

The background of the entire page is a vibrant blue. Overlaid on this are several light blue hexagons of varying sizes. Some of these hexagons are interconnected by thin, light blue lines, creating a network-like or molecular structure. Some of the nodes where lines intersect are marked with small white circles. The pattern is most dense in the top left and bottom right corners, with a large dark blue rectangle in the center-left containing the text.

ILLINOIS MATH AND SCIENCE ACADEMY

# INSTITUTE DAY 2023

professional learning experiences

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March 3, 2023 | 8 AM | Aurora, IL

# CONFERENCE SCHEDULE

8:00 - 8:20 Welcome and Introduction

8:20 - 8:30 Move Between Rooms

8:30 - 9:30 Session 1\*

9:30 - 9:40 Move Between Rooms

9:40 - 10:40 Session 2\*

10:40 - 10:50 Move Between Rooms

10:50 - 11:50 Session 3

11:50 - 12:30 Lunch at IMSA

12:30 - 1:30 Session 4\*

1:30 - 1:40 Move Between Rooms

1:40 - 2:40 Session 5

2:40 - 2:45 End of Day

\*Sessions may be 60, 130, or 200 minutes in length.

**Questions? Contact Lindsey Herlehy at [lherlehy@imsa.edu](mailto:lherlehy@imsa.edu)**



# SESSION 1

8:30 - 9:30



## **MASTERY BASED GRADING FOR SECONDARY MATHEMATICS**

Dr. Anderson Trimm  
6th - 12th Grade Math

Dr. Trimm will discuss in detail his design and implementation of a mastery grading system in calculus at IMSA and how it offers many benefits over traditional grading. Dr. Trimm will also explain how it makes creating assessments and grading easier and less work for the teacher, while being more accurate.

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## **DREAMING UP DREAM CITIES: CULTURALLY-RESPONSIVE STEAM CURRICULUM IN ACTION THROUGH INQUIRY-BASED LEARNING**

Elaine Wu  
6th - 7th Grade Integrated STEM, Equity and Diversity, Engineering

Culturally responsive pedagogy can bridge the diversity gap in STEM by supporting the achievement of all students in the classroom. IMSA Outreach provides inquiry-based, hands-on STEM learning because it is inherently culturally responsive. This session shares how our Dream City program supports all students in thinking like urban planners to design beautiful neighborhoods that are not only structurally sound but also inclusive and responsive to all who come.

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## **THE BLACK HAWK WAR: TEACHING HISTORICAL THINKING WITH DOCUMENTS AND LOCAL HISTORY**

Dr. Eric Smith  
8th - 12th Grade History, Social Science

This session will provide both historical context and the necessary documents in order to offer a lesson teaching critical thinking using documents from the Black Hawk War.



## A LOOK INTO LEADERSHIP

Emma Wilson, Vikram Karra, and Sarah Wheeler  
9th - 12th Grade Leadership

IMSA's Leadership Education & Development program (LEAD) is a student-facilitated course for sophomore students. We believe that leadership can be learned so we take an intricate look at various definitions, theories, models, and conceptualizations of leadership. Students are challenged to think critically about leadership during peer-to-peer facilitated class discussions, hands-on exercises, and group work. Join us to dive into this course while participating in hands-on, leadership-based activities that are great for the classroom!



## COMPUTATIONAL THINKING IN PHYSICS CLASS - WITHOUT PROGRAMMING!

Dr. Peter Dong  
8th - 12th Grade Science, Technology

Computational thinking and the use of computers to solve problems is rapidly becoming an indispensable skill, and physics class is one natural place to develop it. However, the perceived necessity of learning a programming language can deter both teachers and students from approaching this crucial topic. We will show how a simple spreadsheet can be used to solve remarkably complex physics problems, some of them analytically unsolvable, in just a few minutes. **Attendees must bring a computer.**

# EXTENDED SESSION 1

Times Vary



## EARTH & ENVIRONMENTAL STORYLINES FOR A MORE SUSTAINABLE & RESILIENT ILLINOIS

8:30 - 10:40

Cheryl Manning and Dr. Nicole LaDue  
6th - 12th Grade Science, Integrated STEM, Earth & Environmental Science

Illinois critical zone scientists and engineers are studying how human behaviors and environmental changes affect Earth's thin layer from solid bedrock to the tops of trees. Inspired by critical zone science, Illinois teachers collaborated to create seven NGSS-style storylines addressing regional sustainability and resilience issues including soils, invasive species, flooding, erosion, water scarcity and quality, subsidence, and Illinois' connection to the Gulf of Mexico dead-zone. Learn about these storylines and how to create your own. **Attendees must bring a computer.**





## **99 PROBLEMS? PBL CAN HELP: AN INTRO TO PROBLEM BASED LEARNING**

**8:30 - 11:50**

**Dr. Nicole Ross and Allison Albert**

**6th - 12th Grade Integrated STEM**

Classroom engagement got you down? Perhaps Problem Based Learning (PBL) can help. PBL is an instructional technique that engages students in content-based problem solving of a real-world issue. In this session, participants are immersed in a short PBL experience, learn the fundamentals of PBL implementation and begin the design process by exploring how to identify a real-world problem that can be solved by the students in their classroom.

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## **TEACHING THE ENGINEERING CYCLE THROUGH A SERIES OF PROJECTS**

**8:30 - 11:50**

**Dr. Eric Hawker and Mark Carlson**

**6th - 12th Grade Integrated STEM, Equity and Diversity, Engineering**

The goal of this session is to show how a series of similar engineering projects can help students not only understand the engineering cycle but also other aspects of engineering such as communication, inclusion, goal setting, and planning and organization. **Attendees may choose to bring their own safety eyewear.**

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## **ANIMATED PUPPETS: CODING AND CREATING WITH THE HUMANITIES**

**8:30 - 11:50**

**Dr. Devon Madon and Jeff Sweeton**

**6th - 12th Grade Integrated STEM, Equity and Diversity, Engineering**

CodeCreate coaches students in basic circuitry, media and performing arts, robotics and computer programming, illustration and 3D design. We will facilitate a hands on experiences with animated puppetry and engage the audience in meaningful considerations of intersections of art, technology and other forms of diversity. We will also be previewing and discussing free and low-cost tools and methods and their role in common curriculum.

**Attendees must bring a computer**

# SESSION 2

9:40 - 10:40



## **THE MATHEMATICS OF CITY PLANNING AND CRISIS MANAGEMENT**

Patrick Young

6th - 8th Grade Math, Career Awareness

What if you managed a small city that was beset by severe weather and an influx of climate refugees? What types of math would your team need to employ to adapt your city to deal with these crises? Try some sample activities and gain access to an entire curriculum developed to integrate career awareness with middle school math standards.

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## **STEAM AL ESTILO LATINO**

David Hernandez

6th - 12th Grade Science, Integrated STEM, Equity and Diversity, Engineering

Celebrate Hispanic heritage through STEAM! This presentation was designed specifically for students to explore and embrace the Hispanic/LatinX culture. This curriculum will guide the students to experience a combination of STEAM and traditions focusing on the Hispanic influence on America culture. Students will learn and create “Alebrijes” the STEAM way.

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## **IDEOLOGY AND TECHNOLOGY: UNDERSTANDING TECHNOLOGICAL CHOICES THROUGH IDEOLOGICAL PREFERENCE, 1925 - 1940**

Dr. Lee W. Eysturlid

8th - 12th Grade Technology, Integrated STEM, Engineering, Humanities

This presentation will look to introduce research done on the choices made by a wide spectrum of ideologically driven states as concerns specific military technologies in the lead up to World War II. The focus will be on the rational process that a government enters into when making choices for armaments that must suit its internal political beliefs and its “world view.”



## TRAVEL THE WORLD WITH FLAGS: USING DESMOS TO EXPLORE GRAPHING WITH EQUATIONS & INEQUALITIES

Dr. Kelly Remijan

8th - 12th Grade Math

Explore and discover how to replicate flags of various countries by graphing within Desmos using: Linear Equations/ Inequalities, Absolute Value Equations/Inequalities, Equations/ Inequalities of Circles, and Domain/Range. Attendees must bring a computer.

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## IDENTIFYING AND STRENGTHENING EXISTING SUPPORT FOR STUDENTS ON A RESEARCH TO PUBLICATION PATHWAY

Jean Bigger, Dr. Sowmya Anjur, Connie James-Jenkins, Amberly Carter, and Raven McKelvin

9th - 12th Grade Science, Equity and Diversity, Research

Participants will 1) learn how IMSA is generating and disseminating scholarship and incorporating students on a Research to Publication pathway, 2) discover classroom activities that support and promote an understanding of scientific inquiry and the nature of research, 3) discuss student work in IMSA's repository and student portfolios, 4) hear how we are engaging and supporting our CLED students, like Raven McKelvin '24, who will share her experience as an Intern and student liaison. **Attendees must bring a computer.**

# EXTENDED SESSION 2

9:40 - 11:50



## TERMINAL VELOCITY PROJECT: PARACHUTE

Brooke Schmidt and Anastasia Perry

10th - 12th Grade Science

This project is meant for a high school physics course where the students have studied Newton's Universal Law of Gravitation, Newton's Second law, and free fall motion. The students construct their own parachute, record a video in LoggerPro of the parachute in motion, and analyze the data to calculate the drag coefficient of their parachute.

# SESSION 3

10:50 - 11:50



## **STEM STRATEGIES THAT ENGAGE AND EXCITE CURIOUS STUDENTS**

Dr. Christine Moskalik and Elaine Wu

7th - 11th Grade Science, Integrated STEM, Ethics, Online Learning

STEM League programs are designed around a hot topic in STEM and are for self-motivated, independent middle and high-school students. Come learn how we foster a deeper understanding of and appreciation for STEM and simultaneously address relevant ethical considerations. STEM Leagues are different from the typical, competitive science extracurriculars because we focus on the collaborative and constructivist side of STEM. Leave inspired to try some of our strategies to engage and inspire your own students!

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## **THE ART OF CURRENCY!**

David Hernandez and Joyce Symoniak

6th - 12th Grade Math, Science, Integrated STEM, Equity and Diversity, Engineering

While some artists dream about making tons of money, other artists dream about designing money. STEM plus art (STEAM) is the perfect mix for the creation and innovation of currency. First, the students will explore the paper making process to find out the best currency paper. Then, students will create their own currency in an engaging, hands-on, and 3-dimensional learning activity. Join us to take STEAM to the next level and let's create money!

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## **SNOWFLAKES AND CHAOS**

Patrick Young

6th - 8th Grade Math, Science

One day, you may find yourself with a class that can think of nothing but the approaching snowfall. What will you do? Learn an activity about the formation of snowflakes that addresses the idea that no two snowflakes are identical. This fun activity may be engaged with on several levels, from crystal growth to mathematical probability to the science of chaos theory. Keep it handy for the right teachable moment.



## **THE BISECTION METHOD: A SINGLE TECHNIQUE YIELDING SIMPLE PROOFS OF THE FOUR "HARD" THEOREMS OF CALCULUS**

Dr. Anderson Trimm

9th - 12th Grade Math

The Intermediate Value Theorem, Boundedness Theorem, Extreme Value Theorem, and Integrability Theorem are all vital theorems of Calculus, yet are almost never proved in calculus textbooks. I will give simple proofs of these theorems using the Bisection Method, explain how I incorporated these into inquiry-style lessons at IMSA, and discuss the benefits to students. As a connection to Computer Science, the Bisection Method can be viewed as a Binary Search Algorithm.

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## **COMPARING REVOLUTIONS: A FRAMEWORK FOR COMPARISONS AND THE POSSIBILITIES OF CONTENT REINFORCEMENT**

Dr. Eric Smith

9th - 12th Grade History, Social Studies

Drawing on the waves of revolutions (American, French, Haitian, and Latin American Independence) this session will offer two different methods for reinforcing content mastery by drawing comparisons between these revolutions. One method involves utilizing a sociology model while the other is a recent innovation by historians to find "scripts."

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## **I'M TIRED OF PUNNETT SQUARES, BUT GENETICS IS STILL MY JAM**

Sarah O'Leary-Driscoll

6th - 12th Grade Science

As STEM educators, it can be hard to keep up with what's happening in our fields outside of the classroom because we have to prioritize the content and skills we share with the students in front of us. But we teach what we do, hopefully, because we love it, and part of our professional development should be to keep that love alive. In this session, we will share ideas for how to stay current, excited and engaged in your own field and in STEM as a whole, when your classroom content only covers the basics that repeat every year. Bring your own favorite "current events" or resources from your own subject, or just come to learn!

# SESSION 4

12:30 - 1:30



## **SAVING SKEE-BALL: APPLYING ENGINEERING & SCIENCE WITH A FUN STORYLINE**

Dr. Christine Moskalik

6th - 7th Grade Science, Integrated STEM, Engineering

How do engineering and science apply to a simple game of skee-ball? In this session, participants will be introduced to various STEM concepts that can be incorporated into a simple, inexpensive, and fun activity that is coupled with a fun storyline (saving the game of Skee-ball). Educators will work as teams to modify, design aspects of, and play the game. Along the way, they will discover ways to do this with their own students.

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## **SPARK-HOLISTIC APPROACH TO SUPPORTING STUDENTS ON CAMPUS**

Stephanie Broy and Rafael Gonzalez

8th - 12th Grade Mental Health and Wellness

What is SPARK? Students Promoting Awareness, Resiliency, and Knowledge for Mental Wellness. Spark is a multifaceted program that involves active awareness programming, distributing mental wellness resources, and peer-to-peer-based mental health awareness and suicide prevention campaigns.

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## **USING SERIES TO MAKE FINANCIAL DECISIONS**

Lingyi Meng and Evan Brummet

9th - 12th Grade Math

We will be presenting the application of series in mortgage calculation. This application will lead to the consideration of real issues such as borrowing mortgage, refinance, mortgage terms, etc. Mathematically, this application can also involve review of logarithms, and discussion of telescoping series.



## FUNCTIONAL DESIGN + STEAM

David Hernandez

6th - 12th Grade Math, Science, Technology, Integrated STEM, Engineering

Electronic kiosks are everywhere...ordering your food at a restaurant, checking your luggage at the airport, or getting the perfect paint for your living room. Do you know how they work? During this session students will explore the Functional Design Specification (FDS) and encourage students to think abstractly, create, engineer, test, redesign, and create a marketing campaign for a new product. STEAM to the next level.

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## SO, YOU WANT TO TEACH COMPUTER SCIENCE?

Tom Meyer

6th - 12th Grade Computer Science

Most schools are trying to teach Computer Science to improve their student's education. In this session, we will discuss different methods and share resources to help get anyone started.

**Attendees must bring a computer.**

# EXTENDED SESSION 4

12:30 - 2:40



## E2: EQUITY AND EXCELLENCE FRAMEWORK

Dr. Adrienne Coleman

6th - 12th Grade Equity and Diversity

Considering there is a national and global equity focused call to action, IMSA engaged in a process to institutionalize and operationalize Equity and Excellence to address educational inequities. This included policy development, capacity building to engage in equity work, an inclusive and comprehensive data collection methodology, data meaning making, as well as an equity and excellence plan and scorecard development. This presentation will provide participants with an understanding of educational equity, share tools to assist in drafting data-informed policy/plans, and provide a framework to score and measure progress in advancing equity. It will share how to approach equity and excellence in an inclusive manner, and how to confront any resistance that may arise from educational institutions prioritizing this work.



## CAN I PICK YOUR BRAIN? EXPLORATORY BRAIN DISSECTION

Dr. Nicole Ross, Jessica Amacher, and Desirae Klimek

9th - 12th Grade Science

Science labs, particularly dissections, are often confirmatory in nature, conducted at the end of learning to solidify and assess concept knowledge. What if we flipped the script on these labs and began with an exploratory version, instead? Participants will engage in an inquiry-based brain dissection, and explore ways to flip one of their current labs to encourage active exploration of concepts in their classroom. **This session includes an active dissection of a sheep brain.**

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## VISUALIZATION TOOLS AND ANALOGIES TO MODEL STRONG VS. WEAK ACIDS

Dr. Angela Ahrendt and Dr. Laura Kopff

9th - 12th Grade Science

We will present two different ways to introduce the difference between a strong acid and a weak acid. The first one uses a Phet simulation where the students can change different parameters in an inquiry based approach. The second one is a hands-on activity using a guided packet and manipulatives to model the differences between strong and weak acids. **Attendees must bring a computer.**

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## 6-12 MAKERSPACE

Grant Bell and Patrick Young

6th-12th Grade Science, Math, Integrated STEM, Technology

IMSA's Makerspace offers a variety of tools and equipment to advance teaching and learning in STEM and beyond. Educators will hear how different classes have utilized the makerspace to enhance learning. Participants will also have the opportunity to explore the different tools available learning how to use them and completing their own small projects. **This session is limited to the first 20 registrations.**

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## STATISTICS WITH THE AMAZING WEB-SLINGING SPIDER-MAN!!!

Dr. Brian Trainor and Paul Rummelhoff

6th - 12th Grade Math, Integrated STEM

An introduction to linear regression, prediction, and linear transformations featuring the Amazing Spider-Man!!! Students will collect data and create a linear model with the goal of predicting how much "web" Spider-Man will need to use in order to land safely on the ground. **Attendees must bring a computer.**



# SESSION 5

1:40 - 2:40



## WHY ARE THERE MICROSCOPES IN THE ART ROOM?

Joyce Symoniak

8th - 12th Grade Crossing Curriculum, Visual Arts, Math, Science

During this presentation we will explore how working cross curriculum enhances learning within the visual arts, science and mathematics. We will discuss how the visual arts curriculum can be created in order to bond with STEM courses for student success. Through exploration we will discuss how collaboration within these courses can be used to solidify cross curriculum understanding and learning. **Attendees are asked to bring a sample project or lesson.**

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## AN INTRO TO BIOMEDICAL RESEARCH FOR HIGH SCHOOL STUDENTS

Amogh Shetty and Allison Albert

9th - 12th Grade Math, Science, integrated STEM

While many biology courses explain the foundations of the subject in a textbook fashion, students are often not exposed to techniques used in modern biomedical research. This condensed 10-day program introduces common techniques and practices used in biomedical research through a multiple day hands-on lab experiment. Students learn to pipette, count cells, run a PCR (polymerase chain reaction), and perform other important skills as they investigate the genomes of yeast cells.

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## INTERNET CULTURE AND THE "T" IN STEM

Dr. Eric Rettberg

9th - 12th Grade Technology

How can a humanities class help students think about the role of technology in culture? In this session, I'll describe what happens when an English class puts the internet at its center and asks students to help each other understand the dynamic cultural landscape of the internet. I'll share model assignments and argue for a vision of digital literacy goes beyond information retrieval to encompass culture and expression.



## BUILDING COMPUTER SCIENCE CURRICULUM

Namrata Pandya

8th - 12th Grade Technology, Integrated STEM, Equity and Diversity, Engineering, Computer Science

When you are ready to implement a CS curriculum for your school/district, take stock of which teachers are available and interested. Because we don't expect our teachers to be computer science experts, we collaborate with our students and go on a learning journey. Students are often more tech-literate than educators, especially at the middle and high school level. I will share my learning journey with you and the approach we took in creating our curriculum for the courses that we offer at IMSA. **Attendees must bring a computer.**