**Professional Learning Day at IMSA: Close Encounters of the STEM Kind!**
**February 27, 2015**

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| **7:30-8:00 AM** | Check in, Coffee – Front Entry, Rear of Auditorium |
| **8:00-8:15 AM** | **Welcome** - Auditorium |
| **8:15-9:00 AM** | **Keynote Address - *Dr. Kai Ortman*** Auditorium |
| **9:00-9:15 AM** | Move to Morning Sessions |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| **9:15-10:15 AM** | **A-1** *Implementing Common Core in MS Math* **Togliatti** **Loc: A-151** | **A-2** *From Polynomial to Rational Functions* **Dover** **Loc: A-152** | **A-3** *Energy Conservation* **Schmidt/ Hawker** **Loc: B-133** | **A-4** *Ain't No Thing, Chicken Wing* **Minaya/ Darwish/ Richardson** **Loc: B-114/116** | **A-5** *Biology* **Traina** **Loc: A-200/202** | **A-6** *Alternative Energy* **Carlson/ Clancy** **Loc: A-207** | **A-7** *Motivational Issues in Science Classes* **Devol/ Thomas** **Loc: A-148** | **C-1** *Equilibrium* **Scarano/ White** **Loc: A-211/213** | **C-2** ~~*Problem-Based Mathematics: You Reap What You Sow*~~ ~~**Ross/Herlehy**~~ ~~**Loc: Tellabs**~~ Cancelled | **C-3** *Epidemiology* **Dosch/Randall** **Loc: B-108/109** | **C-4** ~~*Linear Programming*~~ ~~**Patankar/ Kammrath/ Tobin**~~ ~~**Loc: A-133**~~ Cancelled |
| **10:15-10:30** | ***Break – Move between sessions*** | | | | | | | | | | |
| **10:30-11:30 AM** | **B-1** *Pipelines* **Young** **Loc: B-110/111** | **B-2** *Statistics in Modeling* **Stalmack/ Krouse** **Loc: A-155** | **B-3** *Math Games* **Condie** **Loc: A-150** | **B-4** *Foods of the Future* **Minaya/ Darwish/ Richardson** **Loc:B-114/116** | **B-5** *Mentor Matching* **Naughton/ Heine** **Loc: A-147** | **B-6** *The Power of Water* **Patel** **Loc: B-145** | **B-7** *3D Printing* **McKenna/ Bergie** **Loc: B-148** | | | | |
| **11:30-12:30** | ***Lunch Break (1 Hour) On your own, or in Campus Cafeteria*** | | | | | | | | | | |
| **12:30-1:30 PM** | **D-1** *Building Stonehenge* **Young** **Loc: B-110/111** | **D-2** *The Fourth R* **Pandya** **Loc: A-152** | **D-3** *Java Programming* **Patankar** **Loc: A-133** | **D-4** *Particle Physics* **Dong** **Loc: A-200/202** | **D-5** *You are My Density* **Grublesky/ Martinez** **Loc: B-108/109** | **D-6** *Strong Structure by Design* **Minaya/Darwis h/ Richardson** **Loc: B-114/116** | **D-7** *Factors that Motivate STEM* **Coleman** **Loc: A-148** | **F-1** *Science and Warfare* **Kiely** **Loc: Pearson** | **F-2** *Is it all Just Random?* **Ross** **Loc: Tellabs** | **F-3** *Exploring NGSS Practices… Planetary Science* **Hawker** **Loc: B-133** | **F-4** *Quadratic Functions* **Herlehy/Togliatti** **Loc: A-151** |
| **1:30-1:45** | ***Break – Move between sessions*** | | | | | | | | | | |
| **1:45-2:45 PM** | ~~**E-1**~~ ~~*Growth of Uncertainty*~~ ~~**Martinez/ Phillips**~~ Cancelled | **E-2** *Pascal's Triangle* **Porzio** **Loc: A-155** | **E-3** *Science Vocabulary* **Grublesky** **Loc: B-108/109** | **E-4** *MS Science Activities* **Hurlbut** **Loc: A-150** | **E-5** *Kitchen Chemistry* **Thurmond** **Loc: A-211/213** | **E-6** *Aerodynamic Wing Design* **Minaya/ Darwish/ Richardson** **Loc: B-114/116** | **E-7** *Is There an App for That?* **Caster** **Loc: B-110** | | | | |

Math Science Engineering STEM Technology General

**A.M. 1 Hour Sessions**
**Sessions A1-7 9:15 to 10:15**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**A-1** **Implementing Common Core in Middle School Math** **A-151**
*Mathematics*, Grade Levels, 6-8
**Karen Togliatti**, Professional Field Services Staff
This session will focus on implementing Common Core Middle-School Mathematics Standards using student-centered activities. Participants will receive three hands-on activities (one each at grades six, seven, and eight) to take back to their classrooms.

**A-2** **From Polynomial to Rational Functions: Flip!** **A-152**
*Math*, Grade Levels, 11-12
**Ruth Dover**, Mathematics Faculty
Ah HA! Making the connection between polynomial functions, rational functions and using reciprocals! Join us to flip, not flop, with trig for your classroom.

**A-3** **Energy Conservation** **B-133**
*Science*, Grade Levels, Any
**Brooke Schmidt**, Science Faculty
**Eric Hawker**, Science Faculty
This session will focus on the content and different activities that you can do with your students to meet the Next Generation Physical Science Standard 3: Energy. The focus will be on definitions of energy, conservation of energy, and the relationship between energy and forces. The content is appropriate for both middle and high school science students.

**A-4** **"Ain't No Thing, Chicken Wing"** **B-114**
*Science*, Grade Levels, 5-6
**Carmela Minaya**, SSI Specialist
**Aziza Darwish**, Director of Statewide Student Initiatives
**Heather Richardson**, SSI Specialist
Participating teachers will simulate a deep cut on a chicken wing and suture it using similar techniques used in emergency situations. The chicken wing anatomy will be compared to the anatomy of a human arm. The session will provide teachers with the opportunity to introduce a low cost dissection activity into the classroom in a dynamic fashion.

**A-5** **Biology** **A-200**
*Science*, Grade Levels, Any
**Joseph Traina**, Science Faculty
Biology is a fascinating subject, but "textbook" biology is often perceived by students as being both boring and unimaginative. In this session, participants will be introduced to some simple strategies that can be used to enrich the biology curriculum in ways that will inspire and motivate students. These strategies are easy to implement and do not require large amounts of class time.

**A-6** **Alternative Energy** **A-207**

*Engineering*, Grade Levels, 11-12

**Dr. Mark Carlson**, Science Faculty

**Dr. Peter Clancy**, Science Faculty

We will describe how our newly-revised, month-long alternative energy unit in Engineering addresses the 4 NGSS standards. We will map the activities in our IMSA schedule to a traditional high school bell schedule. These activities address not only performance goals and the underlying scientific principles of power generation but also process skills relating to surveying technology, prioritizing criteria, and assessing societal impact. We will reflect on our first round of offering this unit and suggest modifications for future implementations.

**A-7** **Motivational Issues in Students Enrolled in Science Classes** **A-148**

*Science*, Grade Levels, Any

**Dave Devol**, Science Faculty

**Jay Thomas**, Aurora University Faculty

This session will examine data on differences in motivational constructs of IMSA students; more specifically, gender differences in motivation. We will briefly review data from science, English, and history studies and then have a small group discussion session examining specific questions.

**A.M. 1 Hour Sessions**
**Sessions B1-7 10:30 to 11:30**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**B-1** **Pipelines and Oil Spills!** **B-110**

*Math*, Grade Levels, 7-8

**Patrick Young**, Professional Field Services Staff

Don't miss this hands-on approach to middle school math. Participants will construct an actual pipeline from inexpensive materials and record evidence of leakage. They will then conduct an experiment and create a model relating liquid volume and spill area. They will apply their model to determine how much liquid leaked from their pipeline.

**B-2** **The "Roll" of Statistics in Modeling - It All Adds Up** **A-155**

*Math*, Grade Levels, 11-12

**Richard Stalmack**, Mathematics Faculty

**Janice Krouse**, Mathematics Faculty

The common core practice standards ask us to teach students to propose mathematical models and test their viability. Participants will do an experiment, collect data and use technological tools to combine modeling, analysis and basic statistics. Participants should bring a laptop, if possible; otherwise, bring a graphing calculator.

**B-3** **Mathematical Games, Puzzles, and Diversions** **A-150**

*Math*, Grade Levels, Any

**Steven Condie**, Math Faculty

Delve into the exciting world of math through games, puzzles and other sources! Participants shall try their luck and test their skill at these diversions. Participants will leave this session with a wealth of mathematical activities appropriate for students of all ages.

**B-4** **Foods of the Future** **B-114**

*Science*, Grade Levels, 5-6

**Carmela Minaya**, SSI Specialist
**Aziza Darwish**, Director of Statewide Student Initiatives
**Heather Richardson**, SSI Specialist

Teachers will learn the simple science behind the most recent culinary rage, Molecular Gastronomy. They will have a cost effective example to bring back into their classroom with students.

**B-5** **Mentor Matching Engine** **A-147**

*STEM*, Grade Levels, 11-12

**Jacki Naughton**, Online Education Specialist
**Carl Heine**, Program Director for IMSA Talent and CoolHub

Participants will tour the Mentor Matching Engine (MME), a robust platform available to Illinois high school students for conducting research with assistance from online mentors. IMSA, in partnership with the Illinois Science and Technology Coalition and Northwestern University, administer MME as part of the state's R&D Learning Exchange. In addition, participants will discover powerful models of personalized learning and the outstanding results.

**B-6** **The Power of Water** **B-145**

*Engineering*, Grade Levels 7-8

**Dhruti Patel**,

Get energized and quench your knowledge in this dynamic session which will include the basic introduction to hydro power generation! Participants will become knowledgeable about the concept of basic fluid dynamics and the potential energy stored in water, which converts to kinetic energy to mechanical energy to electrical energy.

**B-7** **3D Printing for the Next Generation Learners** **B-148**

*Technology*, Grade Levels, Any

**Britta McKenna**, Chief Innovation Officer
**Lawrence Bergie,** Chief Information Officer

Are you thinking about creating a Maker Space or purchasing a 3D printer for your school or classroom? Or are you just interested in seeing new technology up close and personal with the ability to ask questions to a maker space rookie and her sidekick the techno geek? Check out this lively session where we'll 3D scan something (or somebody) and print it out on our 3D printer, doodle with our 3D pens and ask all the practical questions (like how much does all this cost?) We'll share examples of how we are introducing new technology to our students, faculty and staff, bridging learning to the classroom and an early report out of our new student Maker Squad initiative.

**A.M. 2 Hour Sessions**
**Sessions C1-4 9:15 to 11:30**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**C-1** **Equilibrium** **A-211**

*Science*, Grade Levels, 11-12

**Deb Scarano**, Science Faculty
**Anita White**, Science Faculty

Find your balance in this hands-on lab session which will allow teachers to try out several simple lab activities that will enable students to better understand equilibrium.

**C-2** **Problem-Based Mathematics: You Reap What You Sow** **Tellabs**

*Math*, Grade Levels, 5-8

**Nicole Ross**, Professional Field Services Staff

**Lindsey Herlehy**, Professional Field Services Staff

Approach problem-based mathematics through a historical perspective! Join us to learn a fun, hands-on approach to examining the science behind crop rotation systems originally implemented during the Medieval Period. This activity requires students to mathematically evaluate the efficiency of a crop rotation system, strategically complete an integers-based crop puzzle, and evaluate crop yield and profit through data analysis. This activity integrates a variety of middle school mathematics.

**C-3** **Epidemiology** **B-108**

*Science*, Grade Levels, 9-10

**Don Dosch**, Science Faculty

**Crystal Randall**, Science Faculty

Epidemiology, the study of factors influencing the spread of communicable disease, has become a broadly discussed topic given the recent Ebola virus outbreak in western Africa. Participants in this session will work in the lab to model epidemiology and examine the results through a simple ELISA assay. We will discuss how to use data to identify original patients. Further, we will look at some in-class activities that highlight some well-established case studies in epidemiology (NGSS ESS3.A and LS2.C).

**C-4** **Linear Programming** **A-133**

*Math*, Grade Levels, 11-12

**Pat Patankar**, Mathematics Faculty

**Mark Kammrath**, Mathematics Faculty

**Caitriona Tobin**, Mathematics Faculty

Tired of the old paper and pencil linear way of thinking about linear programming? Join us for a hands-on demonstration of a new, FREE, way to solve the same linear problems using a graphing program called Winplot!

**P.M. 1 Hour Sessions**
**Sessions D1-7 12:30 to 1:30**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**D-1** **Building Stonehenge** **B-110**

*STEM*, Grade Levels, 9-10

**Patrick Young**, Professional Field Services Staff

Building Stonehenge is a series of problem centered activities in which students use simple machines to construct a scale replica of a Stonehenge Trilithon. Using only materials available to Neolithic engineers and a scaled quantity of force, students must devise a way to lift heavy stones into the proper position without ever touching them with their hands. Problem-centered activities are a great way to integrate multiple STEM concepts and practices into an enjoyable learning experience.

**D-2** **The Fourth R** **A-152**

*Computer Science*, Grade Levels, 11-12

**Namrata Pandya**, Mathematics/CS Faculty

What basic skills do kids today need to thrive in the 21st century digital age? In addition to the 3 R's of "reading", "riting", and "rithmetic", a student today needs a fourth R: "rithms", as in algorithms, or basic computational skills. IMSA has taken steps to expose all our students to this basic skill and has made a course in computer science, a requirement for graduation. How do we keep our advanced students interested in computer science? This year we introduced a course in cyber security and android apps development. We will walk through some of the topics that keep our students engaged in this class and discuss the online resources available for these topics.

**D-3** **Java Programming** **A-133**

*Computer Science*, Grade Levels, 11-12

**Pat Patankar**, Science Faculty

How to train your robot! Join us for a discussion about how we learn Java programming language by using the Lego NXT robotic kit. Participate in programming created to accomplish various robotic behaviors, such as playing music, drawing on the NXT LCD screen, and working with sensor (touch, sonar) inputs.

**D-4** **Particle Physics** **A-200**

*Science*, Grade Levels, 11-12

**Peter Dong**, Science Faculty

Particle physics is generally seen as far too difficult, too abstract and mathematical, to teach at the high school level — which is a pity, since particle physics is most likely to get students interested in the subject (witness the response to the discovery of the Higgs boson). However, the day-to-day work of experimental particle physicists is remarkably understandable, even for high school students willing to do a little work. We will examine assignments given at IMSA in this vein, including a class-wide analysis that simulated the search for a super symmetric Higgs boson, and discuss how they worked. Attendees will receive materials for these assignments for use as independent projects or group work.

**D-5** **You are My Density** **B-108**

*Science*, Grade Levels, 4-8

**Brian Grublesky**, Professional Field Services Staff

**Elizabeth Martinez**, Professional Field Services Staff

Teachers will explore the topic of density through a student-centered, constructivist approach that can be tailored to multiple grade levels. Discussion will include how to take a science activity and change it for different grade levels and abilities. Finally, we will discuss how to look at this through an interdisciplinary perspective.

**D-6** **Strong Structure by Design** **B-114**

*Engineering*, Grade Levels, 5-6

**Carmela Minaya**, SSI Specialist

**Aziza Darwish**, Director of Statewide Student Initiatives

**Heather Richardson**, SSI Specialist

Strengthen your pedagogy by learning how the monolithic dome, inspired by the shape of an egg, is one of the strongest existing architectural structures. They will go back to their schools with an inexpensive activity challenging student to make a 3D structure from a 2D picture, then combining several 3D structures to create a monolithic dome.

**D-7** **Exploration of Factors that Motivate Students to Engage in STEM** **A-148**

*Cross-Disciplinary*, Grade Levels, Any

**Adrienne Coleman**, Multicultural Education Specialist

Join in on the discussion of an exploration into factors that motivate gifted and talented Black and Latino students and programs being created to engage those populations in STEM fields.

**P.M. 1 Hour Sessions**
**Sessions E1-7 1:45 to 2:45**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**E-1** **The Growth of Uncertainty: One Grain of Rice** **B-110**

*STEM*, Grade Levels, 7-8

**Liz Martinez**, Professional Field Services Staff

**Dora Phillips**, Director of Statewide Educator Initiatives

This integrative session introduces bifurcation and the concept of exponential growth vs linear growth using math, literature, and technology. Join us to learn a fun, hands-on way to introduce iterations and exponents using a problem-centered approach. This activity asks students to predict, create a plan with a formula, test their plan, collect data, and compare their own plan to one from a literary story. Students will use excel as a tool to help.

**E-2** **Pascal's Triangle** **A-155**

*Math*, Grade Levels, 9-10

**Don Porzio**, Mathematics Faculty

In this session, we will explore unique and interesting ways in which Pascal's Triangle is connected to different areas in mathematics. Participants will walk away with deeper understanding of mathematical concepts.

**E-3** **Constructivist Science Vocabulary** **B-108**

*Science*, Grade Levels, 6-12

**Brian Grublesky**, Professional Field Services Staff

Instructors often grapple with the teaching of vocabulary. Well, in this dynamic session, participants will learn the constructivist approach to teaching science vocabulary. Session participants will walk away with new teaching strategies along with deeper appreciation for constructivist learning.

**E-4** **Developing Middle School Science Activities** **A-150**

*Science*, Grade Levels, 7-8

**Ron Hurlbut**, Science Faculty

This "hands on" session will equip Middle School Teachers to develop activities for their students which will produce high quality data that will be used to reveal Newton's laws of motion by using inexpensive materials and equipment such as stop watches and a meter stick.

**E-5** **Kitchen Chemistry** **A-211**

*Science*, Grade Levels, Any

**John Thurmond**, Science Faculty

If you can't take the heat… then good luck in this kitchen! We are serving up our finest recipes in this hands-on approach to illustrating chemical principals. We can only have so many cooks in the kitchen, so reservations are required!

**E-6** **Aerodynamic Wing Design** **B-114**

*Engineering*, Grade Levels, 5-6

**Carmela Minaya**, SSI Specialist

**Aziza Darwish**, Director of Statewide Student Initiatives

**Heather Richardson**, SSI Specialist

Teachers will walk away with an activity for their students that will utilize materials readily available for students to experiment with various aspects of aerodynamic wing design.

**E-7** **Is there an App for That?** **B-110**

*Technology*, Grade Levels, 7-8

**Ed Caster**, Professional Field Services Staff

This presentation will show a variety of different apps for tablets, smart phones, etc. that have educational uses. A number will be presented and demonstrated. Teachers who attend will also be asked to share apps that they use have found valuable, or simply ones that they like.

**P.M. 2 Hour Sessions**
**Sessions F1-4 12:30 to 2:45**

| SESSION NUMBER | SESSION DESCRIPTION | ROOM |
|---|---|---|

**F-1** **Dining at the Warlord's Banquet: Science and Warfare in Modern History** ***Pearson***

*Science/History*, Grade Levels, 7-12

**Rob Kiely,** History Faculty

This session will address the intricate connections between scientific discovery and military establishments in the 19th and 20th centuries. We will certainly examine the complex ways in which scientific change has revolutionized modern warfare, particularly with respect to varied technologies: weapons, materials, communications, and remote-sensing. However, we will also explore the experience of warfare as a driver of scientific discovery, particularly with respect to medical applications. Finally, we will consider how military priorities and financial support have affected the culture of scientific research, from the 19th century to the Manhattan Project and the Cold War.

**F-2** **Is it all Just Random?** ***Tellabs***

*STEM*, Grade Levels, 5-8

**Nicole Ross**, Professional Field Services Faculty

Students in middle school often learn basic genetics and gain experience using a Punnett Square analysis to determine probable genotype and phenotype outcomes for a family. What students may not learn is how these probabilities relate to the overall population. Probability is an integral part of genetics and heredity. Understanding what is meant by "probability" and how it applies to genetics is an important focus in the CCSS. One way to teach these concepts is to tap into popular literature. In this session, we will explore the genetics and probability behind the character, Auggie, in the book, *Wonder*, by R.J. Palacio.

**F-3** **Exploring NGSS Practices and Cross Cutting Concepts in a Planetary Science Project**

*Science*, Grade Levels, Any **B-133**

**Eric Hawker**, Science Faculty

Join us for an innovative session that will leave participants feeling "out of this world". Participants will actively engage in designing, operating, and analyzing the data from a simulated mission to another planet or moon in our solar system.

**F-4** **Quadratic Functions: As Simple As A, B, C** **A-151**

*Math*, Grade Levels, 8-10

**Lindsey Herlehy**, Professional Field Services Staff

**Karen Togliatti**, Professional Field Services Staff

Participants will engage in several hands-on, minds-on activities that demystify applications of quadratic functions. By exploring simple, yet interactive exercises, student will understand that this function is more than just a formula of a, b, and c. Participants will walk away with several lessons that can be easily adapted to any classroom. This session is appropriate for Grades 8-10.