a technique that entails genetically inserting light-activated ion channels into neurons a brain site-specific fashion, has revolutionized the field. This course trains participants to apply that technique in a Drosophila (fruit fly) model.

What work will be accomplished during the grant period? Supply a brief plan of work.	It is anticipated that attending and participating in the worksh op will constitute a small portion of the total work. The majori ty of the effort will occur over the following two years, which i s an estimate of the period of time necessary to adapt what was learned to work in the hands of our students, with the r esources that are already available at Gustavus. The goal would be to introduce two new labs, one per year. That work will consist of setting up the equipment, piloting the labs, and writing the procedures and assignments that will be provide d to the students.
How will you measure the outcomes and impact on teaching and learning of your work during this grant period? Please be specific about methodology, assessment techniques, and evaluation of student learning.	Each laboratory module is directly complementary, and in sy nchrony, with the material being discussed in lecture. Each s tresses the parallel development of multiple skills that includ e preparation of biological tissue for recording bioelectrical e vents using electrodes and transducers, digital sampling, m anipulation of electronic and mechanical devices, and applic ation of a variety of software-driven analytical, graphical and statistical tools common to the field. The final product is a s ubmission adhering to the style and format of a peer-review ed article similar to ones being read and discussed in the le cture session. For some writing assignments, a draft is sub mitted, and students are permitted to respond to revisions s uggested by the instructor or peers. The instructor works cl osely with students throughout all phases of the process. T hat intimacy, along with the written work, provides frequent a nd clear windows into the progress of each student. In additi on, each unit exam includes questions that in order to addre ss fully require students to integrate what they have learned in the laboratory.
Anticipated project completion date?	June 18-22, 2015
Upload Mini-grant budget form here.	FerragamoMini-grantBudgetFormRevised.xls