

## **2025 madiSTEM Student Workshop Descriptions**

### **BEATING THE ODDS: FIGURING OUT PROBABILITY**

In this workshop we will play and analyze games and try to figure out how probability works as it relates to rolling dice and calculating how we should make decisions.

### **ARCHAEOLOGISTS: THE ORIGINAL TIME TRAVELERS**

Help archaeologists tell the stories of the past! You'll learn the basic skills that allow us to connect with people from centuries ago, one layer at a time. Using artifacts from sites in Virginia, you'll investigate the daily lives of communities who left their evidence below our feet.

### **COLORFUL CRYSTALS**

We will explore the world-class crystals and fluorescent minerals in the JMU Mineral Museum and look at some of our miniature collection under microscopes. Students will then choose their own crystals and create tiny but beautiful mineral displays in small boxes to take home with them.

### **CUTTING WITH CODE**

We make things out of wood, stone, plastic, and fabric. But first we make them out of numbers and code---on a computer. In this workshop, you'll create your own custom sticker by drawing a design, coding it up in a programming language, and sending it to a programmable cutting tool.

### **DESIGN LAB: UNLEASH YOUR INNER ARCHITECT!**

In this interactive and hands-on workshop, you will become architects and urban planners exploring your ideas to make a neighborhood in Harrisonburg the best place it can be! You will think about the pros and cons and then you will get the chance to dream big and create the world you want to see.

### **GAME MAKERS: BUILD YOUR OWN APP WITH MIT APP INVENTOR!**

Have you ever wanted to create your own game? In this hands-on workshop, you'll learn how to use MIT App Inventor to design and build your very own game app! No coding experience? No problem! We'll guide you step-by-step as you bring your ideas to life. By the end of the session, you'll not only have a game to share with friends but also the confidence to keep creating apps. Let's code, play, and have fun!

### **MAKING SOAP**

At one point in history, soap was heavily taxed and was a luxury item only available to the rich. Now we all use soap everyday as handwashing is one of the most important ways to prevent the spread of disease. In this workshop, we will make soap that you will be able to take with you.

### **MIMICKING BRAIN DISEASE**

Proteins are essential for your body to function. Diseases such as Parkinsons and Alzheimers result in misfolded and aggregated proteins in the brain. This workshop will use common household items to illustrate how environmental conditions can misfold and aggregate proteins.

### **MYSTERIOUS SYMPTOMS**

Medicine is full of mysteries, and it takes a skilled detective to solve them and help patients feel better! Join the JMU Physician Assistant students for an exciting hands-on workshop where you'll use medical tools like stethoscopes and reflex hammers to investigate symptoms and uncover the secrets behind common illnesses.

## **OPERATION STATISTICS**

Come play the game Operation! We will hypothesize which "surgery" has the highest success rate then use statistics and graphs to see if we were right.

## **PLAYING WITH YOUR FOOD**

Have you ever wondered what makes gummy worms gummy? Or why there is guar gum in your jam? Join us and explore the chemistry involved in your daily life! We will learn more about the chemicals that you interact with regularly and harness the power of chemical reactions to make delicious desserts.

## **POSITIVE WIFI**

Prevent Others Stealing your Internet in Five (POSITIVE) on your WIFI. Demonstrate how home networking WiFi and associated internet service can be easily hacked into by strangers if the home network wireless router is not configured correctly.

## **POWER UP! EXPLORING WIND AND SOLAR ENERGY**

Join us for exciting hands-on activities where you'll explore the fascinating world of renewable energy! You'll discover how wind and solar energy can power everyday devices. Choose your experiment: 1. Use a wind turbine to see how wind generates electricity and investigate factors that affect energy output. 2. Experiment with a solar panel setup to explore how electricity is created from sunlight. Measure the energy your setup generates and find out if it's enough to power a small light. Join us to learn about renewable energy science and how you can contribute to a sustainable future!

## **PROGRAMMING WITH FINCH ROBOTS**

Want to stay one step ahead of our robot overlords? Start practicing with adorable Finch robots! In this workshop, we will learn to write Python code to make our Finch robots dance, avoid obstacles, sing, and react to light. Come see why Python is the most popular language for teaching introductory computer science at top-ranked universities. No prior experience is necessary - anyone can learn!

## **SCIENCE SLEUTHS: AN ESCAPE ROOM CHALLENGE**

We must solve a science mystery by finding the best available information on a topic. We will use source evaluation methods called "lateral and vertical reading" to solve the mystery with the help of JMU librarians. You will learn about the SIFT & PICK method of reading, then apply it to ESCAPE the room by unlocking a treasure box. You will learn about the importance of fact-checking while working together in small teams to solve the puzzle.

## **SEEING THE INVISIBLE**

Can you see a cell? What about DNA? In this workshop, you will have hands-on experience extracting DNA, using a microscope, and observing and describing different types of cells. If you are interested in biology or just curious to learn more about DNA and cells, join us for this experience!

## **SKITTLE STATISTICS**

Learn valuable statistical analysis tricks with a fun and tasty twist!

## **THE WHAT'S-INSIDE STATION**

Have you ever wondered what is inside a phone or toaster? So many engineered devices in our daily lives remain a mystery to too many of us! Learn to use hand tools to open up these mystery boxes and take them apart! What are all of those little things inside? Let's figure it out together. Will it be difficult? Maybe, but I am confident you are up for the challenge.

### **WE LIKE TO MOVE IT MOVE IT!**

Walking, running, skiing, all share a mechanical interface between your feet and the ground that is critical to the movement of the rest of your body. Why have barefoot running and minimalist shoes become so popular? In this workshop introducing the field of biomechanics, we will learn how we measure foot pressure, joint movements, and whole-body acceleration during various activities such as running and walking. We will learn how the mechanics of your feet - or your shoes - can impact the loads that the other joints of your body experience.

### **WHAT COLOR IS THAT?**

Did you know that color can be measured? If you know how light makes color and how our eyes see it, you can understand how a color can be given a numerical value so that you can tell everyone exactly what color you want. We will talk about color mixing and play a game.

### **WHAT DOESN'T KILL YOU MAKES YOU STRONGER: VENOMOUS CONE SNAILS AND THE PROMISE OF LIFE-SAVING MEDICINES**

Have you ever heard of fish-hunting snails? Snails are slow moving so how in the world could they ever catch a fast-moving prey? We will learn about a fascinating group of predatory marine animals with beautifully decorated shells and a powerful secret weapon. Cone snails have adapted an ingenious method for capturing fish using a harpoon-like extension that contains poisonous venom. Studying the venom has led to possibilities for new life-saving medicines but we need to study the evolution of the cone snail family.

### **WHO DONE IT? - USING DNA EVIDENCE TO SOLVE A CRIME**

We will use a scientific technique called *gel electrophoresis* to solve the mystery of a missing cell phone. We will also discuss possible careers in DNA science related fields.