Biology

Contract	Term	Course	Contract Title	Description
376082	Spring 2018	BIOL 2206K	Stopping Hydrilla- The perfect invasive species	The project I will be working on this semester concerns an invasive aquatic plant species, Hydrilla. This species is causing a number of different types of problems in the waterways all across the United States. Recently we have seen the species starting to appear in parts of Georgia that were formerly clear of this species. Hydrilla causes problems for boats try to navigate the waterways, it is wreaking havoc on the naturally occurring plants and animals, and it is even posing a threat to hydroelectric power sources. Since this plant has no natural predator in the United States, it has been thriving. This project will include collecting samples of Hydrilla and performing various tests on it. These tests include seeing what type of substrate Hydrilla grows best in, how "drying out" periods affect these plants, and what types of biological or chemical means can be used in order to kill it. My main area of interest is on a biological way of maintaining and possibly killing off Hydrilla. This has proven difficult for many researchers and companies such as Georgia Power. If a biological solution is unattainable, I will continue my search for a way to rid our waterways of this pest through chemical means. This will prove to be more of a challenge as I will have to select a chemical that can kill Hydrilla without killing any other plants or animals and without contaminating the water, if at all possible.
374082	Spring 2018	BIOL 2206K	Collecting and Studying Hydrilla	This project will include the collection and observation of an invasive species. Hydrilla is an invasive species in the United States and little is known about it. The first step will be to collect samples and grow them at the school. This project will look at the tubers and the turons, the budding pieces, separately to find out why it is so successful. The hydrilla will be tested in different substrates to see if that has any effect on how well it grows. In addition we will reduce water levels to observe its success in drought. The turons will undergo testing to observe how quickly and efficiently they reproduce and what conditions may speed up or reduce the process.
374083	Spring 2018	BIOL 2207K	Observing and Identifying Bats	Dr. Hanson and I will go to a nearby bridge to catch, identify, and record the bat species living under it.
379092	Spring 2018	BIOL 3215K	A Literature Review on the Applications of Unnatural Amino Acids	Amino acids are the basic building blocks for the formation of proteins. Proteins are the most diverse macromolecules in terms of its functionality in the cells. The properties of proteins have been extensively studied, and this knowledge has allowed researchers to develop methods to predict the function of a protein based on the linear amino acid sequences of a protein. Scientists have also developed a library of genes that codes for the synthesis of polypeptides, and these genes are also associated with the functions of its responsible polypeptides. Aside from research on polypeptides that are synthesized from 20 known natural amino acids, there is also an extensive area of research on the uses of unnatural amino acids. The structure of an amino acid consists of an R-group, carboxyl and amino groups, and a hydrogen attached to the same carbon. Scientists have developed a way manipulating the basic structure of amino acids to include R groups that are not found in nature. Unnatural amino acids are used widely in the field of enzyme kinetics, protein stability, and novel proteins that exhibit interesting properties. In this project, a literature review on the history, development, and uses of the unnatural amino acids will be formed using current peer-reviewed articles regarding the topics of unnatural amino acids.
376083	Spring 2018	BIOL 3215K	Honey: An ironic approach to treating diabetic nephropathy	Having been personally impacted by diabetes, I can say that this disease needs to be contained and stopped as soon as possible. The project I am wishing to conduct involves looking at the effects that honey can have human kidney cells in a normal environment versus kidney cells in a hyperglycemic environment. I will be involved in taking care of the cells and providing them with the basic needs of survival. I will then measure the health of the cells through various means, such as studying the rate of cell division and how well the colony of cells as a whole is carrying out their normal processes.
380082	Spring 2018	BIOL 3216K	Genetics Variations	In Genetics, Dr. Burgess is our professor. For the Honor's contract, the Honor's group will be organizing, collecting. and observing different plant specimens from various countries. There are numerous amounts of specimens that need to be processed for different research studies. This is relevant to present and future research because of biodiversity, medicinal uses, and even artificial selection. By processing and collecting these specimens, I will take a glimpse insidr the world of a geneticist.

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379097	Spring 2018	BIOL 3215K	Measuring Astrocyte Viability when exposed to Acetone and Histamine	Through the course of this project, an astrocyte culture will be exposed to differing concentrations of histamine and acetone. In current literature, histamine is known to cause an excitatory response within the brain and further acts to provide protection in neurons, specifically astrocytes. Although its mechanism has been detailed extensively, its effects on viability has not been explored. Further, polar solvents such as dimethyl sulfoxide have been shown to damage neurons. Being a polar solvent itself and a more affordable option than more expensive solvents, acetone will be used and incubated in astrocyte culture to observe its effects on the neurons. The astrocytes will be divided into three groups for observation which include a control group, a histamine exposed group, and an acetone exposed group. From these three groups, further division will be made in delivering the concentrations of the solvents to the astrocytes. These concentrations will be determined based on current experimental methods gathered from similar research projects in literature. To measure astrocyte viability, a trypan B stain will be performed to differentiate living and dead astrocytes through observation under a microscope. The dead cells and living cells will be summarily counted using a cell counter.
379091	Spring 2018	BIOL 3216K	DNA Barcoding the Flora of Ecuador	The forests of Ecuador are known for their high levels of diversity and endemism, classifying the country as a biodiversity hotspot. Ecuador has one of the greatest densities of species per area of any country on Earth: it occupies only 0.2% of the Earth's land mass but possesses 10% of its plant species (Rios et al. 2007). Both the western Amazon and Andean montane forests are richly populated with tropical tree species that, unfortunately, have been little studied. Dr. Kevin Burgess's lab along with collaborators from Pontificia Universidad Católica del Ecuador are attempting to expand current knowledge of the flora of Ecuador by using DNA barcoding. DNA barcoding has been widely used to address questions in ecology, evolution, and conservation biology (Losos 1996; Hebert et al. 2003; Valentini et al. 2008; Chen et al. 2010; Erickson et al. 2014; Muscarella et al. 2014). Currently, the Burgess Lab is working on six projects in both Amazonian and Andean Ecuador that involve diverse flora from woody species and orchids to traditional uses of plants by indigenous people. Outcomes from these projects will vastly increase global plant biodiversity knowledge and encourage researchers to combine multiple fields of study including taxonomic, phylogenetic, and ethnobotanical information in order to provide new perspectives to these fields. These research projects will also facilitate the building of a DNA barcode sequence library that will enable future barcoding applications not only for the Burgess Lab but for researchers worldwide.
382082	Spring 2018	BIOL 3216K	DNA Barcoding the Flora of Ecuador	As a student with a future career in medicine, I plan to use this experience to observe and further gain an appreciation of genetics in research. Through DNA barcoding, I can better understand heredity and population genetics that may affect my future patients. The forests of Ecuador are known for their high levels of diversity and endemism, classifying the country as a biodiversity hotspot. Ecuador has one of the greatest densities of species per area of any country on Earth: it occupies only 0.2% of the Earth's land mass but possesses 10% of its plant species (Rios et al. 2007). Both the western Amazon and Andean montane forests are richly populated with tropical tree species that, unfortunately, have been little studied. Dr. Kevin Burgess's lab along with collaborators from Pontificia Universidad Católica del Ecuador are attempting to expand current knowledge of the flora of Ecuador by using DNA barcoding. DNA barcoding has been widely used to address questions in ecology, evolution, and conservation biology (Losos 1996; Hebert et al. 2003; Valentini et al. 2008; Chen et al. 2010; Erickson et al. 2014; Muscarella et al. 2014). Currently, the Burgess Lab is working on six projects in both Amazonian and Andean Ecuador that involve diverse flora from woody species and orchids to traditional uses of plants by indigenous people. Outcomes from these projects will vastly increase global plant biodiversity knowledge and encourage researchers to combine multiple fields of study