

# SOfIA Projects 2017

## **Anthropology**

**Faculty: Megan Hinrichsen**

### **Community Health in Chicago and Monmouth**

This project is centered on the development of community health policies to address local health challenges, inspired by The Healthy Chicago 2.0 initiative. This initiative was launched in March 2016 as a four-year plan aimed at improving the well-being of communities in Chicago as well as addressing healthcare inequalities that exist in the city. The plan has ten action areas and was developed with the help of community members. Students working on this SOfIA project will research the particular challenges of health in Chicago as well as Monmouth, Illinois, speak with Public Health officials and community members involved in community health, and examine the local community initiatives to improve health in both locations. Students will use their research to conduct a basic community health assessment for the Monmouth community with suggestions for community-based improvements.

## **Biology**

**Faculty: James Godde**

### **Heigh-ho, Heigh-ho. It's off to work we go! Data mining using bioinformatics.**

Bioinformatics is defined as the science of collecting and analyzing complex biological data using computers. About 5,500 organisms, 90% of which are bacteria, have had their genomes (the complete set of genetic material found in their cells) sequenced in the laboratory. While producing these sequences has become a fairly rapid process, analyzing them is still fairly slow and laborious, so remains largely undone. That means that many of the secrets found in these genomes remain to be discovered and are just sitting there waiting for us to "mine" important information out of them. While my current work is looking for genes that have likely been passed from eukaryotic (nucleated) cells to bacteria throughout the process of evolution, who knows where our projects might lead us in the end? After all, the dwarfs referenced above never know when they are going to uncover a diamond!

## **Chemistry**

**Faculty: Laura Moore and Michael Prinsell**

### **The Chemistry of Baking**

How are pizza dough and bread dough different? Can you use bread dough to make a pretzel? Why is a cupcake soft and tender whereas a pound cake is moist and dense? In this SOfIA project, we will spend a significant amount of our time in the "food chemistry lab," also known as the nutrition lab, exploring these questions. We will make different recipes and adapt some to become our own. We will also examine different components of foods (starch, proteins, fats, and molecules that produce specific flavors) in the chemistry laboratory. All of our experiments (both edible and non-edible) will provide a basis of how scientific research is conducted.

**Faculty: Brad Sturgeon and Lynn Daw (college archivist)**

### **Chemistry Archives**

In 1952 the Monmouth College Chemistry Department hosted ~125 chemistry faculty members on our campus to discuss the “state of chemistry education” in the Midwest. Sixty-four years of meeting documents and photographs were recently donated to the College and will be a featured aspect of the 65th annual meeting to be held at Monmouth College on October 13-14, 2017. During this SOflA project, students and faculty will continue to digitalize archived materials and explore relationships unveiled within the archives. Students will be taught all aspects of maintaining/establishing a digital archive. The faculty leading this project are also interested in “maker spaces” and how 3D printing and laser etching/cutting can be used to bring the archives to life.

Students should have a general interest and aptitude in computers and digital technology. No previous experience is needed. Current digitized documents can be found here:

[http://esr.monmsci.net/wiki/index.php/MACTLAC\\_Archives](http://esr.monmsci.net/wiki/index.php/MACTLAC_Archives)

## **Communications**

**Faculty: Rebecca Buel**

### **Monmouth Forensics Team: Competitive Public Speaking**

Monmouth Forensics is a competitive public speaking team. During this project, students will study the art of public address, oral interpretation, and limited preparation speaking while preparing for the collegiate season.

## **Computer Science**

**Faculty: Logan Mayfield**

### **Analog and Digital Sound Synthesis**

Students will construct hardware and software systems design to synthesize sound and play music. In doing so we will explore the ways in which computing technology can create and interact with music. Students should be ready and willing to dive into some basic programming and explore the construction of computing systems in both a hardware and software setting. No prior programming or computing experience is needed, but you must be willing to tinker and experiment with computers. A solid foundation in math is a plus. Interests and experience in music is also a plus. If you like technology and music and want to create the later with the former, then this might be your project.

## **Economics**

**Faculty: Ramses Armendariz**

### **Let's Take Economics to the Lab!**

Economists create models to make quantitative predictions. However, for a very long time, they could not test the validity nor the accuracy of those models due to the large number of factors that affect people choices. Now, this is not true anymore. There is a sub-field in Economics called Experimental Economics that tests models in highly controlled environments. In this SOfIA project, we will employ the tools of Experimental Economics to test the validity of different models that predict the value of a risky asset as, for example, a lottery ticket.

## **Education**

**Faculty: Tammy LaPrad and Sherry Bair**

### **The Art of Mathematics, and the Mathematics of the Arts.**

Many children and adults go through life thinking mathematics is not something they are good at, or find interesting. But there is often a side of mathematics that they have never experienced or even knew existed. This is the artful, creative side of mathematics. The intent of this SOfIA project is to encourage students to discover the connections between the arts and their own creative thinking processes as they relate the school mathematics they studied in the K-12 classrooms as procedures and skills to master. The instructors will have students challenging their own beliefs about the very nature of mathematics and what it means to do and understand mathematics, as we explore the world of art, music, and the history of all three areas of study.

## **English**

**Faculty: David Wright**

### **The Poet and the Archivist**

Come learn how digging deeply into the past can result in lively, inventive poems in the present. Student writers will have access to research materials at the Warren Co. Historical Society, and those photographs, artifacts, and documents will become material for a set of poems they will draft themselves. Each writer will get a chance to workshop their poetry with Prof. Wright and with their peers. And then we'll present the work present as part of a reading and exhibit. Creative writers, history buffs, and all those interested in seeing how the past is relevant for today will want to sign up.

## **Exercise Science**

**Faculty: Sean Schumm**

### **Health Markers in College Students**

This project will consist of conducting basic health screening measurements on incoming students. These assessments may include basic health measurements related to weight, body composition, and muscular strength. The measurements will be compared to published values and norms. Comparisons will also be made between different groups of students including athletes, non-athletes, and different groups of athletes.

2/23/2017

## **History**

**Faculty: Michelle Damian**

### **An Asian Shipwreck in Lake Erie?**

How did a wooden sailing vessel built in Asia in 1840 end up at the bottom of the Great Lakes after World War Two? Its colorful career included time as trading vessel off the coast of India and later a prison hulk in Australia. Along the way it would sink and rise again. The "Success" sailed into the twentieth century and in a strange twist made its way around the world to the heart of North America bringing images of torture and imprisonment to eager visitors around the lakes. This SOfIA project will explore the Success - its origins, current state, and artifacts that were recovered from the wreck site and preserved in local maritime museums. Students will add to the story by recording information in both manual and digital formats.

**Faculty: Christine Myers**

### **Interdisciplinary Archaeology**

Monmouth College's Archaeology Lab is home to thousands of prehistoric Native American artifacts that were collected in the local area over several decades. While some, like spear points and axe heads, are easy to identify, others are more mysterious. Students working on this SOfIA project will try to determine the use of an unknown object that has stumped trained archaeologists in many countries. Taking an interdisciplinary approach, students will consider the benefits or drawbacks of using chemical testing, DNA analysis, and neutron activation to study the item, along with doing research in anthropology, geology, and history in an attempt to solve this historical puzzle.

## **Mathematics/Statistics**

**Faculty: Mike Sostarecz**

### **Mathematical Modeling with High-Speed Imagery**

Participating students will get the opportunity to learn and work with the College's high-speed camera. The project will combine data collection and analysis with mathematical modeling to explore experiments that occur in very short time frames. The students will be allowed and encouraged to choose the project's direction and focus. Some possibilities include projectile motion, the impact of objects onto solid or fluid surfaces, and the visualization of fluid flow. The ideal student should have taken calculus in high school and have an interest in mathematics, computer science, physics, chemistry, or engineering.

**Faculty: Trevor Richards**

### **Cards, Dice and Lotteries: Exploring the Mathematics Underlying games of Chance**

In this project, participants will use the tools of probability theory to explore games of chance. We will learn how to tell whether a game is fair (mathematically speaking) and develop some playing strategies. Some of the games we will discuss are card games, dice games, coin flipping games, and lotteries. No advanced mathematical background will be necessary or expected.

## **Music**

**Faculty: Jordan Van Dyke**

### **The Physics of Percussion**

We will apply physics to the art of snare drumming. This project should be of interest to students who are interested in percussion or science. The goal of this project is to quantify each stroke of a drum head to analyze a percussionist's playing technique. In order to quantify the drum stroke, a piezoelectric force sensor is inserted into the tip of a pair of marching sticks and connected to an oscilloscope. The waveforms produced are representative of the force and timing of each drum stroke. With this information, the timing and dynamic consistency of a player's strokes can be determined.

## **Physics**

**Faculty: Chris Fasano**

### **Mapping Lightning--Plotting the Strike Path in 4D**

Lightning is a fantastically interesting phenomenon that occurs both on earth and on other planets. The Monmouth College Lightning Research Group is already studying lightning emissions in the X-Ray and Gamma ray region. In this SOfIA project we will build a prototype "LMA" -- a Lightning Mapping Array that will allow us to plot individual strikes using VHF radio signals and fast timing. This will add another dimension to our research and it's the beginning of a long term effort. Students may continue to work on this project as they are interested and inspired. We would love to produce a video like in this <https://www.youtube.com/watch?v=gSj0X3nOVk4>.

**Faculty: Ashwani Kumar**

### **Astrophotography: Monitoring Near Earth Objects**

Astronomical photography can be done for pleasure as well as for scientific purpose. Scientists use these photographs to find out distance, size, temperature, and many more physical properties of the heavenly object. Noted Physicist, Hubble even used such images to estimate the age of the universe. Monmouth College has recently acquired a 20 inch telescope equipped with high resolution camera. During SOfIA program you will learn how to take good quality picture of the heavens and use it for classification of heavenly object. Specifically, you will learn how to identify near earth asteroids (NEAs) and map out their orbit. . According to NASA there are over 11,000 NEAs that have been identified and confirmed. Nearly 1500 of these asteroids are classified as potentially hazardous asteroids (PHAs) i.e. their orbit is within 0.05AU of Earth's orbit and slight change in their orbit may send them to earth. Many observatories over the world keep track of the orbits of many of these asteroids. As a long-term project, you may choose to observe some of PHAs in order to keep orbital predictions up to date and accurate.

## **Psychology**

**Faculty: Kristin Larson**

### **Socializing in Cyberspace: Well-being in the Modern "Third Place"**

For generations, people would meet to socialize in the local coffee shop, park, barber shop or bar (referred to by Oldenburg [1991] as third places). Today, many people get their social contact through social media. Does this mean the end of the informal gathering space in communities? Does contact over social media contribute to well-being in the same way as face-to-face contact? This project will involve both ethnographic and empirical data collection and analysis. We will spend time in some local coffee shops to determine if they still function as a third place.

This project is appropriate for students interested in psychology, sociology, anthropology and communications. Students considering this project find some enjoyment spending hours in a coffee shop. A fondness for coffee is recommended but not required.

**Additional projects may be added in the near future. Check the list when you apply to the program!**