

**Welcome** to the first STEM Education Summer Institute, STEM: Links to the Future. Thanks to the efforts of the sponsoring organizations, the NYS STEM Education Collaborative, and colleagues in education and industry, the program is extensive and diverse.

**What Should You Expect?** Since curriculum integration is key in our purpose for this conference, presenters will address integration of two or more STEM disciplines in their presentations. We want you to leave with useful suggestions, tips, and tools for STEM integration in your classroom.

We must thank our major financial sponsors, without whom the institute would not have become a reality. They include:

NEW YORK STATE UNITED TEACHERS

NEW YORK STATE TECHNOLOGY EDUCATION ASSOCIATION

ASSOCIATION OF MATHEMATICS TEACHERS OF NEW YORK STATE

SCIENCE TEACHERS ASSOCIATION OF NEW YORK

Thank you for attending this first STEM Education Summer Institute. We hope it has been a worthwhile, rewarding experience.

Sincerely,

*Jan Stark*

*Frank Sobrawski*

Co-Chairs  
NYS STEM Summer Institute

# NYS STEM Education Collaborative

## Mission & Goals

**Our Mission Statement:** To define STEM and the STEM disciplines in a fashion that will serve as a model for New York State and throughout the nation.

AMTNYS, ASEE, NYSSPE, NYSTEA and STANYS will work collectively and collaboratively to deliver STEM Education in the spirit and vision of the NYS MST Frameworks and Learning Standards. We must take this approach to skillfully and completely address the concerted state and national cry for STEM Literacy.

### Our Overarching Goals

- To transform the NYS MST Learning Standards into an effective and meaningful STEM Education Learning Standards delivery.
- To explore the possibility of holding a mutually supported STEM Education Collaborative Conference or Symposium by 2010 that will encourage and facilitate the sharing of successful and innovative classroom STEM practices by presenters representing AMTNYS, ASEE, NYSSPE, NYSTEA and STANYS.
- To carry forward our NYS STEM Education Collaborative foundational work with enlightening debate and constructive discussions through various means of communication and a (yet to be determined) conducive timeframe.
- To work together to ensure that accepted research and practice based STEM principles are applied in the development of revised or new MST Standards.
- To mutually support, connect and strengthen science, technology, engineering and math P-16 instruction. All three disciplines would still maintain their separate learning standards, integrity, scope and depth but would be delivered within a cross connected methodology.
- To influence support funding, school policy, teacher training and preparation methods, with our mutually envisioned STEM Education approach.
- To foster the modification of existing assessments, with changes in written language and references, to bring about STEM connections, without changing the primary purpose and thrust of each.

# INSTITUTE SCHEDULE

**7:30 – 8:30 Monday – Wednesday - Registration  
Continental Breakfast  
Wilber Hall**

## OPENING SESSION

Monday, August 9

8:30 a.m.

305 Park Hall

MODERATOR: Chuck Goodwin

## PANELISTS

William E. Dugger, Jr.

- Senior Fellow with the International Technology and Engineering Educators Association
- Former director of International Technology Education Association's Technology for All Americans Project, which resulted in *Standards for Technological Literacy: Content for the Study of Technology* and *Advancing Excellence in Technological Literacy: Student Assessment, Professional Development, and Program Standards*
- Emeritus professor of education and program area leader for technology education, Virginia Tech
- Past president of ITEA
- Past member, Phi Delta Kappa Board of Directors

Bob Hazen

- Consultant, Niagara University's Education Department and Western NY Education Services Council
- Turn-key trainer, NYSED Math Bureau, Technology Planning for Improving Schools Project, NYS Holography in the Classroom Project, Global Learning and Observations to Benefit the Environment Program
- Part-time Education Instructor Specialist for IBM
- Past president of Association of Mathematics Teachers of New York State
- Member New York State Association of Mathematics Supervisors, Western New York Mathematics Consortium, NYS STEM Education Collaborative

Can Isik

- Sr. Associate Dean, LC Smith College of Engineering and Computer Science, Syracuse University
- Professor, department of Electrical Engineering and Computer Science
- Research interests include controls and adaptive systems and their applications as indoor environmental systems, medical instrumentation, and robotics.
- Past associate chair of the EECS Department and director of programs in electrical engineering.

Michael Jabot

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- Professor of Science Education, State University of New York at Fredonia
- Director of the Institute for Research in Science Teaching and Great Explorations in Math and Science Center, SUNY Fredonia
- Serves on the National Expert Panel for Assessment of Common Core Standards and national Faculty of the National Science Research Center
- 2009 recipient of the Chancellor's Award for Excellence in Research from the State University of New York

James N. Baldwin

- District Superintendent Questar III
- Representative of New York Commissioner of Education to the school districts in Questar III's supervisory district
- Former executive deputy secretary of state for the State of New York
- Former corporation counsel for the City of Troy

Frank P. Roma, P.E.

- Staff Consultant, Sheppard T. Powell Associates LLC
- Member of New York State Society of Professional Engineers and NYS STEM Education Collaborative
- Employed by New York State Electric & Gas for 34 years overseeing water chemistry for power plants, developing cycle chemistry limits and procedures, training personnel, inspecting boilers, turbine condensers and deaerators.
- Co-authored *Colloidal Silica Removal by Anion Resin* and *Condenser Tube Live Extension without Re-tubing*

**Multiple Individual Sessions - Monday 10:45 – 4:00**

**Tuesday 9:00 – 4:00**

**Wednesday 9:00 – 11:45**

**Lunch - Noon – 1:00 Monday - Tuesday - Campus Center**

**Wednesday - Boxed Lunches - Wilber Hall**

**Banquet – Monday – Campus Center**

**Cocktails 5:30 p.m. Dinner 6:30 p.m.**

KEYNOTE SPEAKER:

Jack D. Hidary built his career as an entrepreneur in the finance and technology sectors and is currently focused on energy and transport technology and policy. Highlights of his career include:

- Co-founder, president, and CEO of EarthWeb/Dice
- Co-founder of Auto XPrize
- Co-architect of Cash for Clunkers program
- Chairperson of Smart Transportation
- Recipient of several industry and community awards
- Board member on several boards including National Renewable Energy Lab Advisory Council and National Lab Day

Hidary's work is featured by Tom Friedman in *Hot, Flat and Crowded* and several of Tom Friedman columns as well as in many other publications. Hidary is a frequent guest on BloombergTV and CNBC.

**Dinner – Tuesday 6:00– Campus Center**  
**Ice Cream Social – Tuesday 8:00 – Campus Center**

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**Session 1**

**Monday, August 9**  
**10:45 a.m. to noon**

**Opportunities in Engineering**  
**Marc Chiffert**

**Park Hall 304**

CAREER OPPORTUNITIES IN ENGINEERING

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**Building Geodesic Domes**  
**Linda Fusco**

**Park Hall 202**

Participants will learn how to construct models of geodesic domes and then explore how to create a full size geodesic structure at their school. The presentation will include how STEM is integrated into the dome building project.

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**Patterns to Algebraic Thinking: Effective Strategies for Making Connections**  
**Perry Gelakis**

**Wilber Hall 253**

Scaffold the development of algebraic thinking using technology, multiple representations of concepts, and problem solving to create a rich learning environment. CD and resource materials included.

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**Formative Assessments in the STEM Classroom**  
**Michael Jabot**

**Park Hall 101**

The session will present hands-on examples of formative assessment techniques that can be used to inform instruction in STEM classrooms. The discussion will focus on the use of probes; the use of a classroom response system as a data collection system will be discussed and demonstrated.

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**Using Model Hot Air Balloons to Teach any Subject**  
**James Kuhl**

**Rich Hall 219**

Learn about an exciting unit that uses model hot air balloons (HABs) to teach the application of basic concepts of science, math and engineering. Student construction and research about HABs enables integration of all subject areas including ELA, reading, and social studies.

**The STEM Academy—Establishing Engineering Habits of the Mind**

**Russell Mickelson**

**Rich Hall 220**

Learn how the STEM Academy engages all learners in STEM education, not just the top 15% of upper-classmen. Program scaffolds from K-12 and features discovery based courses (K-8) and mainline education to advanced courses for 9-12. Program maps to ITEA, ABET, NSTA, NCTM standards; features student certification and articulation with leading universities.

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**Creating an Nspired Learning Classroom**  
**Dana Morse**

**Rich Hall 221**

Get hands on and up close with the latest educational technology to enhance the classroom. Engage and challenge students to discover mathematical properties. Take away ready-to-go classroom lessons and activities.

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**Infusing Energy Education into Your Classroom**  
**Raymond Pitcher**

**Park Hall 301**

This program will give participants a taste of energy activities that can be used in their classrooms. It will introduce the participants to the courses that are offered by NYSERDA and to the materials that are available on line.

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**Evaluation of STEM Professional Development: What Have we Learned?**  
**Sara Silverstone**

**Rich Hall 223**

The Rochester STEM Teaching Institutes has been providing teachers high-quality PD across disciplines and grade levels since 2007. The Institutes employ a continuous improvement model, including rigorous evaluation and peer learning. Drawing from research literature and our experiences, we will share insights about what makes STEM PD truly effective.

**Fablab Modelmaker in the STEM Collaborative Environment**

**Olaf Trunzer**

**Park Hall 204**

The program addresses all four of the STEM disciplines: Science / Technology / Engineering / Math. We will be demonstrating the latest in ROBO Cutter and 3D printer technology interfaced with FabLab ModelMaker. We are the forefront of the STEM Initiative. Make sure you do not miss this session.

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**Combine Heat and Power—Algebra Problems, Technology, and Science**

**Patrick Witmer/Jean Hallagan**

**Wilber Hall 354**

This session will give a description of Combined Heat and Power (CHP) generation. Local and worldwide examples will be provided. A science lab will be demonstrated as well as many algebraic application problems for grades 8-10. Appropriate for advanced learners taking algebra, or those taking algebra over two years.

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**Session 2**

**Monday, August 9**

**1:00 p.m. to 2:15 p.m.**

**Marvelous Mars and Our Solar System**

**Marilou Bebak**

**Wilber Hall 352**

Teachers will make and take classroom materials. Inexpensive manipulatives for three activities involving astronomy and mathematics. 1) How Far Away? Use metric system to plot the size of our solar system. 2) I Have...Who Has...? Review 'game' for Mars facts. 3) Be a Mars Scientist! Investigate the surface of Mars.

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**Enabling 21<sup>st</sup> Century Science Education**

**Dot Brown**

**Park Hall 101**

Join us for this session and learn how to prepare your students for the future: 21st century science education using 21st century science methods and tools. Deliver authentic 21st century science experiences by combining standards-based content and relevant professional development with innovations in modern, electronic measurement.

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**Design and Engineer an Air-Droppable Survival Shelter      Park Hall 204**  
**for Extreme Winter Conditions**  
**Chuck Goodwin**

All STEM instructional areas are integrated into this Structures Case Study that centers on the design of an emergency survival shelter that can house five people for three days. Interior and exterior temperatures, R-Values, wind and snow loads, heat loss, air drop capability, ease of assembly, and transport need to be incorporated into the design.

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**Patterson's ActionLabs, CareerPlus, and CareerPlus2      Park Hall 304**  
**George Herman**

Paxton/Patterson's STEM learning systems are based upon engaging, collaborative, contextual project-based learning. They include significant career exploration and emphasize the development of "soft skills" necessary for success in postsecondary education and the workplace. Student performance can be tracked relative to specific standards

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**Balancing Linear Objects      Park Hall 301**  
**Ben Lindeman**

Stability is important to NASA scientists. Stable satellites are easier to keep in prescribed orbits. A tumbling satellite does not produce accurate images for use by scientists. In this session, participants will gain an understanding of center of mass (CM) and will find the CM for several linear objects.

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**How to be a Road Scholar      Wilber Hall 354**  
**Blair Madore**

Road Scholar is a popular event at middle and high school Science Olympics. In this hands-on workshop you'll learn everything you need to know to run a Road Scholar event. More generally you'll learn a lot about the science and math behind maps.

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**Example of Integrating Science, Technology, Engineering, and  
Mathematics through Aerospace  
Michael Nehring**

**Park Hall 202**

Come see an example of how two high school teachers successfully combined their expertise in engineering, mathematics, and technology to create an exciting integrated curriculum, developed around the book *Rocket Boys*. The presentation will also include a discussion about technology's natural role as a vehicle for curriculum integration.

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**The Magic of WWW.Geogebra.org  
Dani Novak**

**Wilber Hall 253**

As a teacher I found GeoGebra a most useful tool to teach mathematics and make it meaningful to students. By creating simulations, students are DOING the math and taking an active role in learning it. We will demonstrate examples and participants will take an active role.

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**Text and Tech: Broadening our Idea of Reading for Math and Science in the  
Digital Age  
Catherine Saldutti**

**Rich 219**

NYSTEA's call for 21st century students to "exhibit information literacy" and "demonstrate visual literacy" demands that we rethink the notion of "text" in the age of technology. To access information from and employ reading strategies with animations, numeric charts, interactive maps, databases, etc., students need strategies. Come learn some!

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**Session 2 - 3**

**Monday, August 9**

**Double Sessions**

**1:00 p.m. to 4:00 p.m.**

**(break 2:15 - 2:45)**

**Reading the Landscape East of Lake Ontario with Middle Grades Math  
Concepts**

**Rich Hall 221**

**Mark Hanok**

Participants will build actual weathervanes, then explore the landscape around the SUNY Oswego campus and use topographic maps. We'll discover interrelationships between local topography, micro-climates, and eco-systems, compare these characteristics to other regions of New York State, and connect these facts to key middle grades math concepts.

**Math with Apps to Computer Science and Technology that will Increase Student Understanding and Interest**

**Rich Hall 223**

**Jim Matthews**

Participants will solve problems in the areas of number systems, finite automata, recursion, functions, and graphs. For example, the automata problems will lead to the design of a vending machine. Exponents, logarithms, polynomials, slope, and rates of change are math areas that we will connect with. Material will apply to middle and high school.

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**Session 3**

**Monday, August 9**

**2:45 p.m. to 4:00 p.m.**

**What I Learned as an Elementary Science Coach**

**Park Hall 301**

**John Brinkman**

An overview of my transition from high school chemistry teacher to K-6 Elementary Science Coach in the Niagara Falls City School District. Presentation, including hands-on activities, represents the development of integrated Math, Science, ELA, and Technology inquiries.

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**What Cup Material holds Coffee the Hottest, the Longest?**

**Wilber Hall 117**

**Jane Cushman**

Using a temperature probe and a TI-84, we will collect data from various types of cup material (Styrofoam, ceramic, and paper) and hot water. We will analyze the data to determine whether Styrofoam, ceramic, or paper hold hot water hotter, longer.

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**Using Algebra Tiles from Polynomials to Factoring**

**Wilber Hall 352**

**Virginia Head**

Learn how to make factoring into a concrete visual experience for your students. Teachers will have a chance to explore algebra tiles and learn how to use them to show both algebraic multiplication and factoring.

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**Implementation of a Cooperative P-12 Outreach  
Component at Syracuse University/SCSD  
James Henderson**

**Park Hall 304**

In spring 2010 we piloted a formal cooperative learning jigsaw project that brings together undergraduate and graduate students with P-12 students in the development of stand-alone learning modules that a P-12 STEM teacher could easily incorporate into his or her curriculum. This presentation summarizes and analyzes progress and lessons learned.

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**Creating the Interactive Mathematics/Science Classroom  
Dana Morse**

**Wilber Hall 253**

Engage all learners and create a trusting community of learners in your classroom with educational technology. Assess student understanding during instruction; give all students a voice that can be seen instead of just being heard. Give students the power to demonstrate and lead the class from anywhere in the room. Take away ready-to-go lessons.

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**Mars Student Imaging Project  
Jean Pounder**

**Park Hall 101**

This session shares the Mars Student Imaging Project from Arizona State University and NASA, some of the specifics of the project, and one of the project's activities. The activity involves using algebraic measuring techniques to measure Martian features by using images from the THEMIS collection.

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**Using a Home Softener System to Demonstrate STEM Principles  
Frank Roma**

**Park Hall 204**

The goal of the presentation is to show the design of ion exchange equipment uses STEM. Using a softener as an example, we will look at hydraulic lift, ion exchange chemistry, vessel and flow design. This is meant to provide you the knowledge to develop your own activity.

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**Gears and Ratios**  
**Jan Stark**

**Park Hall 202**

When teaching the World of Technology students about gears and ratios, the students design and build a Sumo Bot Wrestler device. They utilize math skills when determining the ratio of the gears, science skills when determining what energy and forces are being applied, and technology skills when they are designing and building their Sumo Bots.

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**Applied and Industrial Mathematics for  
Middle and High School Outreach**  
**Peter Turner**

**Wilber Hall 354**

Contests can be a valuable motivator for introducing middle and high school students to applied mathematics and its integration with other sciences. This talk will introduce some of the competitions that are available. Opportunities for both professional development and for student-based activities will be presented.

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**Session 4**

**Tuesday, August 10**  
**9:00 a.m. to 10:15 a.m.**

**Integrating STEM into Classrooms using  
LEGO Robotics**  
**Tom Barrowman**

**Park Hall 304**

LEGO mechanisms that address all areas of STEM will be demonstrated. Software, specifically WeDo for elementary, Robolab for middle school and high school, and LavView for high school will be covered.

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**Creating a Team of Retired STEM Education  
Supervisors who will Improve Teacher Performance**  
**Neal Berkin**

**Wilber Hall 354**

This new evaluation system being considered by the Regents and Legislature is on the cusp and the sooner we begin to address the huge deficits we currently have in our teacher evaluation system, the better. Anyone involved in science education will benefit from this presentation.

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**A Model for Sustainable Expansion of FLL  
and FTC Programs From Tournament to Classroom  
James Carroll**

**Park Hall 101**

This presentation will discuss the Northern New York Robotics Institute's successful implementation of "Contest to Classroom" concept to date by leveraging the FIRST Logo League and Tech Challenge Programs. We will present best practices and hands-on demos of teacher-developed learning experiences and associated assessment results.

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**Math and Science Roots of Architectural Engineering  
Marc Chiffert**

**Park Hall 304**

Math and science concepts and their applications to the diverse aspects of architectural engineering from plumbing design, HVAC design, to foundation engineering and zoning. This session will provide a number of valuable examples that teachers can use to illustrate how math and science concepts are applied to buildings and construction projects.

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**How to Solve Problem-Solving for our Students  
Kim Loucks**

**Park Hall 301**

This session will explore problem solving's role in making learning a personal and emotional experience. Through problem solving, children make this important connection. The NYS MST Learning Standards are filled with ways in which teachers and students can engage in problem solving. Join us as we start solving some of YOUR problems.

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**Science Fairs give way to STEM Fairs with a 'Green Focus'  
Gwendolyn Maturo-Grasso**

**Park Hall 202**

Participants will receive templates to guide their students on a path of discovery and research, web links, shortcuts, and templates for judging panels. Not sure how to recruit judges? This will be covered, too. Every child deserves to have a chance to enter his or her ideas into a STEM competition.

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**Learning to use Large Sets of Light and Temperature Data**  
**Shawn Reeves**

**Wilber Hall 352**

Participants will review resources and methods for gathering wind and solar data and will practice analyzing it using free and inexpensive tools for the purpose of siting and predicting electric generation.

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**The Future of Fablab Modelmaker within the  
STEM Initiative**  
**Olaf Trunzer**

**Wilber Hall 253**

Apex Software has been deeply involved in the STEM initiative through high level meetings in Virginia and Hawaii. The result is “FabLab ModelMaker” which leads students from the design stage of 3D models on the computer to the final result: fabricating the models using the Graphtec Silhouette Cutter.

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**Session 4 - 5**

**Tuesday, August 10**  
**Double Sessions**  
**9:00 a.m. to noon**  
**(break 10:15 – 10:45)**

**Math and Movement**  
**Suzy Koontz**

**Rich Hall 221**

This session will focus on movements that will help students master math while simultaneously offering teachers and students an overall sense of well-being. Math and Movement is a kinesthetic, multi-sensory approach to teaching math that incorporates exercise, stretch, cross-body movements, and yoga. Come learn the Nines Twist and more!

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**Long Distance Airplanes**  
**Ben Lindeman**

**Rich Hall 223**

Participants will make paper airplanes and discover attributes of airplanes that increase flight distance. Students will “fly” their planes to obtain data which they will organize, display, and interpret. Participants will plan a Rescue-Mission game to learn about the four forces of flight: thrust, drag, lift, and gravity.

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**Improving Measurement Skills in Math and Science**  
**Victoria Williams**

**Rich Hall 219**

This hands-on workshop will actively engage you in science activities and collegial discourse while building measurement skills that meet both math and science standards. Play with clay, matchbox cars, cotton balls, straws, and other fun materials that push you to think about how measurement overlaps in both math and science.

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**Session 5**

**Tuesday, August 10**  
**10:45 a.m. to noon**

**Draw it, Write it, Own it. Expand your Toolbox to Reach Them All.**  
**Perry Gelakis**

**Park Hall 304**

Create an interactive student-centered approach to 'hook' students using manipulatives and technology that builds understanding from the concrete to the abstract. CD and support material provided.

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**The Science of Water Play with Children**  
**Carol Gross**

**Park Hall 301**

Make playing with water a science education for young children. This session explores buoyancy, density, displacement, absorption, evaporation, mixtures, solutions, surfactants, pressure, flow, measurement, volume, miscibility, saturation, solubility, suspension, dispersion, and more.

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**STEM Education – NYSED Perspective**  
**Will Jaacks**

**Park Hall 204**

This session will include a discussion related to the current NYS Learning Standards and STEM Education.

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**STEM not S.T.E.M.  
Michael Jabot**

**Wilber Hall 354**

This session will describe the use of an integrated STEM focused approach in elementary classrooms. The focus of this work is based on the use of engineering design principles as an umbrella concept for learning science—in particular physical science at the elementary level. Data showing the impact of this work will be shared.

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**The Ups and Downs of CO<sub>2</sub>: Using Mathematical Modeling  
to Explore a Real Scientific Data Set  
Catherine Saldutti**

**Park Hall 305**

This session marries authentic climate change data to differentiated instruction in the math classroom around linear and non-linear relationships. An additional approach uses Excel to create linear, quadratic, exponential, and radical math models to analyze the same data, compare accuracy across models, and make scientific predictions using evidence.

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**Using SSSNOW to Integrate Math, Science, Technology,  
and other Middle School Disciplines  
Scott Silverman**

**Wilber Hall 352**

Discover “cool” ways to take advantage of winter weather and engage your students without leaving school grounds! Inspired by the NASA *History of Winter* program, Project SSSNOW involves students collecting and synthesizing authentic snow data, while integrating math, science, technology, and other disciplines.

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**SMARTboard Fun  
Amy Stephenson**

**Wilber Hall 117**

SMARTboards allow us to provide a hands-on/interactive environment in our math classrooms. This session will demonstrate educational games that can be used to incorporate math/technology in an interactive environment. General SMARTboard activities will be enhanced with the use of Quia, Study Island, and School Dude.

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**Using Earth Systems Science Data in the  
Joseph Zawicki**

**Park Hall 202**

This project will address the use of NASA Earth system science datasets, interactive models, simulations, and educational resources for use in middle and high school classrooms. An interdisciplinary team creates web based learning progressions that will facilitate learning about Earth's rotation and revolution. Preliminary results will be shared.

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**SESSION 6**

**Tuesday, August 10  
1:00 p.m. to 2:15 p.m.**

**Building a STEM-Library Media Program Collaboration  
through the Lens of the SED SLMPE Rubric  
John Brock**

**Park Hall 301**

A view to fostering increased collaboration between STEM leaders and New York School Library Media Programs (LMP) through use of the newly revised SED School Library Media Program Evaluation rubric. Use of the student-focused 25 "Essential Element" rubric of the new paradigm of the LMP as an entrée to further STEM-LMP collaboratives.

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**Gate Keeping: Teaching Mathematics from a  
Multicultural Perspective  
Marcia Burrell**

**Park Hall 204**

How does one ensure the rigorous teaching of mathematics for all while preparing a diverse population for success in a STEM field such as mathematics? The use of technology to provide access to mathematics for all students is a way to increase the pipeline and provide multiple teaching perspectives for students who access topics differently.

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**Practice Based Evidence in the Implementation  
of STEM Education  
Michael Jabot**

**Wilber Hall 354**

As STEM education garners greater attention, it is important that new initiatives be introduced in a way that maximizes their effectiveness. This session will share data concerning the implementation of an integrated STEM approach including measures of fidelity of implementation and the use of developmental assessment to guide instruction.

**The Basic Mathematics of Fullerenes**  
**Yvette Monachino**

**Wilber Hall 352**

A carbon molecule in the shape of a soccer ball was synthesized in 1980 leading to a Nobel Prize. Mathematicians worked on classifying all mathematically possible carbon molecules and investigated the mathematical properties that might have chemical significance. The basic math underlying these structures is very accessible and interesting.

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**Joy of Math**  
**Beverley Mowatt-Plaskett**

**Park Hall 101**

Feel the excitement and enthusiasm build as you develop problem-based explorations using multi-sensory resources. Geometric applications will be the focus of this middle-school session.

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**Introduction to GeoGebra**  
**Dani Novak**

**Wilber Hall 253**

Theo Jansen is an amazing artist/engineer who breaks the boundary of what we think is possible. GeoGebra is amazing free software that has the potential to transform mathematics education. This presentation will introduce GeoGebra for folks who never saw it and demonstrate ways of how it can be integrated with the standard curriculum.

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**Reading Scientific Graphs**  
**Jean Hallagan**

**Park Hall 202**

Sample scientific graphs related to climate change will be presented. Then participants will surf to find a scientific graph of their choice and learn how to create a series of questions related to the graph that assesses students' ability to read and interpret scientific graphs. For middle grades science, math, and technology.

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**SUPPORT STEM EDUCATION IN NEW YORK!**

## **SESSION 6 – 7**

**Tuesday, August 10**  
**Double Sessions**  
**1:00 p.m. to 4:00 p.m.**  
**(break 2:15 – 2:45)**

### **Eternally Entangled Ellipses in STEM** **Bob Hazen**

**Rich Hall 221**

This presentation includes activities that help develop your students' Planetary Motion, Technical Drawing guides, the Ellipse as Conic Sections, and the Engineering Design Cycle. We will use: manipulatives, software, and a participant co-operative activity.

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### **Data Collection Activities that Connect** **Mathematics and Science** **Jim Matthews**

**Rich Hall 223**

In this session, participants will consider physical phenomenon, identify variables, form hypotheses, collect data, and analyze the data using appropriate grade level mathematics. For middle school level there will be emphasis on proportional reasoning and for high school it will be on algebra and geometry.

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### **Constructing and Using the 72-point Geoboard** **Eric O'Brien**

**Rich Hall 219**

Strengthen the technological, mathematical, and artistic skills of your students by teaching them to construct and experiment with a 72-point circular geoboard. Build your own board and indulge yourself in a series of explorations that unearth a veritable cornucopia of geometric theorems. Will anyone else ever offer you a cornucopia?

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### **The Mathematics of Vectors in Two and Three Dimensions** **Paul Schwiegerling**

**Rich Hall 220**

Applications of vectors will be presented for various topics in physics. The calculation of the magnitude of a resultant vector, the determination of a perpendicular vector to a plane, the dot product, and the cross product of two vectors will be presented mathematically.

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# **SESSION 7**

**Tuesday, August 10  
2:45 p.m. to 4:00 p.m.**

## **Structures in Science Douglas Borzynski**

**Wilber Hall 352**

The Buffalo Museum of Science, Buffalo Public Schools, Western New York Women's Fund, and University of Buffalo worked together in the summer 2009 to produce a unique summer program called Structures in Science (SIS). Intended for middle school girls, this program linked structures from nature (DNA, cell biology) to human made materials and biomimicry.

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## **Promoting Mathematics and Physics using Roller Coaster Design Kathleen Fowler**

**Park Hall 305**

We will present an overview of learning experiences focused on roller coaster design that integrate mathematics and physics for grades 6 – 12. This session will include some hands-on design aspects and ideas that can easily be implemented in the classroom or as part of an after school enrichment program.

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## **A Tool for Building the Instructional Capacity for Mathematics Perry Gelakis**

**Park Hall 304**

Teachers face many challenges. They need teaching strategies that integrate different resources including technology, manipulatives, and problem solving activities. Participants will receive a CD.

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## **STEM Activities in the Classroom Thomas Hayse**

**Wilber Hall 253**

Garden City has been integrating STEM Concepts into its technology program for the past two school years with great success. This presentation will demonstrate easy-to-use technology based resources for integrating physics into the research and design of a transportation system. Topics of software engineering and problem solving will also be covered.

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**A Merged Glimpse at MST Data**  
**Michael Jabot**

**Wilber Hall 354**

This session will focus on the analysis of a pooled data set representing middle level student's performance on statewide assessments addressing the Mathematics, Science, Technology Learning Standards. Particular focus will be given to items which touch on similar concepts/skills across disciplines.

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**How to Find and use Local Data to Construct  
Lessons on the Environment**  
**Sheila Meyers**

**Park Hall 202**

This presentation will provide an introduction on how to research and locate data sets to use when constructing lessons on graphing in MS Excel. Lesson plan ideas and packaged data sets will be presented as well as instruction on using Excel to produce a number of graphs on water chemistry, biology, and climate change indicators.

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**Implementing School District Wide  
SySTEMic Solutions to Improve Test Scores**  
**Sharon Vladutu**

**Park Hall 101**

We will explore the STEM-focused programs offered by PCS Edventures for K-12. The presentation will include research results demonstrating increases in Technology, Math, Self-esteem, etc. Hands-on activities and use of project-based inquiry and critical thinking processes.

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**Technology Enhanced K-12 Mathematics  
Experiences with an Engineering Focus**  
**Sergei Abramovich**

**Park Hall 204**

This presentation will demonstrate how engineering problems can be adapted for educational purposes at the pre-college level to increase students' interest in the STEM disciplines. The issue of integrating the 'E' component of STEM into teacher education programs will also be addressed.

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## **SESSION 8**

**Wednesday, August 11  
9:00 a.m. to 10:15 a.m.**

### **A STEM Approach to Bottle Rocketry Clark Greene**

**Wilber Hall 352**

Model rocketry has long been a staple of science and technology education. Despite obvious connections to STEM, how much purposeful application of math, science, and technology principles actually occurs? This presentation will carry you through an entire rocketry activity with significant and planned attention to math and science principles.

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### **Case Study for the Design of Autonomous Urban Housing Thomas Kubicki**

**Wilber Hall 354**

A turnkey presentation for an urban autonomous housing design activity for high school and college level applications. The design probe uses an embedded STEM content base and authentic application of technological literacy.

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### **10/10/10, Not Just Another Day Caryl Lorandini**

**Park Hall 204**

What better way to celebrate such a great date than with a METRIC themed day? Come learn about the activities our middle school team has planned. Use our ideas or create your own to have a school-wide celebration.

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### **Video Game Design Foundations John Marconi**

**Park Hall 301**

Video Game Design Foundations is a complete curriculum for introduction to video game design, providing theory, application, and software. STEM exercises in math and science as well as exercises in language arts and social science are described. Provide design activities that apply theory via software programs.

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**Educating Youth Through 21<sup>st</sup> Century Learning  
in Scratch  
Brandon Milonovich**

**Park Hall 202**

Today's youth require much more interaction in the classroom than previous generations. This session will show how and why to engage students in learning through Scratch, a computer programming language for children designed by MIT Lab. Scratch engages students in learning across the curriculum including math, science, and computer science.

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**A System of Systems: Coordinating Math and  
Science Vocabulary through the Grades  
Catherine Saldutti**

**Park Hall 304**

Technical vocabulary is a tool that supports mathematicians and scientists in communicating more efficiently. When building background knowledge in math and science, all students should have a framework from which to access and construct academic language. See our cross-curricular system and gain strategies for working with a diversity of students.

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**SESSIONS 8 – 9**

**Wednesday, August 12**

**Double Sessions**

**9:00 to noon**

**(break 10:15 – 10:45)**

**TEAMS, a 21<sup>st</sup> Century Renaissance: Connecting  
the Dots from STEM to all Disciplines  
Jim Brazell**

**Rich Hall 223**

Move from why to how with stories and team activities for teachers. TEAMS explores the role of innovation systems in the context of education and global change. Discover transdisciplinarity – moving within, among, and beyond the disciplines to innovate.

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**Math Buddy Program**  
**Suzy Koontz**

**Rich Hall 221**

The Math Buddy program teams older and younger students for the purpose of enhancing math ability in both groups, building community and allowing a student to improve his or her own math skills through teaching others. Students are trained to teach math using Math and Movement, which uses physical activity and fun to teach basic math skills.

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**STEM Career Academics: 21<sup>st</sup> Century**  
**Education for 21<sup>st</sup> Century Teachers**  
**Lisa Strahs-Lorenc**

**Rich Hall 219**

The goal of a career academy is to deliver the new 3 Rs – rigor, relevancy, relationships. Career Academies, a 40-year old program, demonstrates an interdisciplinary approach to education and connects to workforce readiness and economic development in a region. Ford PAS will be introduced.

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## **SESSION 9**

**Wednesday, August 11**  
**10:45 a.m. to noon**

**Sustainability and Teaching Algebra: Math**  
**Problems and CHP (Combined Heat and Power)**  
**Jean Hallagan - Patrick Witmer**

**Park Hall 204**

This session will give a description of Combined Heat and Power (CHP) generation. Local and worldwide examples will be provided. A science lab will be demonstrated as well as many algebraic application problems for grades 8 – 10. Appropriate for advanced learners taking algebra or those taking algebra over two years.

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**Can I Come Back Next Year? An Interdisciplinary**  
**Approach to Regional Summer School**  
**Kathy Hoppe**

**Wilber Hall 117**

During the Monroe 2 – Orleans BOCES Intermediate Level Regional Summer School Program, students are co-taught by a math and a science teacher using an interdisciplinary approach. Students are exposed to real world problems and participate in inquiry and engineering projects. Instructional technology is implemented throughout the program.



**21<sup>st</sup> Century Assessment for the STEM Classroom**  
**Michael Jabot**

**Wilber Hall 354**

With an increasing number of assessment opportunities available in electronic format, there is a need to help STEM teachers navigate this growing library. The session will spotlight opportunities and demonstrate their applications in classrooms. Additionally, tools for teacher-generated assessment taking advantage of technology will be shared.

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**Math in Action... Technology at Work**  
**Edward Kafrissen**

**Wilber Hall 253**

A program that combines basic logic math skills with various areas of technology. A student steps through 20 lessons, each lesson turns math logic into experiments that illustrate areas of technology such as solar energy, robot control, etc. No programming skills are used or needed, only basic math logic and an icon-based worksheet running on a PC.

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**Wind Energy Project for your STEM Classroom**  
**Andy Leuth**

**Park Hall 202**

Looking for wind energy projects with engineering challenges that students love to tackle? Using simple equipment you will learn a variety of methods on how to integrate wind energy into your STEM classroom. All attendees will receive a Basic Wind Turbine kit to explore these ideas back home.

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**Theo Jansen Sculptures in Geogebra**  
**Dani Novak**

**Wilber Hall 352**

Theo Jansen is an amazing artist/engineer that breaks the boundaries of what we think is possible. GeoGebra is an amazing software (free) program that does the same for mathematics education. This presentation will combine both and show how to build Jansen dynamic sculptures in GeoGebra hands on.

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**What's the Best Mathematical Model?**  
**Ray Siegrist**

**Park Hall 101**

Participants collect data by bouncing a ball, observing a pendulum, loading a spring with mass, and producing images with mirrors. Then, by using graphing calculators, they find an equation that models the data.

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