



IU SCIENCE FEST

Exploration Guide

2016



Saturday, October 22, 2016
Indiana University Bloomington



INDIANA UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

Office of Science Outreach



Welcome



COLLEGE OF ARTS AND SCIENCES

INDIANA UNIVERSITY
Office of the Executive Dean
Bloomington

Dear Friends of the College and Future Scientists:

Welcome to Science Fest 2016! The College of Arts + Sciences at Indiana University, Bloomington, is pleased once again to open our doors to you, so you can share the excitement and wonder that our faculty and students generate every day.

This year you'll have the chance to experience some literally earth-shaking events. We invite you to visit the Quake Cottage to see what an earthquake feels like or watch our volcano eruption simulator. Or perhaps you'll want to follow the buzz: our Biology Department will teach you about bees and our Speech and Hearing Department will teach you why your ears ring after you hear loud music.

Whatever field you explore, the College of Arts + Sciences is proud to continue a tradition begun more than sixty years ago by our Physics Department. We're excited and proud to open our labs and our minds every year to thousands of visitors who come from around the Midwest so that they can see for themselves why Reuters has ranked IU among the world's most innovative universities.

As you walk across our beautiful campus today, consider that you're treading the very same paths taken by IU's Nobel Prize winners and other eminent scientists. We hope that the demonstrations and discoveries experienced today at Science Fest will inspire you, your students, and your children to come back to our campus one day to conduct trailblazing research and make border-bursting discoveries that change the world.

So, welcome and enjoy.

Larry D. Singell
Executive Dean
College of Arts and Sciences





Paths to Exploration

You'll be amazed by the many activities that will pique your curiosity and challenge your mind.

To assist you in finding your way around campus today, we've created our own "yellow brick road" by using sidewalk chalk and images to identify each building. At the bottom of each activity page you will find an image, this is the image that is chalked on the sidewalk for the building where the activities listed on the page can be found. Follow this legend to a world of science exploration & wonder!



Follow the ORANGE FLASK path to CHEMISTRY



Follow the GREEN PALM LEAF path to JORDAN HALL



Follow the YELLOW SATURN path to KIRKWOOD OBSERVATORY



Follow the BLUE COMPUTER path to LINDLEY HALL



Follow the PINK CLOCK TOWER path to the STUDENT BUILDING



Follow the WHITE ATOM path to SWAIN WEST

Information & Sign-In

We Want to Know How We are Doing – Please Help Us!

As we grow, we want to find ways to improve your experience and count who joins us at Science Fest. You can help us collect this information in two ways:

1. **INFORMATION TABLES** are located in all six buildings. Please sign in so we know you and those you came with are here. If you would like to receive an early notification about next year's Science Fest, provide us with your e-mail as well. This will help us let potential funders know how many people (and what age groups) come to Science Fest.
2. **WANDERING DATA COLLECTORS** will be walking around eager to get your views on Science Fest. If you see them with their clip boards and volunteer Science Fest t-shirts on, please stop by and answer their questions. It will only take one or two minutes and you will be contributing to the Science Fest knowledge base.

****SPECIAL NOTE:** Your participation in answering these questions is completely voluntary. This is not a scientific study, it is an evaluation. All information collected will be aggregated without reference to individuals. There are no known risks. The benefits are potential better Science Fest programming**





Master Schedule

Every building has hands-on activities that run all day that you can do at your leisure. In addition we offer demonstrations, tours, and talks that occur at designated times. **Items in BOLD occur ONLY ONE time**, while everything else listed occurs multiple times throughout the day.

TIME	ACTIVITIES	LOCATIONS
9:30 am	Pokemon LI-GO Physics Demo Electric Fish Demonstration Greenhouse Tour	Swain West 119 Jordan Hall A110 Jordan Hall 139
10:00 am	The Mystery of Chemistry Demo Show Woodlands Tour The Geography of Food Lab (must sign-up)	Chemistry 122 Departs from Environmental Science Table in Jordan Hall Atrium Departs from Geography Table in Jordan Hall Atrium
10:30 am	Electric Fish Demonstration Greenhouse Tour Volcanic Eruption Demo Low Temperature Physics Demo	Jordan Hall A110 Jordan Hall 139 Outside in front of Student Building Swain West 007
11:00 am	Chemistry Research & Facility Tour Woodlands Tour Plants: They Whisper, Talk, and even Move	Outside Chemistry 046 in Atrium Departs from Environmental Science Table in Jordan Hall Atrium Jordan Hall A100
11:30 am	Electric Fish Demonstration Greenhouse Tour Chemistry Research & Facility Tour Volcanic Eruption Demo	Jordan Hall A110 Jordan Hall 139 Outside Chemistry 046 in Atrium Outside in front of Student Building
12:00 pm	Chemistry Research & Facility Tour Woodlands Tour Teacher's Lunch (must sign-up)	Outside Chemistry 046 in Atrium Departs from Environmental Science Table in Jordan Hall Atrium Swain West 251
12:30 pm	Electric Fish Demonstration Greenhouse Tour Chemistry Research & Facility Tour Volcanic Eruption Demo	Jordan Hall A110 Jordan Hall 139 Outside Chemistry 046 in Atrium Outside in front of Student Building
1:00 pm	Chemistry Research & Facility Tour Science Slam Woodlands Tour Meet A Scientist: Paleontologist	Outside Chemistry 046 in Atrium Chemistry 033 Departs from Environmental Science Table in Jordan Hall Atrium WeDigBio Table Jordan Hall Atrium
1:30 pm	Electric Fish Demonstration Greenhouse Tour Chemistry Research & Facility Tour Volcanic Eruption Demo	Jordan Hall A110 Jordan Hall 139 Outside Chemistry 046 in Atrium Outside in front of Student Building
1:45 pm	Pokemon LI-GO Physics Demo Ctr for the Analysis of Socio-Economic Landscapes (must sign-up)	Swain West 119 Departs from Geography Table in Jordan Hall Atrium
2:00 pm	The Mystery of Chemistry Demo Show Chemistry Research & Facility Tour Woodlands Tour	Chemistry 122 Outside Chemistry 046 in Atrium Departs from Environmental Science Table in Jordan Hall Atrium
2:30 pm	Electric Fish Demonstration Greenhouse Tour	Jordan Hall A110 Jordan Hall 139





Campus Food Options

INDIANA MEMORIAL UNION (IMU) — 900 EAST 7TH STREET

Indiana Memorial Union (IMU)

900 East 7th Street



Burger King

Open 8:00 am to 4:00 pm

Charleston Market

Open 7:00 am—11:00 am

Circle Café

Open 6:30 am—5:30 pm

Cyclone Salads

Open 10:30 am to 5:00 pm



Pizza Hut

Open 7:00 am to 11:00 pm

Sakura Sushi and Hot Bowl

Open 7:00 am—7:00 pm



Starbuck's

Open 8:00 am to 3:00 pm



Forest Residence Hall

The Woodland Restaurants

1725 East 3rd Street

The Clubhouse—open 9:00 am to 10:00 pm

This is a sandwich shop where you can build-your-own creation just the way you like it!

The Round—open 9:00 am to midnight

Mostly coffee—they serve Starbucks coffee! You can order flat-breads here and they have a variety of bakery items such as muffins and cheesecake.

The Stone Grill—open 11:00 am to 9:00 pm

The Stone Grill puts an interesting, and way more delicious, spin on the traditional cheeseburger. Vegetarian options available. You pick your toppings. Add French fries or fried green beans to complete your meal.

Romaine—open 11:00 am to 8:00 pm

This restaurant serves salads, soups and fruit! Build-your-own salad!

Caliente—open 11:00 am to 8:00 pm

Is a Mexican restaurant that serves everything from flatbreads to burrito bowls. It is also a build-your-own type of bar offering many different toppings.

Fusion—open 11:00 am to 8:00 pm

Offers an array of international foods. They serve stir-fry, sushi, and much more.

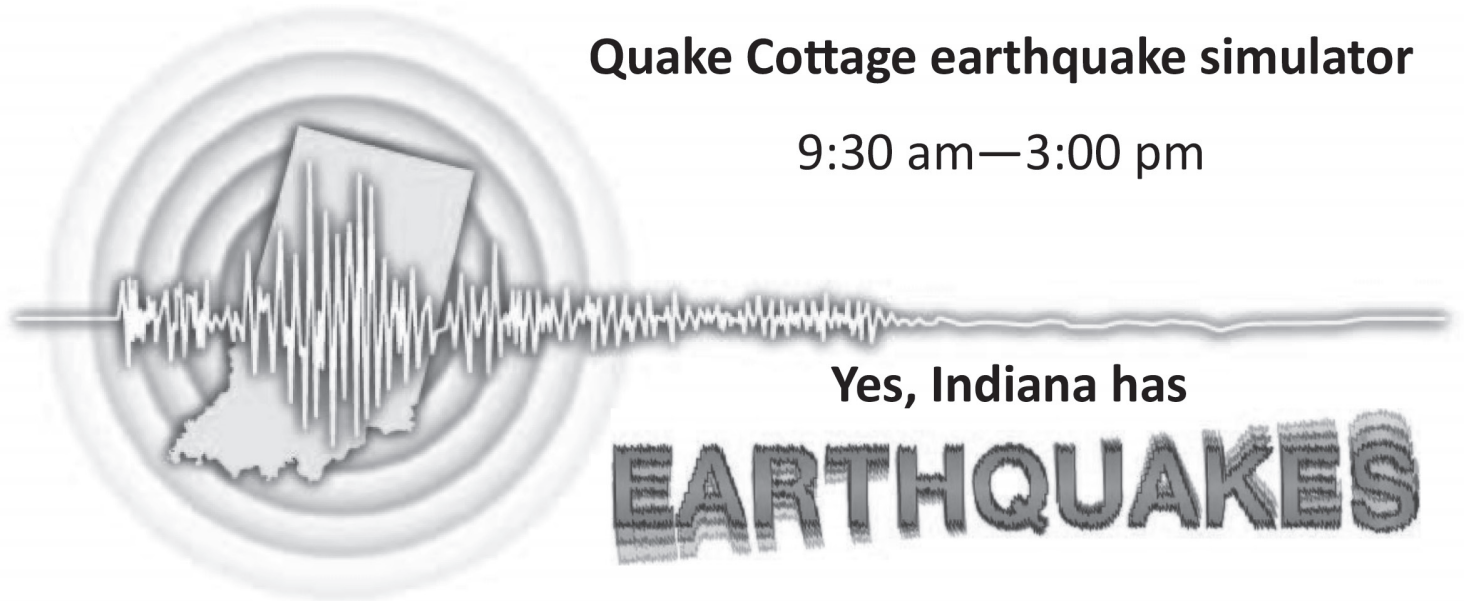
Mangia—open 11:00 am to 9:00 pm

This is an Italian restaurant that serves pizza, pasta, calzones cooked in their brick oven!

Bloomingberry—open 11:00 am to 11:00 pm

Frozen yogurt! You choose your flavor and add your favorite toppings.





Quake Cottage earthquake simulator

9:30 am—3:00 pm

Yes, Indiana has

EARTHQUAKES

Participants 7 years of age & older can experience the shaking of a 3.0 to 7.0 magnitude earthquake.

Must be at least 7 years old with a liability waiver.

Learn about the Hoosier State's shaky past by visiting the Quake Cottage, an earthquake simulator that provides citizens with a safe yet realistic experience of the intense shaking that can occur during an earthquake.

Earthquake Quiz

1. What should you do when you feel the earth shake?
2. Name 3 ways you can prepare for an earthquake:



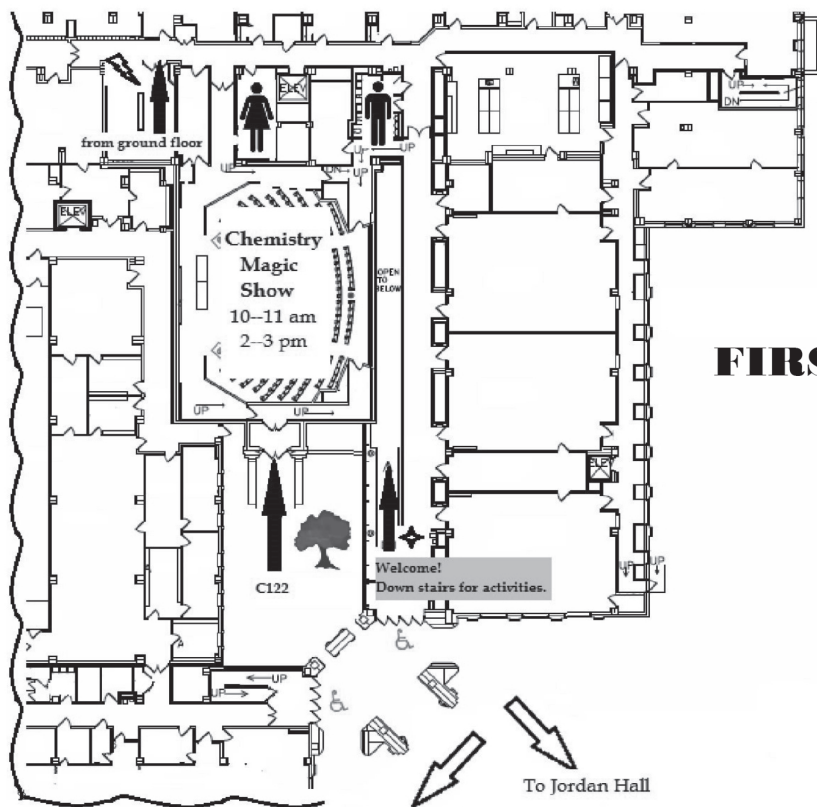
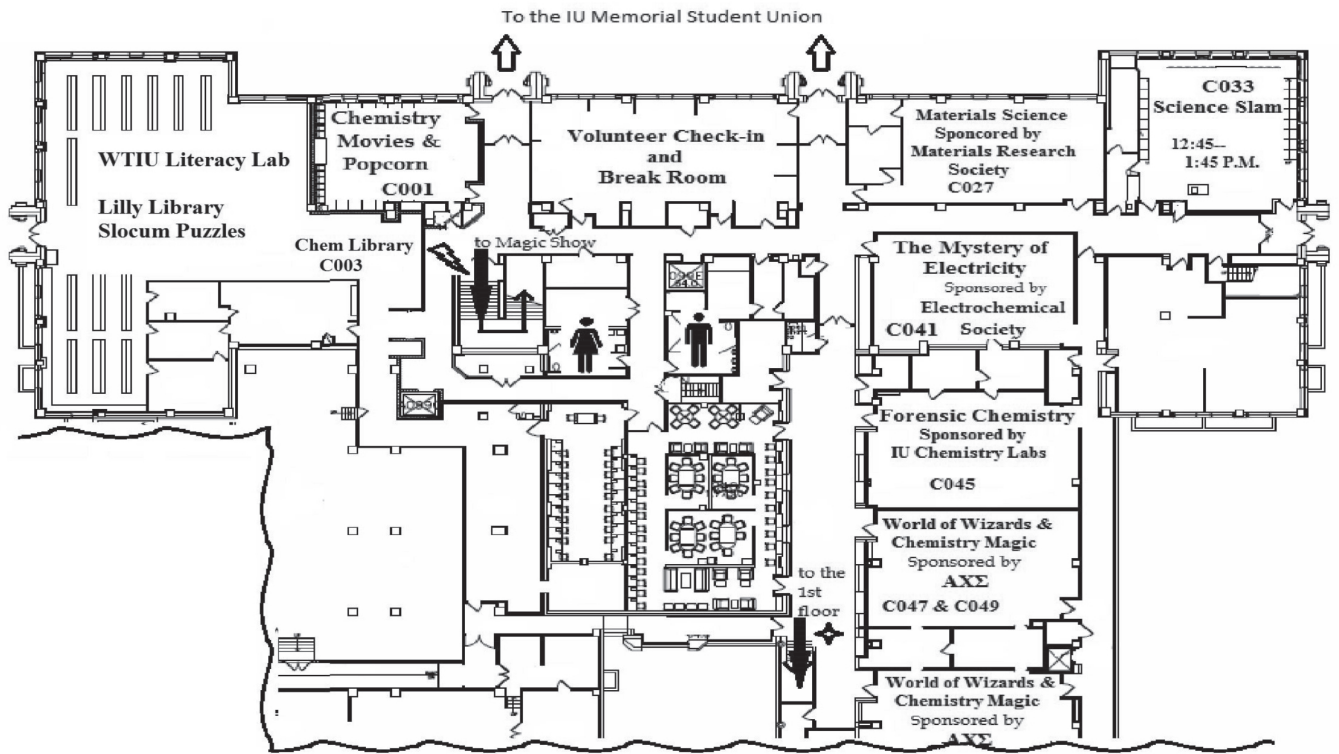
For free educational activities, visit
<http://igs.indiana.edu/>



Chemistry Map

CHEMISTRY BUILDING—800 EAST KIRKWOOD AVENUE

GROUND FLOOR



FIRST FLOOR





Chemistry

CHEMISTRY BUILDING—800 EAST KIRKWOOD AVENUE

HANDS-ON LAB ACTIVITIES

9:00 am—2:00 pm

Chemistry, Room 027

Materials Chemistry

(Materials Research Society)

- Strength of Steel
- Sand and Glass
- Plastics

Chemistry, Room 041

Electrochemistry

(Electrochemical Society)

- Write with electrical ink!
- Counterfeit Coins

Chemistry, Room 045

CSI Chemistry

(Chem Graduate Representatives Committee)

- Finding fingerprints
- Identifying an unknown substance

Chemistry, Room 047 + 049

Science at Hogwarts

(Alpha Chi Sigma professional chemistry fraternity)

- Potions Class
- Studies in Alchemy
- Divinations Class



RESEARCH & FACILITY TOURS

11:00 am—2:00 pm

Please gather in the atrium outside
Chemistry 046 to meet your tour guides!

Tours Include:

Glass Shop—Meet with expert glass blower Don Garvin and see his work in action!

Molecular Structure Center—Meet with Dr. Maren Pink and learn how the IUMSC solves many fun and exciting chemical problems with X-rays and crystals.

Nuclear Magnetic Resonance Facility—Meet Dr. Frank Gao to learn how large magnets can help us see the tiny structure of molecules.

Electron Microscope—Meet with Dr. David Morgan and explore the world of the super small!

Mass Spectrometry Lab—Meet with Dr. Jon Karty to learn how chemists can weigh atoms and identify substances in the world around us.

THE MYSTERY OF CHEMISTRY

DEMO SHOW

Chemistry, Room 122

Enjoy a spooky mystery chemistry demo show where our crime-fighting chemists solve a campus haunting!

Show Times:

10:00 — 11:00 am

2:00 — 3:00 pm





Science Slam

Science Fest Lecture Series presents:

SCIENCE SLAM



1:00 - 2:00 p.m.

Chemistry 033

Please be
seated by
12:45 pm

Four scientists; four topics; 12 minutes to impress you as to why THEIR topic is the coolest. Now is your chance to grade the teacher! Four scientists will compete for the audience's approval, each explaining a topic in just plain English and in only 12 minutes. The audience will determine the slam champion.

Moderator: Dr. Cate Reck

Meet the Contenders:

Special Relativity and Time Dilation

Karna M. Desai, Astronomy

Einstein based his 'Special Theory of Relativity' on two principles, (1) same laws of physics apply equally in all constantly moving frames of reference, and (2) speed of light is always constant and is independent of the motion of the source or the observer. This talk will discuss one of the fascinating effects of these principles, "time dilation." Time slows down for moving objects. Although negligible in our daily lives, these effects are important at the astronomical scale, and understanding these give us a glimpse of the magnificence of the universe.

Aliens Among Us: the Exuberance of Insect biology in South-Central Indiana

Armin Moczek, Biology

Insects are everywhere! They constitute by far the most diverse group of animals on this planet, and affect our lives in many important ways. At the same time, the biology of insects is full of beauty, intricacy, and complexity, and one does not have to go to the Amazon to realize that. In this talk I present three cases that highlight the exuberance of insect behavior, morphology, and communication in South-Central Indiana, taking place literally in our backyards. My goal is to convey some of the splendor of insect biology that surrounds us, how it can be explored and studied by anyone, and how it deserves protection from everyone.

GC-MS Analysis of Fragrances and Flavorings

Jonathan A. Karty, Chemistry

GC-MS is a powerful analytical technique allowing one to identify the components of complex mixtures from gasoline to tap water to possible markers of life on Mars. But can it detect any differences between synthetic and natural vanilla extracts? We will explore the basics of this powerful technique while taking a close look at what comprises an important component of tasty cookies, pancakes, and a multitude of other treats.

What Does Einstein's General Relativity Tell Us about Black Holes?

Shouhong Wang, Mathematics

Both Newton's Law of gravity and Einstein's General Relativity give rise to the existence of the event horizon of a black hole, defined as the point of no return. In this talk, we present the black hole theory derived from Einstein's General Relativity. Then we point out the essential differences between the black hole theory and the viewpoint on black holes from Newton's Law. Amazingly, the black hole theory offers explanations on the formation of stars, galaxies and supernovae explosion.





Slocum Puzzles

CHEMISTRY BUILDING—800 EAST KIRKWOOD AVENUE



Come to The Chemistry Library and experience a selection of hands-on puzzles from the Jerry Slocum Mechanical Puzzle Collection at IU's Lilly Library. Experience the different types of mechanical puzzles that you can find in the full collection of over 32,000 puzzles at the Lilly Library.

Unlike word or jigsaw puzzles, mechanical puzzles are hand-held objects that must be manipulated to achieve a specific goal. Popular examples include the Rubik's cube and tangrams, both of which will be available for you to try. The hands-on puzzles that will be available represent the many different types of mechanical puzzles that exists.

You can try your hand at classic mechanical puzzles or test your wits with a modern mechanical puzzle. You can even try our collection of 3D printed puzzles, and learn about how you can make your own. Our Curator of Puzzles will be at the event to answer questions about mechanical puzzles, the Slocum Mechanical Puzzle Collection and maybe even offer a few hints.

Test your spatial reasoning and critical thinking by having fun and solving with awesome hands-on mechanical puzzles by world renowned puzzle designers. Stop by the Chemistry Library and try some puzzles.

Test Your Puzzle Solving Skills

Here are a few examples of what you might find in the puzzle room!

- ◆ Boxed L-U-V: three dimensional box packing puzzle by Stewart Coffin
- ◆ Engleberg Square: two dimensional tray packing puzzle by Stewart Coffin
- ◆ Few Tile: two dimensional tray packing puzzle by Stewart Coffin
- ◆ FourFit: two dimensional tray packing puzzle by Stewart Coffin (also known as Martins Menace in honor of the late Martin Gardner)
- ◆ Stealth: two dimensional tray packing puzzle by Stewart Coffin
- ◆ Turtle Celt: Impossible puzzle (which seems to defy Newtons Law)
- ◆ Elephant Spin Out: Sequential Move Puzzle
- ◆ Conway Curious Cube: three dimensional packing puzzle designed by John Conway
- ◆ Conways Cursed Cube: three dimensional packing puzzle designed by John Conway
- ◆ Ball Octahedron/Ball Room: three dimensional put-together puzzles
- ◆ Four Ts: two dimensional interlocking puzzle
- ◆ Kumiki Barrel: three dimensional Japanese interlocking puzzle
- ◆ Cast ABC: Cast metal interlocking puzzle from Hanayama
- ◆ Cast Vortex: Cast metal interlocking puzzle from Hanayama
- ◆ Four Piece Jigsaw: Interlocking puzzle by Stewart Coffin
- ◆ A-Mazing Box: cylindrical maze sequential move puzzle
- ◆ Apparently Impossible Cube: three dimensional put together puzzle
- ◆ Puzzle Sphere: Interlocking puzzle
- ◆ Coffin's Improved Burr (level 2.3): interlocking burr designed by Stewart Coffin





WTIU Literacy Lab

CHEMISTRY BUILDING—800 EAST KIRKWOOD AVENUE

WTIU Kids



CHEMISTRY LIBRARY

Ground Floor



WTIU invites parents and kids to try out fun and educational PBS KIDS apps that support reading, science, creativity, and math.

Play games with the Odd Squad, Cat in the Hat, Wild Kratts, and all your favorite PBS KIDS characters. Parents can take home free app cards to download games to their own iPad or Android devices.

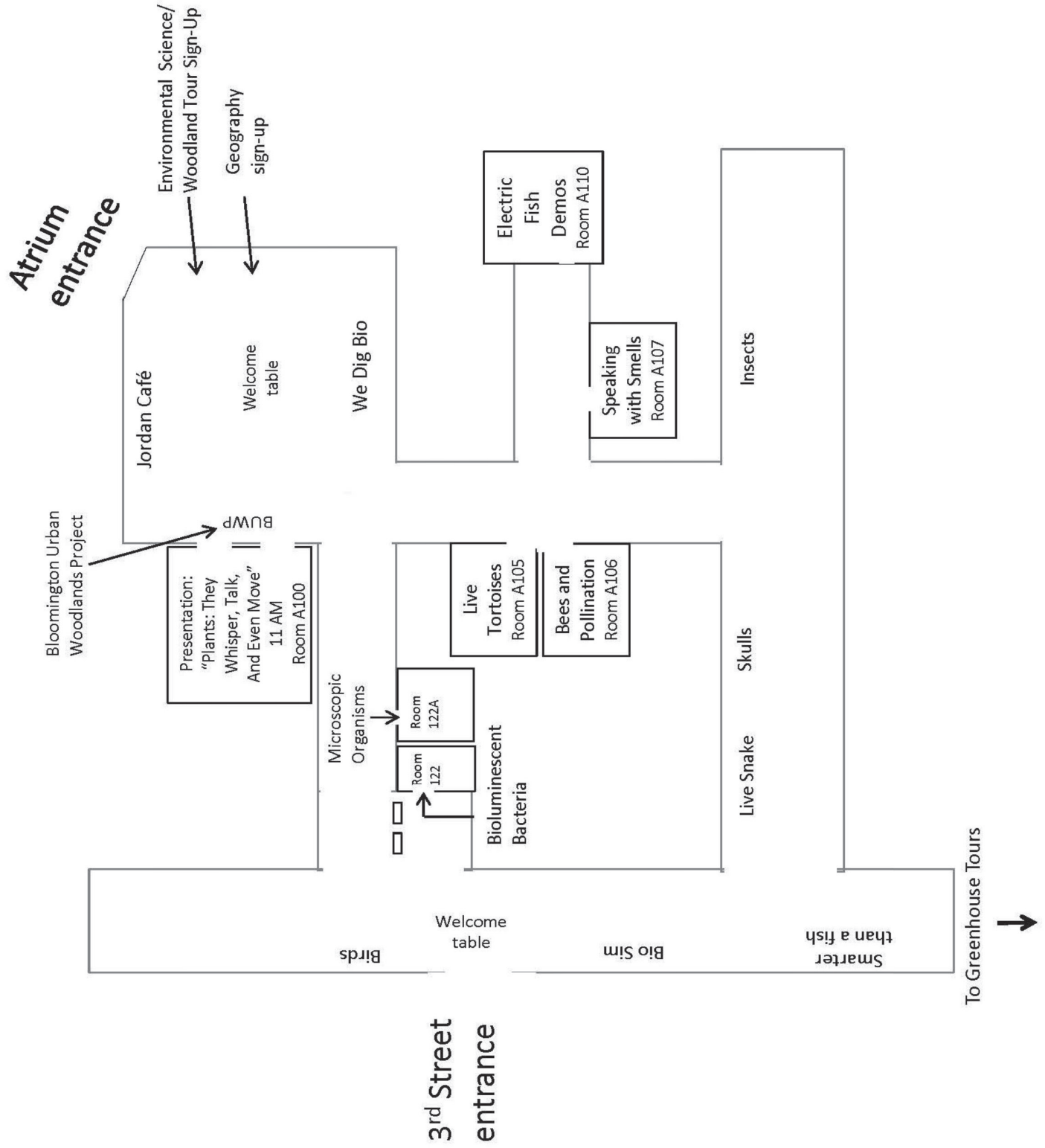




Jordan Hall Map

JORDAN HALL—1001 EAST THIRD STREET

Science Fest 2016 at Jordan Hall





Biology

JORDAN HALL—1001 EAST THIRD STREET

EXPLORATION ACTIVITIES:

1st Floor hallways, classrooms, and greenhouses

Are You Smarter Than A Fish? Learn how fish use their lateral line systems to expertly read water currents, and how this skill may be affected by climate change

Beekeeping and Pollination: Learn about beekeeping and pollination, and make your own bee.



Bioluminescent Bacteria: Experiment with bioluminescent bacteria and watch them glow!



Birds Battle for Boxes: Learn what IU researchers have discovered about how tree swallows and other birds compete for nesting sites, and find out how you can provide safe nest boxes for these birds.

Insects and Insect Killers: Insects are the most diverse group of animals on earth. Learn about their life stages and ecological roles, and see what IU researchers have discovered about the dangers that lurk for insects in our local soils. You'll be amazed by the cooperation and warfare that goes on!

Microscopic Organisms: The world is full of living creatures too small for our eyes to see. Use microscopes to examine this hidden diversity, and learn how these organisms affect our lives!



Skulls: Explore skulls of over 40 species of mammals, and examine how skull form matches function.



Snakes: Meet a friendly snake up close, and learn about the amazing biology of snakes.

Speaking with Smells: Many animals talk to each other using odors, but what do they talk about? Learn how animals use their sense of smell to explore and respond to their environment.



Tortoises: Meet a group of live tortoises and learn about their biology!

ELECTRIC FISH DEMONSTRATIONS:

See a live demo of how fish from South America can use electricity to find their way around - and communicate with each other - in the dark. Meet IU researchers who study these fish, and witness this "secret sense" in action!

Demonstrations will be in
Jordan Hall Rm A110 at:

9:30 am, 10:30 am, 11:30 am, 12:30 pm,
1:30 pm & 2:30 pm

GREENHOUSE TOURS:

See IU's collection of beautiful living plants from around the world, including spectacular rainforest, desert, and carnivorous species!

Guided tours begin at the door to
Jordan Hall, room 139 at:

9:30 am, 10:30 am, 11:30 am,
12:30 pm; 1:30 pm & 2:30 pm

PRESENTATION:

"Plants: They Whisper, Talk, and Even Move"

11:00-11:30am
Jordan Hall A100

Join Biology Professor Roger Hangarter, winner of last year's Science Slam, for a stunning presentation that uses time-lapse photography to illustrate the surprising and dynamic ways that plants respond to their environment.

Jordan Hall Café

Open 9:00 am to 1:00 pm

Here you will find drinks and snack items. This is a grab and go option.





Environmental Science

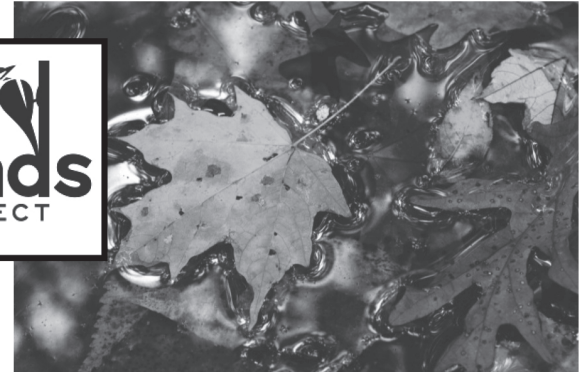
In partnership with the **Bloomington Urban Woodlands Project**

JORDAN HALL—1001 EAST THIRD STREET

Take a half-hour tour of the Woodlands on Campus!

Join students and faculty involved with Environmental Science on campus for a half hour fun and informational walk through Dunn’s Woods. Learn about:

- Woodland ecology
- Campus tree inventory
- History of the campus woodland
- Current research

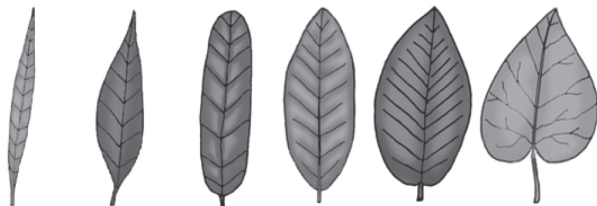


Tour Registration & Times

Sign-up at the Environmental Science table in the Jordan Hall Atrium where tours will depart on the hour, every hour beginning at 10 a.m.

Are you able to identify trees by their leaves?

Stop by the Environmental Science table in the Jordan Hall Atrium to learn leaf ID and test your abilities for a prize!



IU Integrated Program in the Environment

www.environment.indiana.edu

IU Research and Teaching Preserve

www.indiana.edu/~preserve/

Bloomington Urban Woodlands Project

www.sustain.indiana.edu/programs/buwp



INTEGRATED PROGRAM IN THE ENVIRONMENT

INDIANA UNIVERSITY

The administrative office for environmental & sustainability degrees on campus:

- BS Environmental Science
- BA Environmental & Sustainability Studies



INDIANA UNIVERSITY

RESEARCH AND TEACHING PRESERVE
Bloomington

Contact if interested in having your student group take a field trip or tour to experience environmental science research in the field! Activities include:

- Interpretive hikes around University Lake
- Field lab natural history exhibit
- K-12 environmental curriculum workshops





School of Education

JORDAN HALL—1001 EAST THIRD STREET

bioSIM's BUZZ-worthy BeeSim Demonstration

How do honeybees know where to find flowers with the best nectar for making honey?

BeeSim is a fun way to teach complex science to young children through embodied play.

Children in grades K-3 engage with interactive bee puppets to learn about the roles of forager bees and investigate how bees use a special dance to communicate the location of flower nectar to other bee scouts. The students can then use interactive software that offers a third-person perspective on the collected data.



Why Honeybees?

Because they represent a number of complex systems-related concepts and this makes them a great choice for teaching systems thinking.



Big Ideas

- Honeybees accomplish a lot of complicated tasks to survive.
- A bee's body parts each perform a specific function or purpose.
- Random search and inefficient communication do not make effective nectar collection.
- The waggle dance is a complex form of communication.
- Bees take on various roles depending on their maturity level, and all roles are crucial to the success of the hive.

Learn more about BioSim at education.indiana.edu/BioSim

The BioSim project is a collaboration of Drs. Kylie Pepler's Creativity Labs and Joshua Danish's Representations Activity Play and Technology (RAPT) lab, along with Dr. Armin Moczek of the Biology Department, all at Indiana University in Bloomington and is funded through National Science Foundation.





WeDigBio

JORDAN HALL—1001 EAST THIRD STREET



Specimen Transcription

9:00 am—3:00 pm

Meet a Scientist: Paleontologist!

1:00 — 1:30 pm

Have you ever wondered what's inside the cabinets at a natural history museum? Join IU scientists to unlock hidden biological collections with WeDigBio!

WeDigBio, or the Worldwide Engagement for Digitizing Biocollections, is a worldwide digitization event to transcribe fossil, plant, and archaeological specimen images. Try your hand at real science by transcribing specimens from IU's natural history collections.

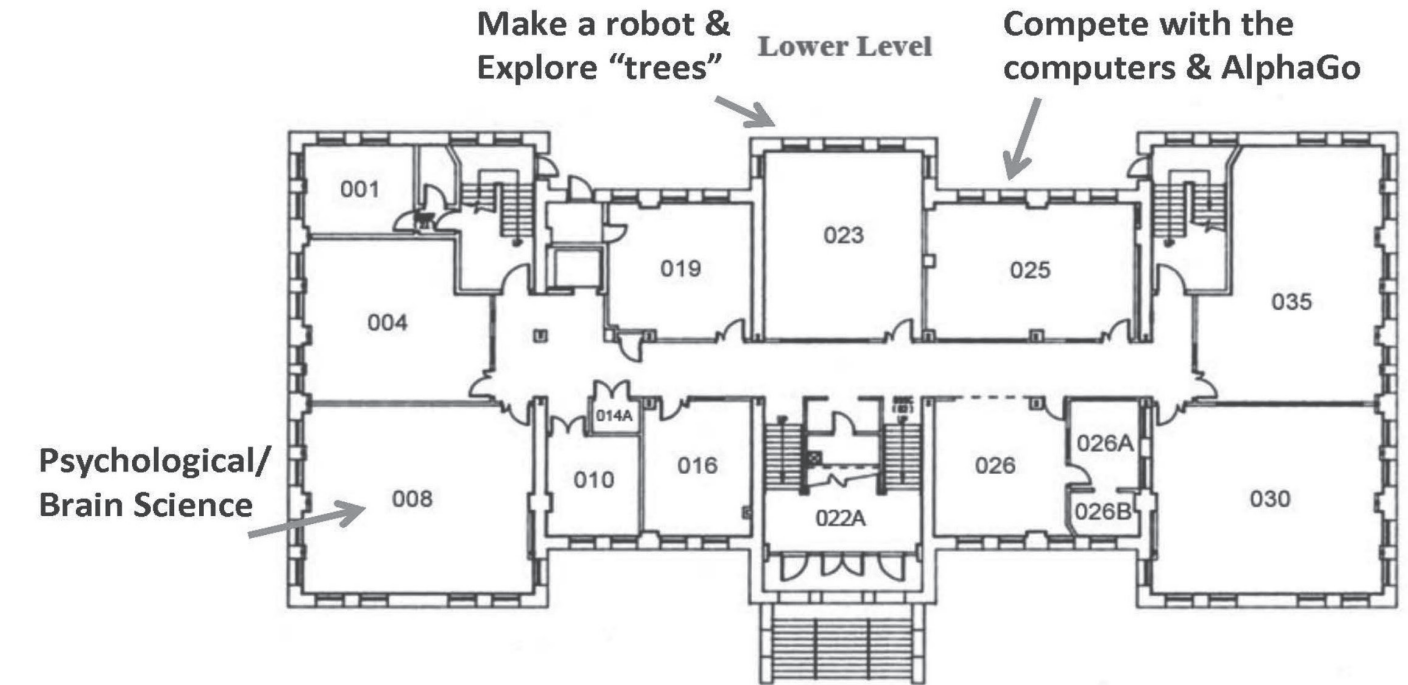
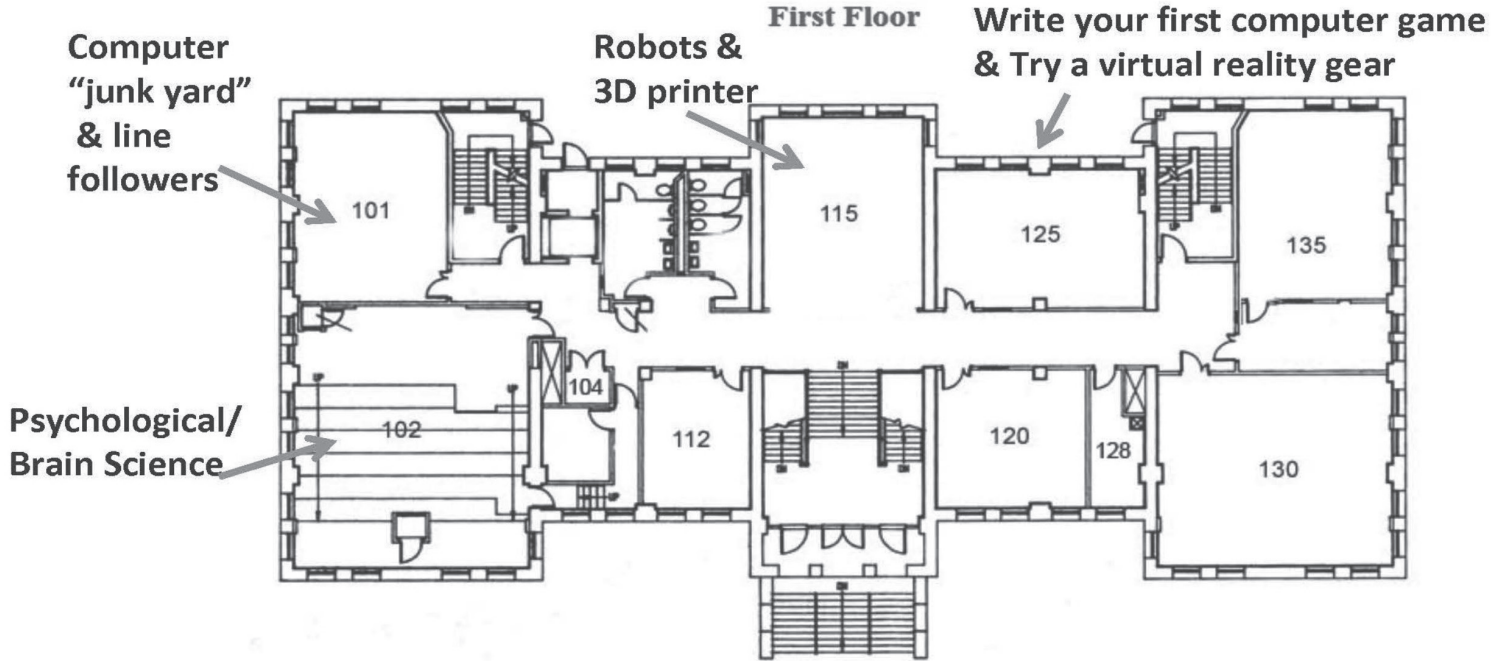
Learn about fossils, 3D visualization, and biological collection research.





Lindley Hall Map

Lindley Hall — 150 South Woodlawn Avenue



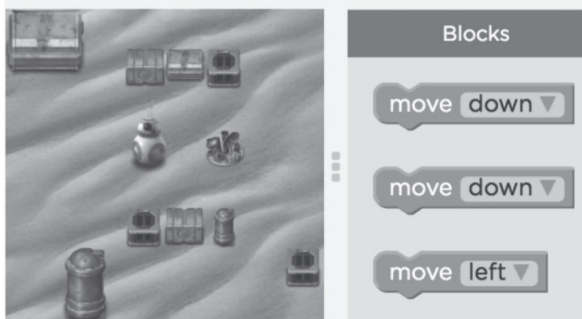
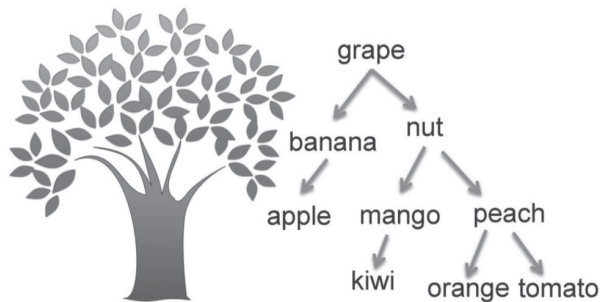
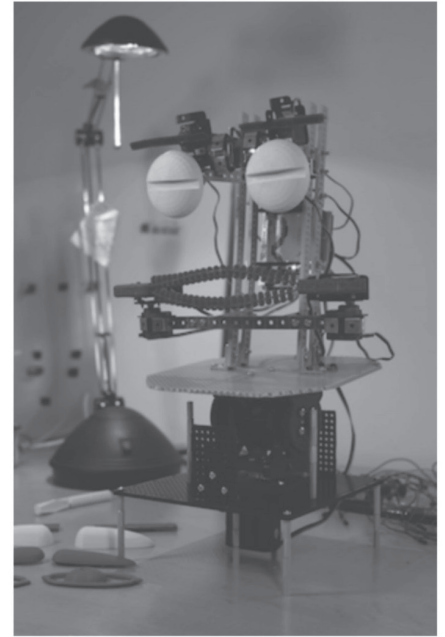


Computer Science & Informatics

Lindley Hall — 150 South Woodlawn Avenue

Join the Department of Computer Science and Informatics as we explore science and technology.

- Come make a galaxy and help BB-8 accomplish a task on a computer, to learn about **programming**.
- Come meet **robot** friends that smile, squeal, and shimmy.
- Come try a **3D-printer**.
- Come make a robot using **arduino** chips and “eyes”.
- Come see and make different kinds of **trees** (tree of life and binary search trees).
- Come explore in our computer “**junk yard**”.
- Come compete with computers and learn about **AlphaGo**.
- Come experience **virtual reality** games.





Psychological & Brain Sciences

Lindley Hall — 150 South Woodlawn Avenue

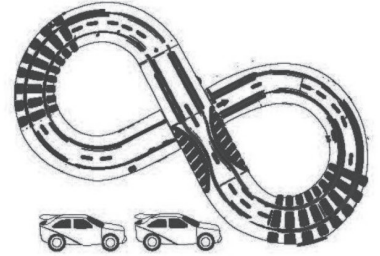


The Department of
**Psychological
+Brain
Sciences**

psych.indiana.edu

BRAIN RACECAR GAME

Use your brain waves to control a racecar. It's not magic, it's science.



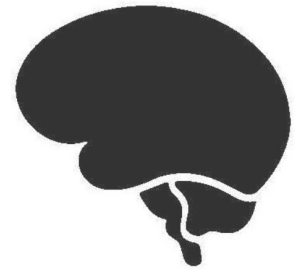
BLOCKS ROCKS

Challenge your friends to a fast-paced game of Blocks Rocks- a game where players race to see who can arrange their blocks to match a variety configurations. It's simple, it's fun and it can help your brain. Come find out how.

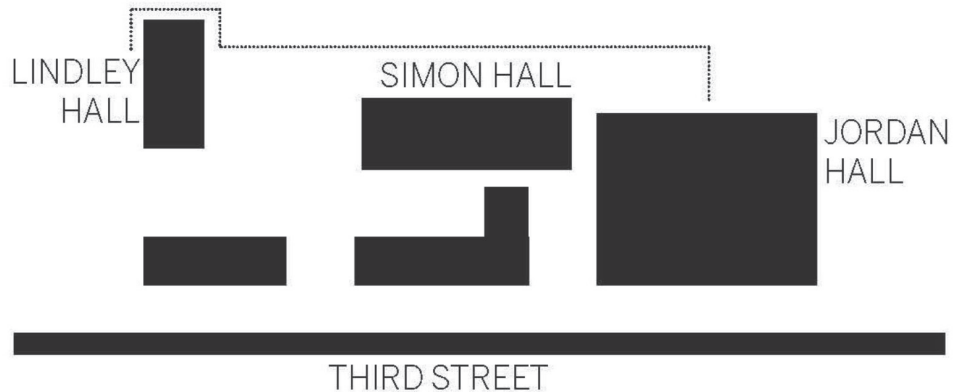


ARTS, CRAFTS AND BRAINS

Create a brain hat, build neuron models, build lego robots and more with hands-on arts and crafts projects.



Getting there is easy.

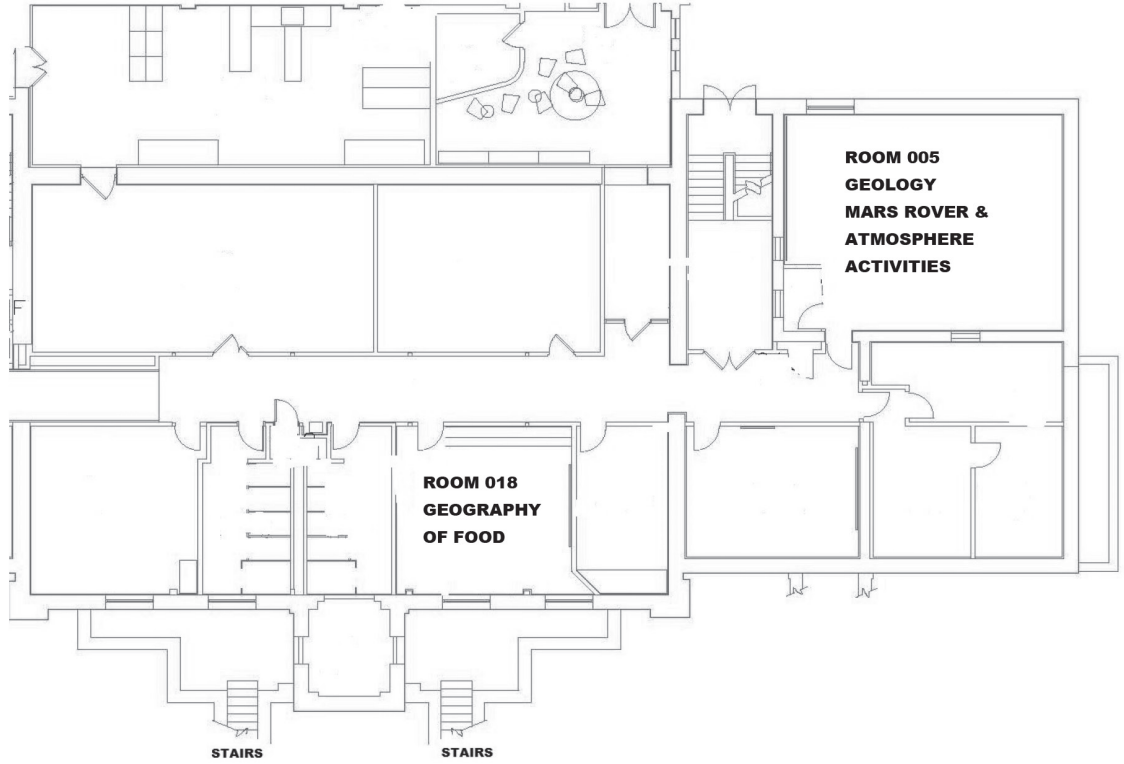




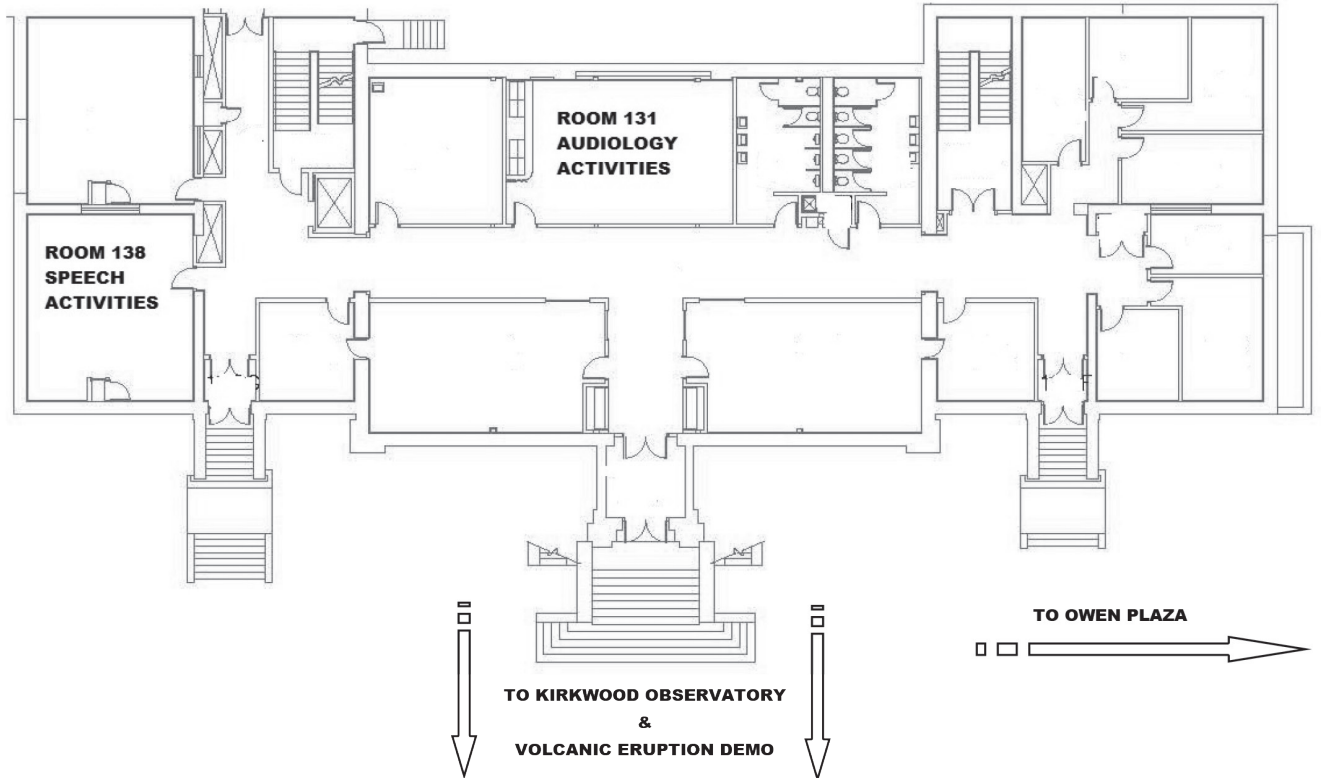
Student Building Map

Student Building — 107 South Indiana Avenue

GROUND
FLOOR



1ST
FLOOR





Geography

STUDENT BUILDING — 107 SOUTH INDIANA AVENUE

The Department of Geography features two activities!!

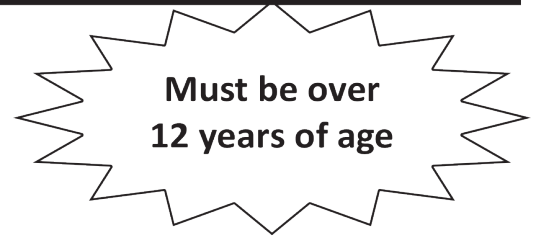
1

THE GEOGRAPHY OF FOOD LAB

Reserve Your Spot in Jordan Hall Atrium

Time of departure from sign-up table : 10:00 am

Lab Location: Student Building 018



Geography of Food: The Department of Geography invites you to visit the Geography of Food Laboratory! Sign up at the Department of Geography table in the Jordan Hall atrium. Food Lab Tours will leave from the table at 10:00 AM. From there we will walk through historic Dunn Woods to the laboratory in Student Building 018.

Once at the lab we will prepare a four course Roman meal which will allow you to experience:

- ◆ How we can “cook” food using common acids like citrus juice
- ◆ Examine how starch and egg works to bind things by making Carbonara, delicious cheese and Parma ham-laden pasta
- ◆ We'll pasteurize a very small portion of skirt steak and finish it off (caramelize it) with a torch
- ◆ Use cheese, butter and fruit to make a simple, but amazing cake

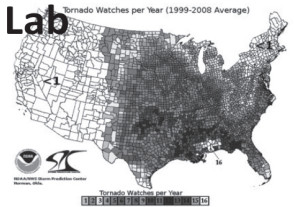
2

Center for the Analysis of Socio-Economic Landscapes Lab

Reserve Your Spot in Jordan Hall Atrium

Time of departure from sign-up table : 1:45 pm

Lab Location: Student Building 331



Geographic Information Systems: The Department of Geography invites you to visit the Center for the Analysis of Socio-Economic Landscapes (CASEL). Sign up at the Department of Geography table in the Jordan Hall atrium. CASEL Tours will leave from the table at 1:45 PM. From there we will walk through historic Dunn Woods to the CASEL laboratory in Student Building 331.

Geography is the science of place and space. Geography integrates the natural, life and social sciences to investigate important world problems. It also has a distinctive methodology: spatial data analysis, sometimes called GIS. Our laboratory is the world around us. At IU the Department of Geography is organized around five themes:

- ◆ Food and Agriculture
- ◆ Globalization, Development and Justice
- ◆ Global Climate, Environmental and Land Use Change
- ◆ Water Resources
- ◆ Geographic Information Systems and Remote Sensing

We won't make you memorize the names of countries, capitals or rivers. We will ask that you become engaged in solving world problems like hunger, climate change, desertification and the increasing divide between the world's richest and poorest nations. For more information on studying Geography at IU go to <http://geography.indiana.edu/>.



Ψ Geological Sciences

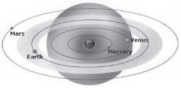
STUDENT BUILDING — 107 SOUTH INDIANA AVENUE

Highlights



Volcanic Eruption

Outside the Student Building (Loc.-1)



Solar System Tour

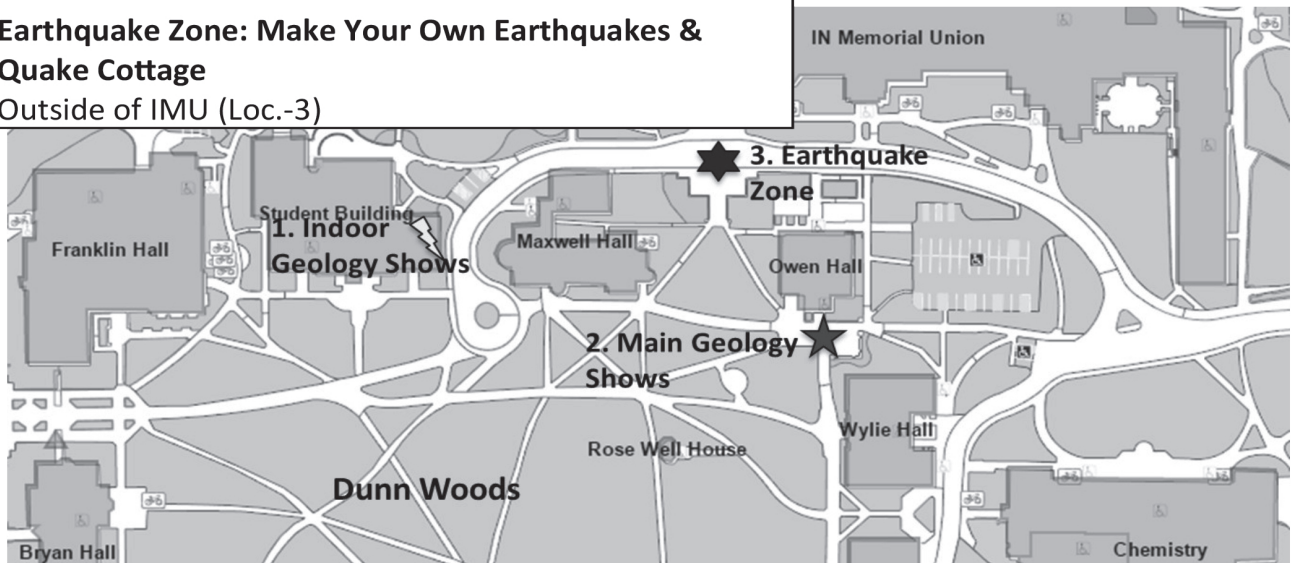
Passing by Owen Hall Pavilion (Loc.-2)



Earthquake Zone: Make Your Own Earthquakes & Quake Cottage

Outside of IMU (Loc.-3)

Geological Sciences Activities Map



Location-1: Student Building Ground Floor

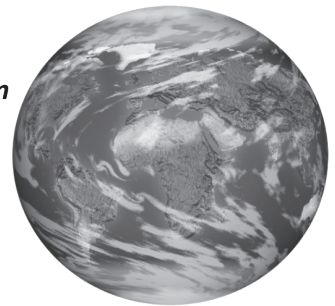


- ❖ Explore Mars! *Drive your own planetary rover!*
- ❖ Discover the Atmosphere! *See your own body heat! Chase a tornado!*
- ❖ Right outside: **Volcanic Eruption!** *10:30am, 11:30am, 12:30pm, 1:30pm*

Location-2: Owen Plaza outside Owen Hall (Main Geology Shows)



- ❖ Check out the **Gems!** *Rock/Mineral/Fossil Show*
- ❖ Dig for a **Fossil!** ... *and take home a souvenir!*
- ❖ **Geode Bash!** *Grab a hammer and find the hidden beauty in 'Hoosier diamonds'!*
- ❖ **Make your own River!** *See if you can change it's course or cause a landslide!*



Location-3: Indiana Memorial Union Southside Entrance



- ❖ **Make Your Own Earthquake!** *And record it with a seismograph!*
- ❖ **Quake Cottage:** *Feel (and measure) the Earth Move!*

(Provided by Indiana Geological Survey)





Rain Initiative

STUDENT BUILDING — 107 SOUTH INDIANA AVENUE



Student Building, Room 015

RAIN Initiative, Secchi Dip-In, Laney Lab (SPEA's Limnology Lab)

- * Learn about and test the water quality of IU's Jordan River
- * discover aquatic macroinvertebrates



Indiana
Clean Lakes Program



About Rain

The RAIN (Restorative Adaptations for Infrastructure) Initiative is an action- and research-based organization founded by graduate students at the School of Public and Environmental Affairs at Indiana University. They work to improve existing and install green infrastructure for the purposes of stormwater management at Indiana University and in the City of Bloomington, to encourage a paradigm shift of **grey** to **green** regarding stormwater at the local level, and to educate the public on the potential for manufactured ecological processes to provide crucial, cost-effective solutions.

Follow progress of the RAIN Initiative on Twitter: <https://twitter.com/RAINinitiative>

Facebook: <https://www.facebook.com/stormwaterresearch>

or see our webpage: <http://sustain.indiana.edu/programs/rain-initiative/index.php>





Speech & Hearing

STUDENT BUILDING — 107 SOUTH INDIANA AVENUE



Audiology Activities

Student Building, Room 131

What does hearing loss sound like?

- ◆ Listen to a simulation of hearing loss
- ◆ Try out ear plugs to simulate hearing loss
- ◆ Listen to a simulation of a cochlear implant

What does a hearing aid sound like?

- ◆ Listen to the sounds in the room through a hearing aid

What does your ear drum look like?

- ◆ Get pictures of the ear drum

Why do your ears ring after listening to loud sounds?

- ◆ Learn why they ring
- ◆ Learn how to protect your ears for life

Learn some simple sign language

Some fun facts about hearing:

- ◆ The ear's malleus, incus and stapes (otherwise known as the hammer, anvil and stirrup) are the smallest bones in the human body. All three together could fit together on a penny.
- ◆ The ear continues to hear sounds, even while you sleep.
- ◆ Sitting in front of the speakers at a rock concert can expose you to 120 decibels, which will begin to damage hearing in only 7 1/2 minutes.
- ◆ Male mosquitoes hear with thousands of tiny hairs growing on their antennae.
- ◆ Fish do not have ears, but they can hear pressure changes through ridges on their body.

Speech Activities

Student Building, Room 138



What would you do if you suddenly found you could no longer speak?

Experience how the use of augmentative and alternative communication (AAC) can help individuals, across the age span, develop or regain the ability to communicate with

others, in hands-on activities using multiple modes of AAC.

Learn how we examine the health of your voice

Explore various disorders of the speech mechanism and learn how speech language pathologists provide treatment

Some fun facts about speech:

- ◆ In order to speak, about 100 muscles of the chest, neck, jaw, tongue and lips must work together.
- ◆ Children learn speech and language when they are very young. It is very difficult, if not impossible, to learn speech and language if a person has not been exposed at a young age.
- ◆ Speech language pathologists work with people who have speech, language, voice, and swallowing disorders.
- ◆ Smoking and too much shouting can damage your voice.

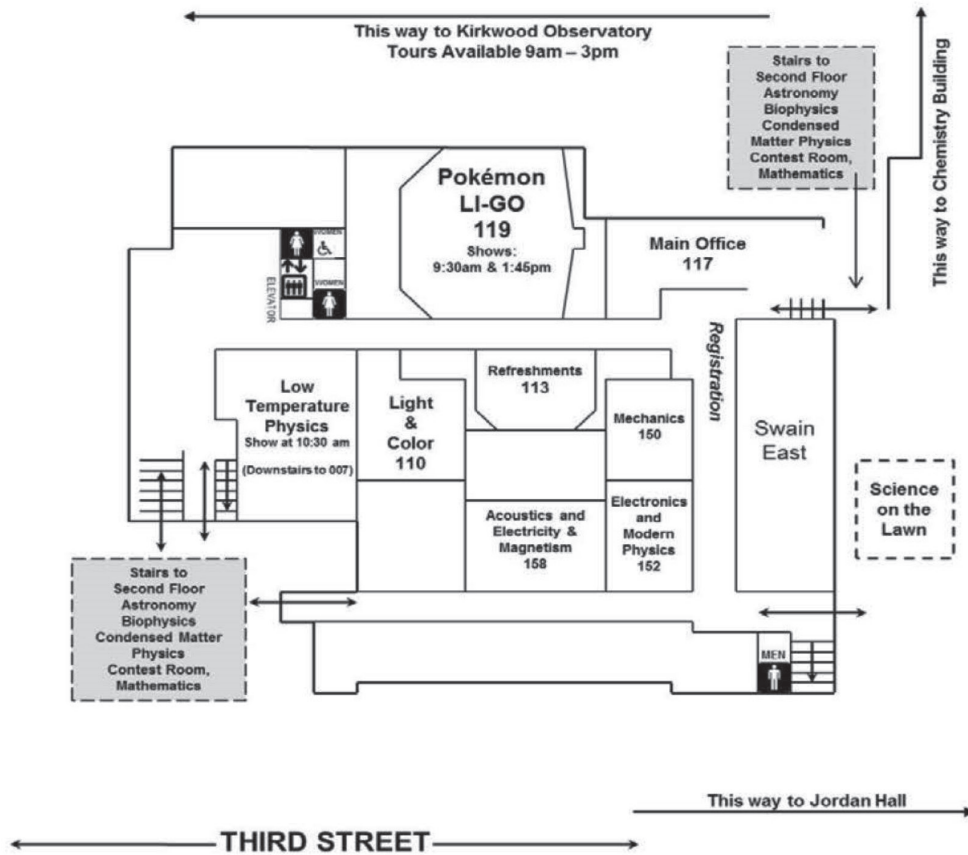




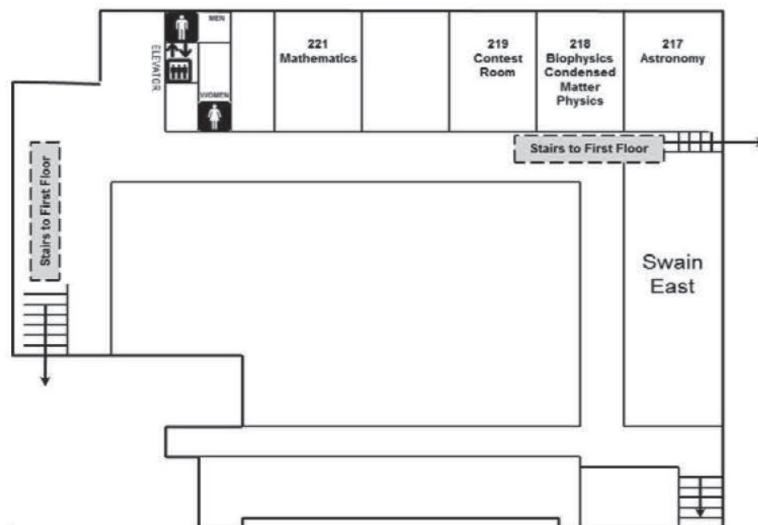
Swain West Map

SWAIN WEST—727 EAST THIRD STREET

Science Fest 2016 Swain West Activity Room Map



Swain West First Floor



Swain West Second Floor





Astronomy

SWAIN WEST—727 EAST THIRD STREET & KIRKWOOD OBSERVATORY

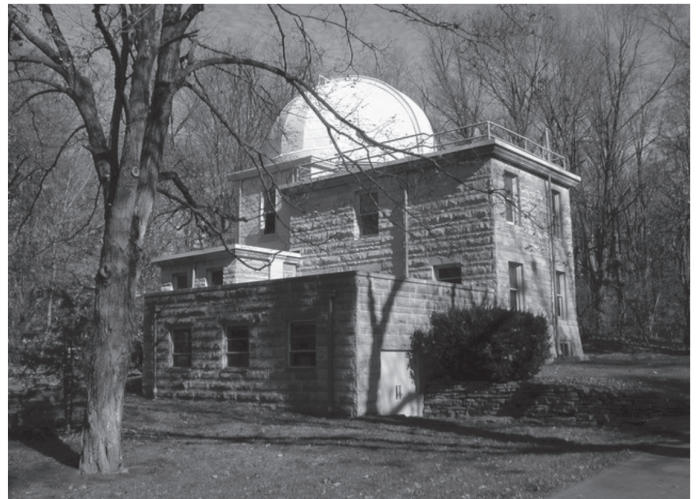
ACTIVITY ROOM

Swain West, Room 217

- ◆ Make your own comet!
- ◆ Experiment with the infrared camera!
 - ◆ Make a pocket solar system!
 - ◆ Win a prize on the prize wheel!
- ◆ Model Moon's phases using Oreo cookies!

VISIT KIRKWOOD OBSERVATORY TODAY!!

See the 115 year old telescope!
View the Sun in the Solar Lab
(weather permitting)



D	T	Y	U	W	F	B	J	R	A	S	G
N	O	V	A	E	S	A	G	J	R	C	A
A	S	R	T	P	U	L	S	A	R	V	L
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R	G	U	P	I	E	S	C	A	E	K	N
P	A	N	E	U	R	O	P	A	N	T	D
O	L	D	C	A	G	B	A	O	U	R	R
R	A	E	L	L	I	L	L	S	T	F	O
E	X	O	P	L	A	N	E	T	S	T	M
F	Y	P	I	O	N	I	O	A	I	O	E
U	K	O	B	E	T	A	E	R	O	R	D
C	E	T	R	U	T	Y	N	L	P	O	A

WORD SEARCH

Find the names of these astronomical objects!

- | | | |
|--------|------------|--------|
| GALAXY | EXOPLANET | NOVAE |
| AGN | SUPERGIANT | STAR |
| PULSAR | ANDROMEDA | EUROPA |

For events and news, visit our website at:

<http://www.astro.indiana.edu>

Follow us on Twitter @iuastro

Department Email: astdept@indiana.edu

**Explore the sky at the
Kirkwood Observatory!**
Come to our weekly open houses and see objects like the Moon, planets, star clusters, galaxies, and nebulae. Every Wednesday between mid-March and Thanksgiving (weather permitting).

**The 4th Annual F. K. Edmondson
Astronomy Public Lecture
*Strange New Worlds***

by Josh Winn (Princeton University)
Learn about the discovery of planets
outside our solar system.

7:30 PM Wednesday October 26, 2016.

Swain West 119





Energy Bikes

SWAIN WEST—727 EAST THIRD STREET

Ever wonder how much energy it takes to power a light-bulb? An electric fan? A hairdryer? Use your own pedal power and find out!

The Monroe County Energy Challenge will be setting up youth and adult Energy Bikes and giving out free LED light bulbs as part of their 1,000 bulb Project Porchlight initiative! Learn about how our energy use impacts the environment and what you can do to reduce your carbon footprint every day.

MONROE COUNTY
ENERGYCHALLENGE



Project  Porchlight



Monroe County is one of 50 communities competing for the \$5M Georgetown University Energy Prize. To find out more, visit <http://mocoenergychallenge.org/> or call 812.349.3558.





Mathematics

SWAIN WEST—727 EAST THIRD STREET

Topological Games

Swain West, room 221

Explore topological games such as how to use mirrors to bend light to hit a target. Learn how to solve wire puzzles of different complexities. You will even get the chance to build your own puzzle using light switches and ropes!

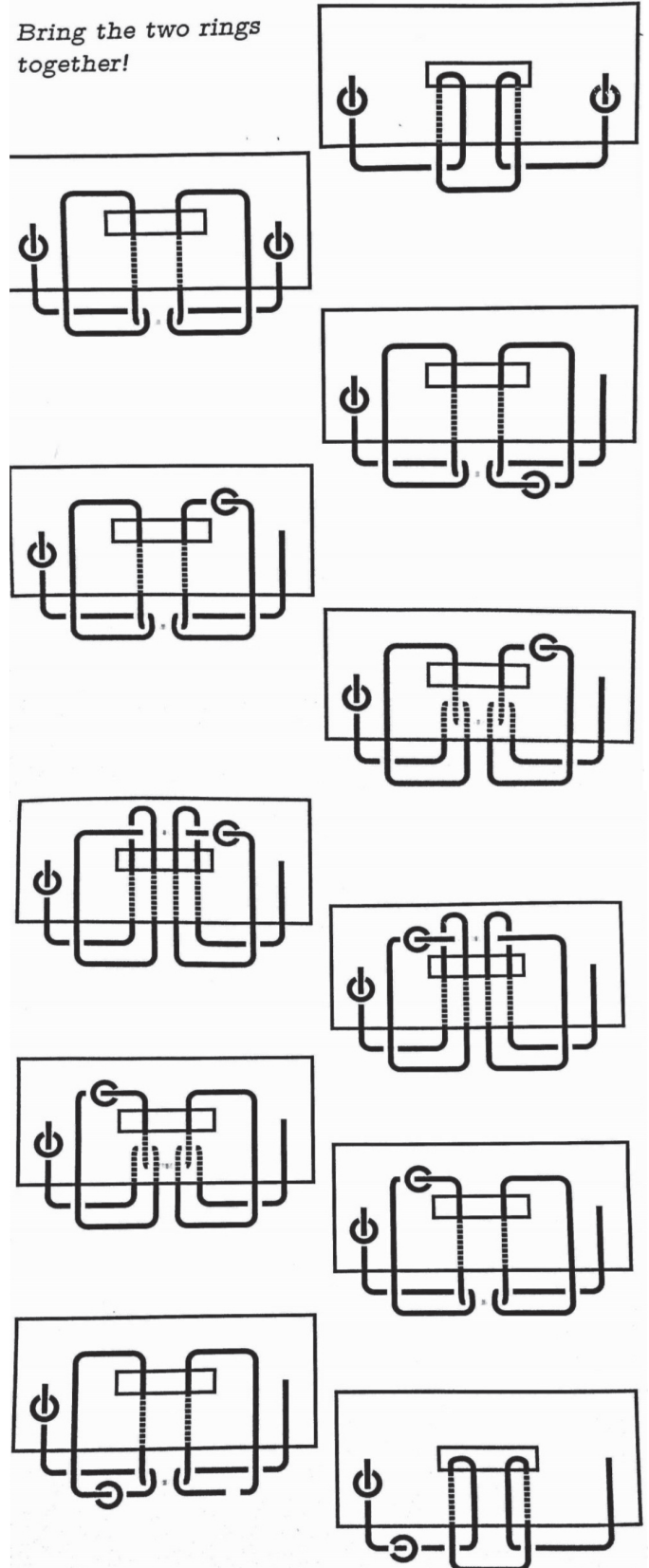
Learn more about the Department of Mathematics Outreach Program by visiting:

<http://www.math.indiana.edu/resources/outreach.phtml>

SUDOKU

			1		4			
	2	6						5
3	9			7				1
5				6			3	
	6						8	
	3			8				7
9			2				5	6
4					5		2	
		2		3				

Bring the two rings together!





Physics

SWAIN WEST—727 EAST THIRD STREET

HANDS-ON EXPLORATION

Science on the East Lawn

- * Bernoulli Blower
- * Dry Ice Bowling
- * Tablecloth Antics

Swain West, Room 110

Light & Color Room

- * Chromatography Flowers
- * Fiber Optics
- * Frozen Shadows
- * Holograms

Swain West, Room 150

Mechanics Room

- * Arch Building
- * Angular Momentum Platform
- * Giant Wave Pendulum
- * Human Gyroscopes

Swain West, Room 152

Modern Physics & Electronics

- * ATLAS and LHC Collider
- * Cosmic Rays in Cloud Chamber
- * Extreme Form of Matter
- * Light Emitting Diodes
- * Moog Synthesizer
- * Speed of Light
- * Theremin

Swain West, Room 158

Acoustics and Electricity & Magnetism Room

- * Acoustic Resonance
- * Crowing Roosters
- * Voice Prints
- * Electromagnetic Induction
- * Magnetic Ring Tosses
- * Jacob's Ladder
- * Van de Graaf Generator

Swain West, Room 218

Biophysics & Condensed Matter

- * DNA Diffraction
- * Visual Voice
- * Illusions
- * Brownian Motion

Swain West, Room 219

Contest Room—Great Prizes!

Fun Physics Contests!

- * Aluminum Boats
- * Lightbox Puzzle
- * Paper Tower Building
- * Yardstick Cantilever

TEACHER'S LUNCH

Swain West 251

Reserve a space at
Registration desk

* Time: 12:00 pm

LOW TEMPERATURE PHYSICS

Swain West 007

See liquid nitrogen turn a banana into a hammer, flowers shatter, and much more!

* Show Time: 10:30 am

POKEMON LI-GO

Physics Demonstration

Swain West 119

IU PHYSICS CLUB

Scientists team up with Pokemon to save the world from Team Rocket! An exciting look at the intersection between physics and Pokemon.

Show Times:

* 9:30—10:30 am

* 1:45—2:45 pm





Office of Science Outreach



OPPORTUNITIES TO TEACH, LEARN, RESEARCH AND LEAD

The **Office of Science Outreach** in the College of Arts and Sciences at IUB is a resource for College faculty and students developing science educational outreach programs as part of their research pursuits. To that end the OSO:

- Serves as a hub for students of all ages and backgrounds to connect with and participate in science in order to promote diversity, awareness, and accessibility of science for everyone;
- Provides support for College and pre-College students in or interested in the sciences;
- Advances interdisciplinary works that draw upon scientific endeavors, and creative activities and scholarship from diverse academic fields.

The Office of Science Outreach connects with area schools and the community by offering science activities and opportunities on the IUB campus, as well as communicating the cutting-edge research that is conducted here.

**DON'T MISS AN
OPPORTUNITY!!**

LIKE US ON FACEBOOK:

IUBSCIENCEOUTREACH

FOLLOW US ON TWITTER:

@IUSCIHOUSE

VISIT US ON THE WEB:

[HTTPS://SCIENCEOUTREACH.INDIANA.EDU](https://scienceoutreach.indiana.edu)

CALL US AT:

812-855-5397

EMAIL US AT:

SCIHOUSE@INDIANA.EDU

**STAY
CONNECTED**

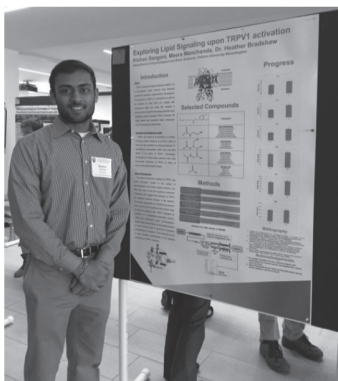


Learn more about science and research at the College:

<http://blogs.iu.edu/sciu/>



Ψ Research Opportunities



IU Science, Technology, and Research Scholars (STARS)

Research program providing four years of faculty-mentored research experience.

- ◆ Join a research lab beginning freshman year
- ◆ Receive mentoring by a leading faculty scientist
- ◆ Acquire lab skills and develop your own project
- ◆ Gain exposure to other research areas through faculty research talks
- ◆ Eligible for summer research scholarships
- ◆ Eligible for travel scholarships for science conferences and meetings

Integrated Freshman Learning Experience (IFLE)

Integrates the study of, and research in, biology, biochemistry and neuroscience in two phases.

Phase 1: Summer Research

- ◆ Become part of a research lab at IU for six weeks before college begins, choosing a lab that matches your interests
- ◆ Work on an independent project with mentoring from faculty and graduate students
- ◆ Learn to present your research in written and oral presentation form
- ◆ Gain exposure to ongoing research and IU facilities through tours and talks
- ◆ Learn your way around campus
- ◆ Summer housing in an IU residence hall along with a meal plan are provided at no cost

Phase 2: Academic Freshman Year Research-based Honors Courses

- ◆ One-time \$1000 Scholarship for participation in these honors courses, if eligible
- ◆ Eight-credit course includes lectures with corresponding lab components
- ◆ Three modules proceed from genes to proteins to cellular systems
- ◆ Inquiry-based format engages students through group experiments

How Do I Apply to STARS and/or IFLE?

- ⇒ As a HS senior, apply to IU Bloomington by **November 1st**.
- ⇒ Complete the Selective Scholarship Application (SSA) by **December 15th**. Note that students must meet certain GPA and standardized test scores to be eligible for the SSA.
- ⇒ Have an intended major in one of the science departments in the College of Arts & Sciences.
- ⇒ For more information about either STARS or IFLE, please contact us at scihouse@indiana.edu or visit go to:

www.go.iu.edu/STARS
www.go.iu.edu/IFLE

**HURRY DEADLINE IS
NOVEMBER 1!!**





K-12 Opportunities



Foundations in Science and Mathematics

A summer science and mathematics program for middle and high school students at Indiana University!



Courses In:

- ★ Astronomy
- ★ Biology
- ★ Chemistry
- ★ Computer Programming
- ★ Mathematics
- ★ Physics

➤ **NEW:** Courses in animal science (zoology), standardized test math review, algebra I + II, and trigonometry!

Class Times

Session 1: June 5-16
Session 2: July 10-21
 Classes are held on Mondays, Wednesdays, and Fridays!

Learn More!

fsm@indiana.edu
 indiana.edu/~fsm/
 Twitter: @FSM_IU

Indiana University Project STEM

Get involved in Research!

Students spend 8 weeks in the summer working with scientist in labs including psychology, neuroscience and chemistry

Important Dates

Application deadline: April 1



Eligibility

Must currently be a Sophomore, Junior, or Senior and must have taken some biology or chemistry

Contact Information

iuprojectseed@gmail.com
 or contact
 Dr. Sharlene Newman
sdnewman@indiana.edu

Applications are found at
<http://psych.indiana.edu/project-stem.php> or
<http://www.iuprojectseed.org/>





Information, First Aid & Emergency

Information Table

You'll see a tent located outside Lindley Hall, Simon and Chemistry buildings on the large grassy knoll (see campus map on the back of this guide). Get directions, ask questions, and pick-up information.

First Aid Station

Intra-Collegiate Emergency Medical Services (IC-EMS) will be located under the tent outside Lindley Hall, Simon and Chemistry buildings on the large grassy knoll (see campus map on the back of this guide). This first aid station will be able to take care of your minor first aid needs. IC-EMS is a student organization comprised of over 100 certified EMT-Basics and first aid personnel. For more information about IC-EMS visit their website at <http://www.iub.edu/~icems/>.

Emergency Information

To reach Campus Security, Fire, or Ambulance dial 911 from a non-IU phone or 9-911 from a University phone.

Emergency Room Location:

IU Health Bloomington Hospital

601 West Second Street

(812) 353-5252

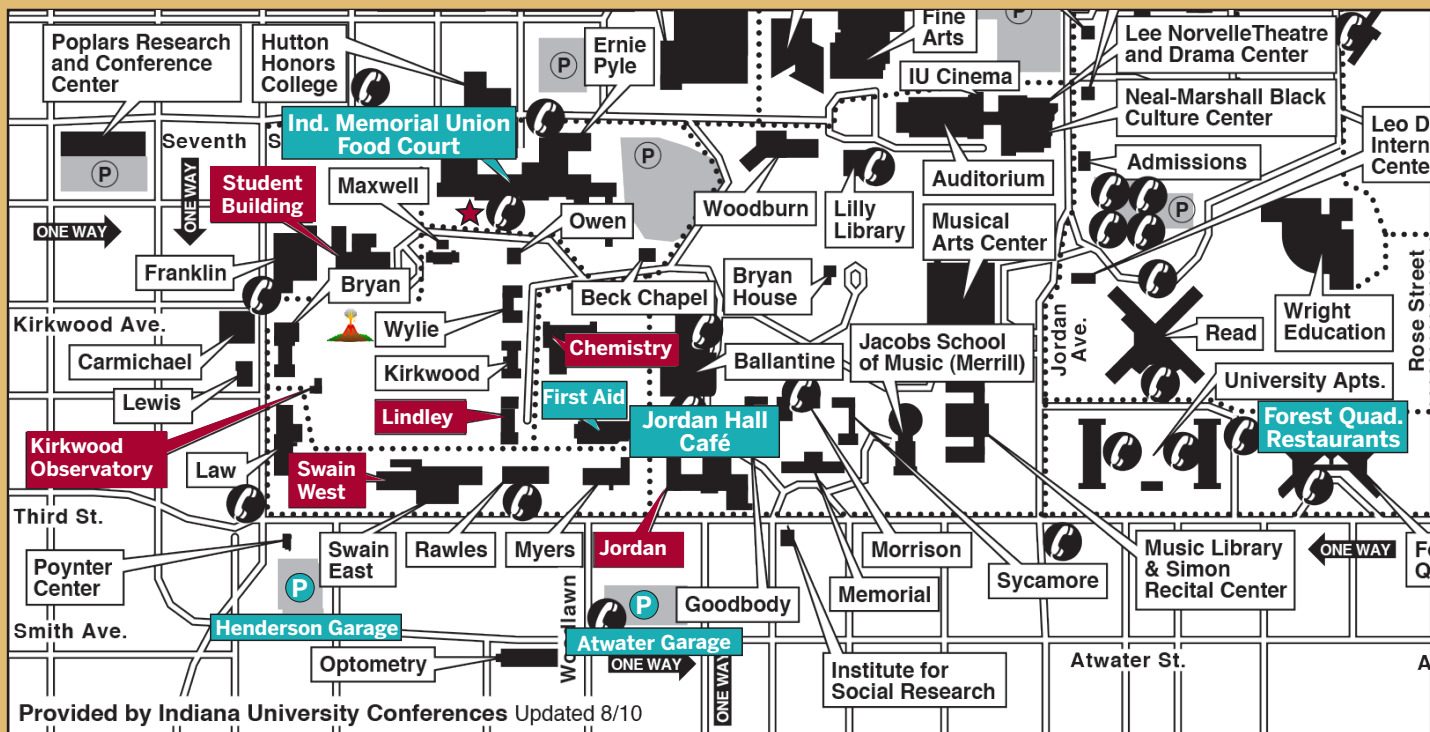
For IU Police (non-emergency) please dial (812) 855-4111.

University Police officers are on duty 24 hours every day. There are numerous emergency telephone call boxes located on campus that are a direct line to campus security at all times. These call boxes can be used to report criminal actions or other emergencies on campus.





IUB Campus Map



Provided by Indiana University Conferences Updated 8/10

ACTIVITY BUILDINGS & OUTSIDE LOCATIONS

- Chemistry
- Jordan Hall
- Kirkwood Observatory
- Lindley Hall
- Swain West
- Student Building
- ★ The Quake Cottage
- 🌋 Volcano Eruption Demo

PARKING, FOOD, & FIRST AID

- Atwater Garage
- First Aid Station
- Henderson Garage
- Forest Quad, Restaurants
- Indiana Memorial Union
- Jordan Hall Café

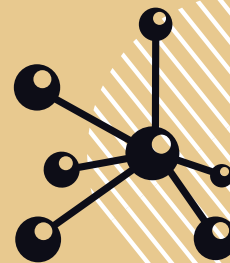
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IUBScienceOutreach



For more information contact the Office of Science Outreach:

Tina Gilliland, Outreach Liaison | scihouse@indiana.edu | (812) 855-5397

go.iu.edu/ScienceFest